C.S.J.M University Kargpur

Syllabus

Distribution of paper for M.Sc.(Ag.) Plant Pathology

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Resolution

The Board of studies in Plant Pathology has gone through the existing syllabus of M.Sc(Ag) Plant Pathology being used in CCS College. However, since 2014-15 resolved that this syllabus be adopted and allowed to be used for the students admitted in 2014-15 batch only i.e. till they present.

It was further resolved that semester system in M.Sc(Ag) be followed with ICAR syllabus w.e.f. 2015-16. Academic year.

[Signatures]

[Date: 27.5.15]

[Dean FAS, Govt. of West Bengal, Vidhan Sabha]
C.S.J.M University Kanpur
Syllabus
M. Sc. (Ag.) First Year
Plant Pathology
(Mycology)

Paper-I

Theory

History of Mycology, Taxonomy, and Nomenclature of fungi, origin and
Phylogeny of fungi, Economic Importance of fungi.
General structure of a fungal thallus, its growth, reproduction and dissemination.
General introduction of the fungal, classification and broad out line of the major
division, Sub-division, classes, order and families of the fungi.
A Critical account of different groups of fungi of Myxomycota,
Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina
with special emphasis on taxonomy, life history, phylogeny, interrelationship and
distribution:

Myxomycota:- Stemonitis, Physarum & Plasmodiophora.

Mastigomycotina:- Synchytrium, Olpidium, Physoderma, Allomyces, Aphanomyces,
Saprolegnia, Achlya, Pythium, Phialosphthora, Albugo,
Peronospora, Sclerospora & Bremia.

Zygomycotina:- Mucor, Rhizopus, Pilobolus, choanephrora & Entomophthora.

Ascomycotina
Saccharomyces, Gymnoascus, Taphrina, Erytche, Sphaerotheca,
Phyllactinia, Ucinula, Leptosphaeria, Neocospora, Cochliobolus
Podosphaera, Pyrenophora, Venturia, Podospora, Chaetomium,
Ceratocystis, Glomerella, Xylaria, Phlloclora, Nectria, Claviceps,
Peziza, Sclerotinia, Mycosphaerella & Physalospora.

Basidiomycotina:
Exobasidium, Agaricus, Pleurotus, Polyporus, Boletus, Coprinus,
Armillaria, Ustilago, Sphacelotheca, Tolypopus, Urocytis,
Tellitio, Neovosspia, Entyloma, Puccinia, Uromyces, Hemilia,
Phragmidium, Melampsora & Gymnoaspergillum.

Deuteromycotina:
Phyllosticta, Phoma, Macrophoma, Ascochyta, Diplodia, Dariuca,
Phomopsis, Septoria, Pestalotia, Verticillium, Colletotrichum
, Cephalosporium, Gloeosporium, Pyricularia, Fusarium,
Helminthosporium, Alternaria, Cercospore, Botrytis, Asperaillus,
Penicillium, Sclerotium & Rhizoctonia.
Theory

**Bacteria:**
Historical development leading to the concept of bacteria as a plant pathogen. Broad outline of morphology, growth, reproduction, nomenclature and classification of plant pathogenic bacteria. Mode of infection, transmission and survival of plant pathogenic bacteria. Effect of environmental factors on bacterial plant pathogens.

Bacteriophages, their structure, properties, multiplication and role in agriculture.

Bacteria in relation to agriculture, nitrogen fixation, nitrogen cycle and biological aspects of nitrogen fixation.

Elementary knowledge of Mycoplasma, its nature, structure, multiplication and classification.

**Virus:**
History and economic importance of plant viruses, nature and properties, classification and nomenclature of plant viruses. Structure of typical plant virus as determined by electron microscopy and X-rays diffraction. Transmission of plant viruses with special reference to insect vectors. Biochemistry of plant virus infection. Immunity and serological reactions, variation, mutation and origin of viruses and virus strains.

**Nematode:**
History of nematology, morphology, taxonomy and economic importance of plant parasitic nematodes.

Biology, population studies and host-parasite relationship of different plant parasitic nematodes.

Life cycle of root knot nematode and cyst nematodes.
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(Statistics)  
Paper-III  

M.M.: 50

Theory


Principles of design of experiment. Paired comparisons. Planning and analysis of completely randomized block, Latin square and Split-plot designs. Missing plot technique in randomized block and Latin square designs, single plot missing. Factorial experiments (without confounding) confounding den Z² designs. Progeny row over trials, University trials, Simple rotational experiments.


Linear regression, Analysis of co-variance. Elementary ideas of probability.
The Practical work will be based on and co-ordinated with the theoretical courses.


Preparation of mounting fluids and stains for temporary and permanent mounts. Collection, preservation and maintenance of plant pathogens. Microtome and Microtomy techniques.

