PLANT PATHOLOGY

1. Path 1101 Fundamentals of Plant Pathology (2 +1)

Theory

Plant pathology- Importance of plant diseases- Definition, Scope - Objectives- History of Plant Pathology-Term 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 parasiteswith 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, nomenclature, classification, key to divisions, sub divisions, orders and classes, reproduction, dispersal. 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 labequipments 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 fungal genera.Staining and identification of plant pathogenic bacteria.Transmission of plant viruses.Study of phanerogamicparasites.

Lecture schedule

Plant Pathology – introduction – importance of plantdiseases
History of Plant Pathology- International and Nationalimportance.

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, incubationperiod.

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 inplants

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 of fungi, methods of reproduction

Mid Term Examination

General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of the Division Myxomycota – *Plasmodiophora,Spongospora.*

General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of Sub DivisionMastigomycotinaS*ynchytrium*&*Physoderma*.

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

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

General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of Sub Division Zygomycotina. *Rhizopus*and*Mucor.*

General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of Sub Division Ascomycotina – *Taphrina&*yeasts

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

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

General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of Sub Division Basidiomycotina. - *Puccinia, Melampsora,Uromyces*.

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

General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of Sub Division Deuteromycotina - *Colletotricum, Alternaria, Cercospora, Pestalotia, BotryodiplodiaandDiplodia.*

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

Morphological Characters and classification of phytopathogenicbacteria.

Symptoms of bacterial diseases, mode of entry, reproduction andspread.

Virus – definition nature, properties, classification, virus – vectorrelationships.

Common symptoms of virus, viroid and phytoplasmal diseases ofcrops.

Characters of algal and phanerogamic plant parasites –symptoms.

Practical schedule

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

Common laboratory equipments andtechniques

Collection and preservation of plant diseasespecimen

Isolation of plant pathogens and pathogenicitytesting

Transmission studies for viral disease symptomexpression.

Microscopic slide culture, common media and mountants used inmycology.

Staining and identification of plant pathogenicbacteria

Study of characters , symptoms, host parasite relationships and systematic position of fungi belonging to DivisionMyxomycota.

Study of characters,symptoms, host parasite relationships and systematic position of fungi belonging to Sub Division Mastigomycotina*Pythium&Phytophthora.*

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

Study of characters, symptoms, host parasite relationships and systematic position of fungi belonging to Downy mildews *–Plasmopara&Peronospora*

Study of characters ,symptoms, host parasite relationships and systematic position of fungi belonging to Sub DivisionZygomycotina*Rhizopus*

Study of characters ,symptoms, host parasite relationships and systematic position of fungi belonging to Sub Division Ascomycotina*. Aspergillus Penicillum Saccharomyces & Taphrina*

Study of characters , symptoms, host parasite relationships and systematic position of fungi belonging to Powdery mildewfungi

Study of characters , symptoms, host parasite relationships and systematic position of fungi belonging to Rust Fungi and Smutfungi

Study of characters , symptoms, host parasite relationships and systematic position of edible macrofungi andfungi belonging to Sub Division.Deuteromycotina

Study of phanerogamic plantparasites.

Practical Examination

Suggested Readings

Agrios, G.N. 2005. *Plant Pathology*. (5 thEd.). Elsevier AcademicPress.882p.

Alexopoulos, C.J., Mims, C.W. and Blackwell, M. 2014. *Introductory Mycology* (4th Ed.).Wiley India Pvt Ltd.833p
Jayaraman, J. and Verma, J. P. 2002.*Fundamentals of Plant Bacteriology* (Reprint, 2015).Kalyani publishers, NewDelhi
Pelczar, M.J., Chan, E.C.S. and Krieg, N.R. 1986. *Microbiology*. Tata Mc Graw- Hill Publishing Company Ltd , NewDelhi.
Ravichandra, N.G. 2013. *Fundamentals of Plant Pathology*.PHILearning Pvt Ltd.639p.
Walkey, D. G. 1991. *Applied Plant Virology* (2nd Ed.). Springer,352p.
Webster, J. and Weber, R. W. S.2007. *Introduction to Fungi*.(3 rd Ed.).Cambridge University press.817 p.

