

Plant Pathology

Introduction, Economic Importance of nematodes (animal and plant parasites). History of Nematology. General morphology of nematodes. Characters of the group Nematode, their taxonomic position, relationships. Biology of nematodes, behaviour, reproduction and life cycle: damage caused to plants, symptomatology. Occurrence, distribution in India, host range, damage to crops biology and control of: Root-knot nematode (*Meloidogyne* spp.). Cyst forming nematodes (*Heterodera* spp.). Root-lesion nematode (*Pratylenchus* spp.), Citrus nematode (*Tylenchulus semipenetrans*), Reniform nematode (*Rotylenchulus reniformis*). Stem and bulb nematodes (*Ditylenchus dipsaci*), wheat gall nematode (*Anguina tritici* etc.). Foliar nematodes (*Aphelenchoides* spp. *Rhadinaphelenchus* etc.), Ectoparasites: criconematoids (*Criconea*, *Criconeoides*, *Hemicycliophora* etc.), Tylenchids (*Tylenchorhynchus*, *Helicotylenchus*, *Hoplolaimus* etc.), and others (*Xiphinema*, *Longidorus* and *Trichodorus*). Virus transmission by nematodes. Nematodes Management.

Introduction, definition of different terms, basic concepts. Importance of mycology in agriculture, relation of fungi to human affairs, history of mycology. Concepts of nomenclature and classification, fungal biodiversity, reproduction in fungi. The comparative morphology, ultrastructure, characters of different groups of fungi up to generic level: (a) Myxomycota and (b) Eumycota- i) Mastigomycotina ii) Zygomycotina, iii) Ascomycotina, iv) Basidiomycotina, v) Deuteromycotina. Lichens types and importance, fungal genetics and variability in fungi.

History of plant viruses, composition and structure of viruses. Symptomatology of important plant viral diseases, transmission, chemical and physical properties, host virus interaction, virus vector relationship. Virus nomenclature and classification, genome organization, replication and movement of viruses. Isolation and purification, electron microscopy, protein and nucleic acid based diagnostics. Mycoviruses, phytoplasma arbo and baculoviruses, satellite viruses, satellite RNAs, phages, viroids, prions. Principles of the working of electron-microscope and ultra-microtome. Origin and evolution, mechanism of resistance, genetic engineering, ecology, and management of plant viruses.

History and introduction to phytopathogenic procarya, viz., bacteria, MLOs, spiroplasmas and other fastidious procarya. Importance of phytopathogenic bacteria. Evolution, classification and nomenclature of phytopathogenic procarya and important

diseases caused by them. Growth, nutrition requirements, reproduction and variability among phytopathogenic procarya. General biology of bacteriophages, L form bacteria, plasmids and bdellovibrios. Procaryotic inhibitors and their mode of action against phytopathogenic bacteria. Survival and dissemination of phytopathogenic bacteria.

Importance, definitions and concepts of plant diseases, history and growth of plant pathology, biotic and abiotic causes of plant diseases. Growth, reproduction, survival and dispersal of important plant pathogens, role of environment and host nutrition on disease development. Host parasite interaction, recognition concept and infection, symptomatology, disease development- role of enzymes, toxins, growth regulators; defense strategies- oxidative burst; Phenolics, Phytoalexins, PR proteins, Elicitors. Genetics of resistance; 'R' genes; mechanism of genetic variation in pathogens; molecular basis for resistance; marker-assisted selection; genetic engineering for disease resistance. Disease management strategies.