Sterilization methods, Preparation of culture media, determination of pH, inoculation, isolation of aquatic fungi, isolation of fungi from infected tissues and soil, purification of fungal cultures, morphological feature of different groups of fungi based on theory course.

Staining techniques and preparation of permanent slides of plant sections demonstrating the host-parasite relationship of the important fungi.

Collection, identification, spawn preparation on different bases and mushrooms cultivation under laboratory conditions.

Microscopic examination of different shapes of bacteria, isolation of bacteria on artificial culture media, and staining techniques, single, gram's spore, Capsule and negative staining of bacteria and their examination.

Students should be familiar with viruses inoculation techniques, identification and comment upon virus affected plants.

Familiarity with techniques for recovery of plant parasite nematodes from soil and infected plant tissues.

Preparation of herbarium and Museum specimen, field trips, class records and permanent slides.
Theory: Plant diseases, their causes, classification and factors responsible for the incidence of plant diseases. General symptoms of plant disease caused by fungi, bacteria, virus and nematodes. Study of the following plant diseases with reference to symptoms, Most-parasite relationship etiology, perpetuation and control measures:

Wheat: Downy mildew, Powdery mildew, Rusts, Loose and flag Smut, Karnal bunt, Hill bunt, Alternaria leaf blight, Tundu or Ear-rot, Ear cookie of wheat.

Barley: Helminthosporium stripe, Loose and Covered smut, Molya, Barley Yellow Dwarf.

Oats: Loose and covered smut.

Rice: Blast disease, Brown spot, Bunt, Leaf smut, false smut, Bacterial blight, Bacterial streak, Tungro, White tip, Ufra or stem nematode, Root nematode and Khaira disease.


Jowar: Downy mildew, Rust, Smuts, Helminthosporium leaf blight, Cercospora leaf spot, Anthracnose, Striga.

Bajra: Green Ear Disease, Eargot, Rust, Smut, Brown leaf spot, Leaf Blast.

Peanut: Downy mildew, Powdery mildew, Rust, Wilt, Bacterial blight, Mosaic.

Arhar: Phytophthora Blight, Wilt, Cercospora leaf spot, Bacterial leaf spot, Canker, Yellow mosaic, Sterility mosaic.

Bean: Anthracnose and Rust.

Gram: Rust, Sclerotinia blight, wilt complex, Root knot, Ascochyta blight.

Soyabean: Rust, Anthracnose, Cercospora leaf spot, charcoal rot, Bacterial blight, Fire blight, yellow mosaic, Root knot.

Urd & Mung: Powdery mildew, Cercospora leaf spot, Charcol rot, Protamycopsis leaf spot, Leaf crinkle, Mosaic.

Lathyrus: Downy mildew, Powdery mildew, Rust, Wilt.

Lentil: Downy mildew, Powdery mildew, Dry rood rot, Sclerotinia blight, Rust, Wilt.

Sugarcane: Red rot, smut, wilt & stalk rot, red striga, Ratoon Stunting, Grassy shoot, mosaic, Root knot, Striga.

Cotton: Wilt, Root rot, Anthracnose, Black arm, Root knot.

Coriander: Stem gall.

Tabacco: Damping-off, Downy mildew, Powdery mildew, Angular leaf spot, Mosaic, Leaf curl, Orobanche.

Coffee: Rust.

Tea: Blaster blight, Red rust.

Brasica & Allied plant: Club root, White rust, Downy mildew, Alternaria leaf spot, Black rot, Mosaic, Cucucita.