2. Path. 2102 Principles of integrated plant disease management (1+1)

Theory

Categories of diseases; Introduction, history, importance, concepts, principles and tools of IDM; Economic importance of disease risk analysis.Epidemiology: Factors affecting disease development. Methods of detection and diagnosis of diseases.Principles and methods of plant disease management.Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Survey, surveillance and forecasting of diseases. Introduction to conventional fungicides and new generation fungicides for the disease management.Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics.Ecological management of crop environment.Development and validation of IDM module.Implementation and impact of IDM (IDM module and disease). Safety issues in pesticide uses. Political, social and legal implications of IDM. Case histories of important IDM programmesin cereals, vegetables, pulses, tuber crops,spices and plantation crops andornamentals.

Practical

Methods of diagnosis and detection of various plant diseases, Methods plant disease assessment. Assessment of crop yield losses, calculations based on economics of IDM, Identification of biocontrol agents.Mass multiplication of *Trichoderma, Pseudomona*s sp. Cultural methods (soil solarization).Physical methods, Planning and implementation of IDM of selected diseases. Nature and damage of important diseases and their management, Assessment of diseases, crop monitoring and planning of preventive strategies, Study of fungicides and their formulations. Methods of pesticide application and their safe use. Calculation of fungicide sprays concentrations**.** Awareness campaign at farmer's fields.

Lecture schedule

Introduction - Losses caused by plant diseases - Importance and history of integrated disease management
Epidemiology of crop diseases - Weather, Pathogen and Host factors and their role in crop diseaseepidemics
Survey & surveillance - Disease assessment - Forecasting - Disease modelling - Economic importance of diseases riskanalysis.
Principles of crop disease management - Importance; General Principles - Avoidance - Exclusion -protection

Plant Quarantine and Inspection - Rules andRegulations

Cultural control - Roguing, eradication of alternate and collateral hosts, crop rotation, mixed cropping manure and fertilizer management. Sanitation, hot weather ploughing, soil amendments, time of sowing, seed rate and plant density, irrigation anddrainage.

Physical Methods – soil solarization, heat treatmentetc.

Biological control - Role and mechanisms of biocontrol agents andPGPR.

Mid Term Examination

9-13. Chemical methods –Fungicides –classification – chemical groups of fungicides – inorganic, organic, systemic, antibiotic etc., Mode of actions - Methods of application of fungicides – seed, soil, foliar spray, post harvest treatment, root feeding etc. - Fungicide formulations – Characteristics of an ideal fungicide. Compatibility and phytotoxicity of fungicides - New generationfungicides.

Plant disease resistance – types of resistance – vertical and horizontal – Defense mechanism in plants – Structural and Biochemical (pre and post- infection)cross-protection

Biotechnological approach in plant disease management – tissue culture – somaclonal variation, transgenic plantsetc.

Integrated plant disease management (IDM) – Concepts, advantages and importance. Ecological management of cropenvironment.

Development and validation of IDM module, Implementation and impact of IDM - Political, social and legal implication ofIDM.

Case studies of important IDM programmesin cereals, vegetables, pulses, tuber crops, spices and plantation crops andornamentals

Practical schedule

Proving Koch'spostulates

Diagnosis and detection of plantdiseases

Assessment of diseases – grading, score chart – diseaseindex.

Screening of varieties for resistance to plantdisease

Disease indexing for early detection of virusdiseases.

Familiarization with different groups offungicides.

Preparation of Bordeaux mixture, Bordeaux paste and cheshunt compound, phytotoxicity of fungicides

Preparation of fungicidal spray solutions- methods of application of fungicides – spraying and soil drenching.

Seed treatment with systemic and contact fungicides; Root feeding, post harvesttreatment.

Bio-assay of fungicides – poisoned food technique, inhibition zone technique and slide g erminationtechnique

Bio-control of plant pathogens – dual culture technique and *in- vitro*testing

Methods of mass multiplication of *Trichoderma* sp and *Pseudomonas*sp.

Solarisation for management of soil borne pathogens; Demonstration of physical methods for crop diseasemanagement

Preparation and application ofbotanicals

Familiarization with plant protectionequipments.

Visit to Plant Quarantine Station, Remote sensing laboratory and Tissue culturelaboratory

Development of IDM of any one disease of field / vegetable / horticultural crops (practical assignment)

Practical Examination

Suggested Readings

Agrios, G.N. 2005.*Plant Pathology* .Academy Press. NewYork.

