

Raja Mahendra Pratap Singh, University

Ph.D. Course Work Syllabus
Paper-I: Subject Specific Course - Botany
Credits: 4 Units: 4
Maximum Marks: 100
Course: Research Methodology

Unit I

Basic techniques in plant sciences: Isolation, purification and quantification of DNA, preparation of stains, fixatives, stock solutions, MS medium, soil and water culture, isolation of protoplast and somatic hybridization, techniques of haploid and double haploid production synthetic seed technology, genetic transformation in plants.

Unit II

Qualitative and quantitative methods: Measurement of growth, parameters, quantitative tests for carbohydrates, proteins, lipids, detection of free radicals through various stains, morphology of stomata; preparation of slides pertaining to cytology, and micrometry.

Unit III

Culture media for microbes: PDA, Richard's and nutrient agar: Isolation of nematodes. Preparation of fungus and nematode inocula and methods of their inoculations. Maintenance of fungus and nematode culture. Histopathological techniques.

Unit IV

Applied techniques in plant sciences: Compound and light microscope. electron microscopy; transmission electron microscopy (TEM) and scanning electron microscopy (SEM), confocal microscopy; ultracentrifugation, PCR and RT-PCR, electrophoresis (2D), isoelectric focusing, autoradiography, DNA sequencing, chromatography; detection of secondary metabolites: HPLC, GC-MS and LC-MS.

Suggested Readings

1. Keith Wilson and John Walker: Principles and Techniques of Biochemistry
2. Plant Tissue Culture: Theory and Practice, Bhojwani, S. S., & Razdan, M. K. (1996). Plant Tissue Culture: Theory and Practice. Elsevier
3. Introduction to Plant Tissue Culture, Dodds, J. H., & Roberts, L. W. (1985). Experiments in Plant Tissue Culture (3rd ed.). Cambridge University Press.
4. B.D. Singh: Biotechnology, Expanding Horizons
5. Prof. Punit Puri: Practical approach to histopathological staining and Microtomy

6. Pavia and Lampman: Introduction to Spectroscopy
7. Atheena Pandian: Types of Microscopes
8. Jennifer D.T. Kruschwitz: Colorimetry and Fundamental colour modelling.
9. Elsa Lundanes and Leon Reubsæet: Chromatography, Basic Principles Sample preparations and related methods.
10. WHO (2003): Laboratory Biosafety Manual
11. DBT (2011): Guidelines and Handbook for Institutional Biosafety Committee (IBSC) Manual of Patent office practice and Procedure (2011)
12. G.R. Basotia and K.K. Sharma: Research Methodology.

Evaluation Scheme

Internal Assessment / Assignment / Seminar: 30 Marks

End Semester Examination: 70 Marks

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