Seasamum: Leaf Spot, Wilt, Anthracnose, Bacterial leaf spot, Leaf curl, Phyllody.
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Linseed : Powdery mildew, Rust, Leaf spot, Wilt.
Ground nut : Tikka disease, Rust, Root rot, wilt, Mosaic, Rosetta.
Castor : Rust, Leaf spot, Blight.
Coconut : Bud rot, Stem Bleeding.
Turmeric : Leaf Botch, Leaf spot, root rot, wilt.
Colocasia : Phytophthora blight.
Ginger : Rhizome rot.
Sweet Potato : White rust, Cercospora leaf spot, Alternaria leaf spot, Sclerotium tuber rot, Rhizoctonia rot Charcol rot, Black rot.
Radish & Shaljam : White rust, Aternaria leaf spot, Mosaic, orobanche.
Chukander : Cercospora leaf spot, Aternaria leaf spot, Sclerotium root rot, Rhizoctonia rot, Yellows, Root knot.
Carrot : Cercospora leaf blight, Alternaria blight, Bacterial blight, Soft rot, Mosaic.
Tomato : Damping off, Wilt, Canker, Mosaic, Leaf Curl, Root knot, orobanche. Brinjal : Leaf spot, Phomopsis blight, Sclerotinia blight, Bacterial wilt, Root knot, Little leaf, Mosaic.
Chilli : Anthracnose, Bacterial spot, Mosaic, Leaf curl.
Cabbage & Cauliflower : Club root, Downy mildew, Bick leg, Alternaria leaf spot, Black rot, Soft rot.
Bhindi : Cercospora leaf spot, Yellow vein mosaic, Root knot.
Cucurbits : Damping off, Downy mildew, Powdery mildew, Fruit rot, Wilt, Bacterial leaf spot, Bacterial soft rot, Root knot, Mosaic.
Onion & Garlic : Downy mildew, Smut, Blast, Neck rot, Purple blotch, Soft rot, Nematode rot, Black mould.
Mango : Powdery mildew, Anthracnose, Bacterial Leaf spot, Wil1formation, Black tip, Loranthus.
Citrus : Decline disease, Greening, Canker, Gumosis, Scab, root rots, Cuscuta.
Guava : Wilt, Stem, Canker.
Papaya : Root rot, Bacterial leaf spot, Mosaic, Leaf curl.
Graps : Downy mildew, Powdery mildew, Anthracnose.
Apple : Powdery mildew, Canker, Fire blight.
Peach : Leaf curl, Powdery mildew.
Banana : Panama Disease, Bacterial wilt, Bunchy top, Anthraeose, Black tip, Leaf spot.
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Paper-II: Principles of Plant Pathology

Theory:

- Scope and importance of Plant Pathology in Agriculture.
- Relation of environment of plant disease production. Liberation and dissemination of inoculums, predisposition, Epidemiology and conditions necessary for its establishment, Forecasting of plant diseases, losses caused by plant diseases, appraisal of losses.
- Pathogens, their classification and survival, phenomenon of plant infection and its effect on host physiology. Bio-chemical approach at host pathogen interactions in plant disease.
- Role of enzyme, Toxins and auxins in pathogenesis, defence mechanisms in plants, Resistance and susceptibility in plant pathogens, Physiological specialization in parasitic fungi.
- Elementary knowledge of Rhizosphere and Phyllosphere.
- General principles of plant disease management.

Practical Bases on Paper I and II:

- The practical work will be based on and co-ordinated with the theoretical course.
- Microscopy, Calibration and measurement of spores, Camera lucida drawing.
- Microtome and microtomy procedures.
- Various methods of preservation of plant pathogen. Preparation of diseased material for microscopic Examinations, preparation of permanent slide of hand sections demonstration.
- Sterilization methods, preparation of culture media, determination of Ph, isolation of pathogen from infected tissues, purification of fungal cultures, inoculation techniques for pathogenicity test, Koch's postulates, isolation of soil rhizosphere and phyllosphere, micro organisms.
- Laboratory evaluation of fungicides by different techniques; indigenous fungicidal preparations, use and maintenance of application equipments.
- Preparation of herbariums and museum specimen, field trips class records and permanent slides.
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Paper-III: Methods of plant disease control

Theory

Scope and importance of plant protection in Agriculture pathogenesis and parasitism, Biochemical Mechanism of Pathogenesis.

General principles of plant disease Control:

Prophylaxis: Quarantine and prohibitions, General ideas of quarantine regulations in force in India and in U.P. Set-up of plant protection organization at state and national level.

Eradication: Crop rotation, Field sanitation, eliminations of alternate and collateral host. Protection: (a) Environmental manipulation.

(b) Chemical land marks during a century progress in the use of chemicals to control plant diseases.

History, Study of different types of fungicides related chemicals, their chemistry, mode of action, environmental interactions, compatibility and utilization, formulation and chemotherapy.

Characteristics of an ideal fungicides, methods of fungicidal application; use of foliage post harvest fungicides, seed and soil treatments.

Systemic fungicides, Antibiotics, mode of their action, movement, distribution and residual effect.

Fungicidal toxicity test, techniques for bio-assay of fungicides, doses response; LD Value.

Familiarity with important auxiliary spray materials and their functions.

Immunization: Plant disease resistance, Factors responsible for resistance and bread down of resistance, Principles and methods of breeding for disease resistance. Important crop varieties known to be resistant to disease. Concept of integrated plant disease management.

Practical Bases on Paper IIIrd

Preparation and use of different fungicides, laboratory evaluation of fungicides by different techniques, Familiarity with parts and working of spraying and dusting machines and application of fungicides to seeds, Plants and soil.

Preparation of culture media, isolation and purification of pathogen inoculation techniques for pathogenecity test. Preparation and preservation of museum specimen, field trips and class records.