Dasgupta, M.K. 1998. *Principles of Plant Pathology*. Allied Publishers Pvt. Ltd.Bangalore

Gupta, G.P. 2004. *Text Book of Plant Diseases*.Discovery Publishing House. NewDelhi

Gupta, V. K. and Sharma, R.C. 2011.*Integrated Disease Management and Plant Health*.ScientificPublishers

Maloy,O.C. 1993.*Plant Disease control. Principles and Practice*. John Wiley and Sons.Inc,

NewYork
Mehrotra, R.S. 1980. *Plant Pathology .*Tata Mc. Graw Till Publ.Co., , NewDelhi.

Nene,Y.L. and Thapliyal, P.N. 1998. *Fungicides in Plant Disease Control*. Oxford and IBH NewDelhi
Prakasam,V., Reguchander,T. and Prabakar,K. 1998. *Plant diseases management*. A.E. Publication,Coimbatore.
Singh. R.S. 2002. *Introduction to Principles of Plant Pathology*. Oxford and IBH Publishing, NewDelhi.

3. Path.2203 Diseases of crops and their management I(2+1)

Theory

Symptoms, etiology, disease cycle and management of major diseases of following crops: Field crops Rice: blast, brown spot, bacterial blight, sheath blight, sheath rot, foot rot, false smut, khaira and tungro;

Maize: stalk rots, downy mildew, powdery mildew, leaf spots, rust; Sorghum: smuts, grain mold and anthracnose, downy mildew, powdery mildew, rust, leaf spots; Bajra: downy mildew and ergot; powdery mildew, leaf spots, rust; Wheat: rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and ear cockle; Finger millet: Blast and leaf spot; Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and PokkahBoeng; Cotton: anthracnose, vascular wilt, and black arm; Tobacco: damping off, black shank, black root rot and mosaic, leaf curl; Groundnut: early and late leaf spots, root rot, viral diseases, wilt; Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic; Sunflower:Sclerotinia stem rot and Alternaria blight; Castor: Phytophthora blight; Pea: downy mildew, powdery mildew and rust; Pigeonpea: Phytophthora blight, wilt and sterility mosaic; Black & green gram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic; Gram: wilt, grey mould and Ascochyta blight; Lentil: rust and wilt; Vegetable Crops:Cruciferous vegetables: Club root, Alternaria leaf spot, black rot, damping off, downy mildew, black leg, black rot, head rot and leaf blight; Mustard:Alternaria blight, white rust, downy mildew and Sclerotinia stem rot; Potato: late blight, early blight, wart, black scurf, bacterial wilt, viral diseases; Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Chillies: anthracnose and fruit rot, wilt and leaf curl, mosaic; Okra: Leaf spot, Yellow Vein Mosaic; Beans: Anthracnose and bacterial blight; Tapioca: leaf spot, sett rot, tuber rot, bacterial wilt, mosaic; Colocasia, Yams, Amorphophallus:Phytophthora blight; Cucurbits: downy mildew, powdery mildew, wilt, leaf spot, viral diseases; Onion and garlic: purple blotch, and Stemphylium blight; Amaranthus& leafy vegetables: white rust, leaf blight; Coriander: stem gall; Post harvest diseases in field and vegetable cropsetc.

Practical

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

Lectureschedule

Introduction to the study of crop diseases – economic importance of crop diseases-symptoms causal agents - disease cycle –management.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Rice- blast, sheath blight, sheathrot.

Economic importance, symptoms, causal organisms, epidemiology and management of other diseases of Rice - brown spot, false smut, udbatta , foot rotetc.

Bacterial diseases of Rice – Bacterial Leaf Blight and bacterial leaf streak;Viral and phytoplasmal diseases-tungro, grassy stunt, yellow dwarf and ragged stunt ;mineral deficiencydiseases.

Economic importance, symptoms, causal organisms, epidemiology and management of Wheatrusts.

Economic importance, symptoms, causal organisms, epidemiology and management of smuts and bunts, powdery mildew, Alternaria leaf blight, and tundu ofWheat.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of millets - Sorghum- rusts, smuts, downy mildew, sugary disease, charcoal rot, anthracnose, blight, leaf spot andstriga.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Maize- smuts, downy mildew, rust, stalk rot and leafspot.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Bajra- rusts, smuts, downy mildew andergot.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of minormillets.

