UNIVERSITY OF MYSORE

Syllabus for Course Work

Ph.D. in Applied Botany

Paper 1: Advanced Research Methodology

Unit 1: Seed quality testing - sampling, Tests for genetic purity, physical purity, germination, moisture, viability, vigour, seed health testing for fungi, bacteria, viruses, nematodes; Molecular Plant Pathology – Characterization of resistance genes, PR proteins, determination of hypersensitive responses.

Unit 2: Plant-microbe interaction – Isolation, identification, characterization and diversity of endophytes, PGPR, mycorrhyza, symbiotic and non-symbiotic nitrogen fixers, phosphate solubilizers; Biological control: Identification of potential biocontrol agents against pests/pathogens, formulation of potential biocontrol agents; Mycotoxins – Detection of toxigenic fungi, Mycotoxin detection methods.

Unit 3: Cell and tissue culture technology - Types of media, micropropagation technology, somatic embryogenesis, haploid culture, protoplast isolation and hybridization, cell suspension culture, meristem tip culture, germplasm conservation; Transgenic Technology - Direct and indirect gene transfer technologies, RNAi technology; Molecular techniques - Construction of vectors, cDNA library, PCR, RAPD, AFLP, RFLP, SSCP, SSR, SNPs, SCAR, blotting techniques, molecular finger printing of plants/microbes/pathogens, serological techniques, Multiplex, Barcoding, Metagenomics.

Unit 4: Biodiversity and bioprospecting - Medicinal plant diversity, endemic/endangered plants and their conservation strategies; Determination of bioactive potential, antioxidant, antimicrobial, antidiabetic, anti-inflammatory, anti-cancer, cardio-protective, DNA protection activity. Extraction, isolation, and characterization of bioactive molecules. TLC, Column chromatography, activity guided fractionation, preparative HPLC, LC-MS, NMR, XRD.

Unit 5: Biostatistics and bioinformatics – Basic bioinformatic tools for genomics and proteomics, database, homology search; Biostatistics – measures of central tendency and dispersion, Types of distribution, Z-score, t-test, ANOVA & multiple range test, chi-square test, regression, correlation, experimental designs; Preparation research papers, literature resources, impact factor, citation index, patent filing.

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