Diseases of legumes -economic importance, symptoms, causal organisms, epidemiology and management of diseases of Pigeon pea – Phytophthora blight, wilt, sterility mosaic and dry rootrot.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Red, Black, Green and Bengal gram - Dry root rot, rust and mosaic; gram – wilt, grey mold and Ascochyta blight; lentil – rust andwilt.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of oil seeds - Groundnut- early and late leaf spot, rust, Sclerotium stem rot, aflaroot disease.

Economic importance, symptoms, causal organisms, epidemiology and management of Groundnut - crown rot, seedling rot, seedling blight, pod rot and viraldiseases.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of diseases of Sunflower – Sclerotium stem rot, rust, Alternaria blight and headrot.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Sesamum - leaf spots and leaf blights, powdery mildew andphyllody.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Castor – seedling blight; Mustard – white rust, downy mildew, Sclerotium stem rot, Alternaria blight and bacterialrot.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Soybean- Rhizoctonia blight, pod blight, seed rot, bacterial pustule, seedling blight and mosaic.

Mid Term Examination

Economic importance, symptoms, causal organisms, epidemiology and management of fungal diseases of Sugarcane – red rot, whip smut, wilt and pineappledisease.

Economic importance, symptoms, causal organisms, epidemiology and management of Sugarcane - ratoon stunting, grassy shoot, gummosis and other bacterialdiseases.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Cotton - wilt, root rot, anthracnose, grey mildew, black arm and leafcurl.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Tobacco – damping off, black shank, frog eye spot and wildfire.

Economic importance, symptoms, causal organisms, epidemiology and management of fungal diseases of Potato – late blight, early blight, wart, black scurfetc.

Economic importance, symptoms, causal organisms, epidemiology and management ofPotato brown rot and other bacterialdiseases.

Economic importance, symptoms, causal organisms, epidemiology and management of

diseases of Potato viraldiseases.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Brinjal - Phomopsis blight and fruit rot, Sclerotiniablight, bacterial wilt, and phyllody.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Chillies – anthracnose, damping off, bacterial and viraldiseases.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Bhindi – leaf spot, powdery mildew and yellow veinmosaic.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Tomato- damping off, late blight, early blight, fruit rot, fungal and bacterial wilt, viral and phytoplasmaldiseases.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Cucurbits – damping off, downy mildew, powdery mildew, anthracnose, and fruit rot, wilt, viral and phytoplasmaldiseases.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Cowpea and Beans – collar rot and web blight, Fusarium wilt, rust, powdery mildew, anthracnose and Sclerotiumblight.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Crucifers - damping off, downy mildew, black leg, black rot, head rot and leaf blight.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of onion- smut, smudge, Alternaria blight, anthracnose; leafy vegetables / amaranthus –white rust and Rhizoctonia leafblight.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Tuber crops – Cassava – mosaic, bacterial wilt, leaf spots, sett rot, tuberrot.

Economic importance, symptoms, causal organisms, epidemiology and management of diseases of Sweet potato&other tuber crops – wilt and viral diseasecomplex.

Post harvest diseases in vegetables and fieldcrops.

Practical schedule

Field visits, survey and collection of diseasesamples.

Preservation of diseasespecimens.

3-4. Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases ofrice.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of wheat.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of sorghum andmaize.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of bajra and othermillets.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of groundnut, sunflower andsesamum.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of castor, mustard andsoybean.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of redgram, greengram, blackgram, bengalgram, beans and vegetablecowpea.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases ofcotton.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases oftobacco.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases ofpotato.

Study of symptoms, etiology, host-parasite relationship and specific control measures of

diseases of solanaceousvegetables.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of bhindi andamaranthus.
Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of Crucifers andCucurbits..
Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of Tuber crops andtea.
Practical Examination

Note: Collection and preservation of plant diseased specimens for Herbarium. Students should submit 50 pressed and well-mountedspecimens.

Suggested Readings

Agrios, G.N. 2005. *Plant Pathology.*Academy Press. NewYork.
Gupta, G.P. 2004. *Text Book of Plant Diseases*. Discovery Publishing House. NewDelhi
Gupta, V.K.and Paul, Y.S.2001. *Diseases of Vegetable Crops*. Kalyani Publishers, NewDelhi - 110 002
Koike. S.T., Gladders, P. and Paulus,O. A.2006. *Vegetable Diseases - A Color Handbook*. Academy Press. NewYork.
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Nair, M.C. and Menon , M.R. 1985. *Diseases of Crop Plants in Kerala*. Kerala Agricultural University
Peethambaran, C.K., Girija, V.K., Umamaheswaran, K, and Gokulapalan,C. 2008. *Diseases of Crop plants and their management*.Kerala AgriculturalUniversity.
Prakasam, V. Valluvaparidasan.V., Raguchander, T., Prabhakar, K. and Thiruvudainambi.S 1997.*Field Crop Diseases*, A.E publication,Coimbatore.
Ramakrishnan, T. S. 1971. *Diseases of Millets*.Indian Council of AgriculturalResearch.
Rangaswami.G. 1987. *Diseases of Crop plants in India.* Prentice Hall of India Private Ltd. NewDelhi.
Raychaudhuri, S.P. and Verma, J.P. 1984/86/88. *Review of Tropical Plant Pathology*. Vol.1, 2 & 5. Today and Tomorrow's Printers and Publishers, NewDelhi.
Rivka Barkai-Golan. 2001. *Postharvest Diseases of Fruits and Vegetables: Development and Control.* Elsevier B.V. USA.
Sharma, P. D. 2001. *Plant Pathology.*Rastogi publications, Shivaji Road,Meerut.
Singh, R. S. 1995. *Diseases of Vegetables Crops*.Oxford and IBH PublishingCo.
Singh, R.S. 1990. *Plant Diseases*. Oxford & IBH PublishingCompany
Singh.R.S. 2001.*Plant disease management*.Oxford and IBH NewDelhi.
Thind T. S. 2005. *Diseases of field crops and their management*.Daya Books, NewDelhi.

4. Path.3104 Diseases of crops and their management II(2+1)

Theory

Symptoms, etiology, disease cycle and management of following diseases: Coconut: wilt and bud rot; Root (wilt), bud rot, leaf rot, grey leaf blight, Foot rot, stem bleeding, cadangcadang disease, lethal yellowing; Arecanut: Mahali, foot rot, Stem bleeding, inflorescence die back, yellow leaf disease, nursery diseases, nutritional disorders, Oil palm: nursery diseases, crown diseases, root and trunk diseases, bud rot, sudden wilt; Cocoa-black pod rot, Monilia pod rot, Botryodiplodia pod rot, other pod rot diseases, Cushion gall disease, witches broom, wilts, root disease , cherelle wilt , swollen shoot; Rubber: Abnormal leaf fall, powdery mildew, stem diseases, root diseases; Tea -Blister blight, grey blight, thread blight, brown blight, birds eye spot stem and root diseases; Coffee: rust, leaf spots, coffee berry diseases, root and stem diseases, die back; Cardamom:azhukal/ capsule rot and

clump rot, Katte and other viral disease, other foliar diseases, nursery diseases; Black pepper: foot rot, slow wilt, pollu disease, bacterial leaf spot ,viral and phytoplasmal diseases; Betel vine: foot rot, anthracnose,bacterialleafspot;Ginger:softrot,leafspot,threadblightandbacterialwilt;Turmeric:

leaf blotch, leaf spot, rhizome rot and root rot; Clove: slow decline, root diseases, leaf blight, die back, leaf spot diseases, leaf blotch; Cinnamon: leaf blight, leaf spot, leaf blotch and die-back symptoms, root diseases; Nutmeg and vanilla: leaf spots, fruit rot and root diseases.Banana: Panama wilt, Moko wilt; Viral diseases-Bunchy top, Mosaic, heart rot, infectious chlorosis and Kokkan, postharvest diseases; Mango: malformation, anthracnose, powdery mildew, die back, pink disease, sooty mould, red rust, black tip; deficiency diseases; post-harvest diseases; Cashew: powdery mildew, anthracnose, damping off, pink disease, sooty mould and inflorescence blight; Grapevine- downy mildew , powdery mildew, anthracnose, black rot, foot rot, dead arm, rust, bacterial viral and phytoplasmal diseases; Citrus: gummosis, leaf fall and fruit rot, scab, pink disease, powdery mildew, root rot , felt disease, sooty mould, citrus canker, tristeza, greening and exocortis, post harvest diseases; Pineapple- fruit rot/ basal rot/heart rot, wilt and leaf spot; Jack: pink disease, immature fruit rot and post harvest diseases; Papaya: stem/foot rot, leaf spot, mosaic, leaf curl, post-harvest diseases; Pomegranate: foliage, stem, fruit and root diseases; Sapota: leaf spot, flat limb, fruit rot; Guava: wilt, canker, dry rot, leaf spot, seedling blight, post harvest diseases; Mulberry-foliar diseases, stem and root diseases; Apple: scab, powdery mildew, root rot, collar rot, black rot, fire blight, mosaic, post harvest and non parasitic diseases; Rose - black spot, powdery mildew, rust, dieback, blight, leaf spot, anthracnose, bacterial leaf spot and viral diseases; Foliar and flower diseases of Orchids, Anthurium, Dahlia, Chrysanthemum &Jasmine.

Practical

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

Lecture schedule

Introduction to the study of diseases of horticultural crops, economic importance, symptoms, causal agents, disease cycle,management.

Diseases of coconut, Root (wilt) disease, economic importance, distribution and symptoms on crown and roots, etiology, disease cycle and integrated management of Root (wilt) disease of coconut.

Economic importance, symptoms, cause, disease cycle and integrated management of bud rot, leaf rot, grey leaf blight ofcoconut.

Economic importance, symptoms, cause, disease cycle and integrated management of Foot rot and stem bleeding, cadangcadang disease, lethal yellowing and other diseases of unknown etiology ofcoconut.

Economic importance, symptoms, cause, disease cycle and integrated management ofdiseases ofarecanut- Mahali, foot rot, Stem bleeding, inflorescence dieback.

Economic importance, symptoms, cause, disease cycle and integrated management of yellow leaf disease of arecanut, nursery diseases, stembreaking.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of oil palm, nursery diseases, crown diseases, root and trunk diseases, bud rot, sudden wilt and other diseases of oilpalm.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of cocoa- black pod rot, Monilia pod rot, Botryodiplodia pod rot, other pod rot diseases.

Economic importance, symptoms, cause, disease cycle and integrated management of

Cushion gall disease, witches broom, wilts, root disease, cherellewilt , swollen shoot ofcocoa.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of rubber -Abnormal leaf fall, powdery mildew, stem diseases, rootdiseases.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of tea -Blister blight, grey blight, stem and rootdiseases.

Economic importance, symptoms, cause, disease cycle and integrated management of Thread blight, brown blight ,birds eye spot of tea.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of coffee - foliar diseases -rust and leafspots.

Economic importance, symptoms, cause, disease cycle and integrated management of coffee berry diseases, root and stem diseases, dieback.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of cardamom- azhukal/ capsule rot and clumprot.

Economic importance, symptoms, cause, disease cycle, transmission and integrated management ofKatte and other viral disease ,other foliar diseases,Nurserydiseases.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of black pepper- foot rot and slowwilt.

Economic importance, symptoms, cause, disease cycle and integrated management of Polludisease , bacterial leaf spot ,viral and phytoplasmaldiseases.

Mid Term Examination

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of betel vine- foot rot, anthracnose, bacterial leafspot.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of ginger - soft rot, leaf spot, thread blight and bacterialwilt.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of turmeric, leaf blotch, leaf spot, Rhizome rot and rootrot.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of clove - slow decline, root diseases, leaf blight, die back, leaf spot diseases, leaf blotch

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of cinnamon - leaf blight, leaf spot, leaf blotch and die-back symptoms, root diseases.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of nutmeg andvanilla - leaf spots, fruit rot and rootdiseases.

Economic importance, symptoms, cause, disease cycle and integrated management of wilt diseases of banana- Panama wilt, Moko wilt; Viral diseases-Bunchy top, Mosaic, heart rot, infectious chlorosis andKokkan

Economic importance, symptoms, cause, disease cycle and integrated management ofpost harvest diseases - Anthracnose, crown rot, black spot, pitting diseases, cigar end rot and pink mould rot.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of mango- mango malformation, anthracnose, powdery mildew, die back, pink disease, sooty mould, red rust, black tip; deficiency diseases; post-harvest diseases - Diplodia stem end rot, anthracnose, soft rot, Black mould rot and Alternariarot.

Economic importance, symptoms, cause, disease cycle and integrated management ofdiseases of cashew - powdery mildew, anthracnose, damping off, pink disease, sooty mould and inflorescenceblight.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of grapevine- downy mildew , powdery mildew, anthracnose, black rot, foot rot, dead arm, rust, bacterial viral and phytoplasmaldiseases.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of citrus-gummosis, leaf fall and fruit rot, scab, pink disease, powdery mildew, root rot , felt disease, sooty mould, citrus canker, tristeza, greening and exocortis, post harvest diseases.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of pineapple- fruit rot/ basal rot/heart rot, wilt and leaf spot; diseases of jack-pink disease, immature fruit rot and post harvestdiseases.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of papaya- stem/foot rot, leaf spot, mosaic, leaf curl, post- harvest diseases. Diseases of pomegranate and ber - foliage, stem, fruit and rootdiseases.

Economic importance, symptoms, cause, disease cycle and integrated management of diseases of sapota- leaf spot, flat limb, fruit rot; Diseases of guava, wilt, canker, dry rot, leaf spot, seedling blight, post harvestdiseases.

Diseases of mulberry-foliar diseases, stem and root diseases. Economic importance, symptoms, cause, disease cycle and integrated management of diseases of apple-scab, powdery mildew, root rot, collar rot, black rot, fire blight, mosaic, post harvest and non parasiticdiseases.

Diseases of rose - black spot, powdery mildew, rust, dieback, blight, leaf spot, anthracnose, bacterial leaf spot and viraldiseases.

Diseasesoforchidsandanthurium.Economicimportance,symptoms,cause,disease cycle and integrated management of diseases of dahlia, chrysanthemum &jasmine.

Practical schedule

Field visits, survey and collection of diseasesamples

Preservation of diseasespecimens

3-4. Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases ofcoconut

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of arecanutand oilpalm

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases ofcocoa

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases ofrubber

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of tea andcoffee

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases ofcardamom

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases ofblack pepper,betelvine

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of ginger,turmeric

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of tree spices andvanilla.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of Banana

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of mango and cashew

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of sapota, jack, pomegranate andber.

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of grapevine citrus, pineapple, papaya

Study of symptoms, etiology, host-parasite relationship and specific control measures of diseases of, apple,mulberry, rose, orchids and anthurium, dahlia, chrysanthemum &jasmine

Practical Examination

Note: Collection and preservation of plant diseased specimens for Herbarium. Students should submit 50 pressed and well-mountedspecimens.

Suggested Readings

Agrios, G.N. 2005. *Plant Pathology.*Academy Press. NewYork.

Bavappa. K.V.A., Nair M. K. and Premkumar, T. 1978. *The Arecanut palm*. CPCRI, Kasargod.

Elsevier B.V. USA.

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Gupta, G.P. 2004. *Text Book of Plant Diseases*. Discovery Publishing House. New

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Lucknow.

Mehrotra, R.S. 1980. *Plant Pathology*.Tata Mc. GrawTillPubl.Co., NewDelhi.

Nair, M. C. and Menon, M. R. 1983. *Disease of crop plants of Kerala*, Kerala Agricultural University Press,Mannuthy.

Pathak, V.N. 1980. *Diseases of fruit crops*. Oxford and IBH, NewDelhi.

Peethambaran, C.K., Girija, V.K., Umamaheswaran, K. and Gokulapalan,C.2008. Diseases of Crop plants and their management.Kerala AgriculturalUniversity.

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Rangaswami.G. 1987..Diseases of Crop plants in India.Prentice Hall of India Private Ltd. NewDelhi.

SanjeevKumar. 2015. Diseases of Horticultural Crops Identification and Management. Astral

Santhakumari, P. (ed) 2004. *Advances in Diseases of Plantation crops and Spices*. IDBCo.,

Sharma, P. D. 2001. *Plant Pathology*.Rastogi publications, Shivaji Road,Meerut.

Sharma, Y. R and Premkumar, T. 1991. *Diseases of black pepper*.NRC for spices,Calicut.

Singh, R.S. 1990. *Plant Diseases.* Oxford & IBH PublishingCompany

Verma, L. R. and Sharma, R.C.1999.*Diseases of Horticultural Crops*: Fruits. Indus Publishing. NewDelhi.