

BHARATHIAR UNIVERSITY
M.PHIL./PH.D BIOTECHNOLOGY
PAPER III – PLANT BIOTECHNOLOGY

Unit I GENOME ORGANIZATION AND ENGINEERING

Plant genome organization, structure of plant gene, Gene family, Chloroplast genome, Mitochondrial genome. Importance of RFLP and RAPD in plant breeding, Construction of cDNA library. Protein targeting to chloroplast and mitochondria, heat shock proteins.

Unit II TISSUE CULTURE TECHNIQUES

Brief historical account: Laboratory organization: Preparation of media: Aseptic manipulation: Sterilization of media, Culture vessels and explants: Single cell culture, Suspension culture. Cellular totipotency, Somatic embryogenesis: Synthetic seeds: Somaclonal and gametic Clonal variation. Shoot tip culture, Haploid production: Anther and Pollen culture: Triploid production: In vitro pollination and Fertilization, Embryo culture.

UNIT III APPLICATION OF TISSUE CULTURE

Protoplast isolation and culture: Somatic hybridization, Cybrid technology, Micropropagation: Gemplasm conservation: Production of secondary metabolites: Genetic engineering of metabolic pathways, Production of secondary metabolites in Bioreactors and downstream procession.

UNIT IV MOLECULAR BIOLOGY OF PLANT MICROBIAL INTERACTION AND TRANSFORMATION

Biofertilizers: Symbiotic and Non-symbiotic nitrogen fixation, Biochemistry and Molecular biology of biological nitrogen fixation, Genetic engineering of nif genes and nod genes, Mycorrhizae: Ecto and Endo Mycorrhizae, Agrobacterium and Crown Gall tumours, Mechanism of T-DNA transfer. Ti and Ri plasmid vectors Agro infection. Direct transfer of plants by physical methods. Selectable marker and reporter genes, Chloroplast transformation. Gene splicing / m RNA- mechanism and application.

UNIT V TRANSGENIC PLANTS AND THEIR APPLICATIONS

Transgenic plants: Genetic engineering of plants for herbicide resistance, Pest resistance, Virus resistance, Disease resistance, Stress tolerance, Cytoplasmic male sterility, Delayed fruit ripening. Genetic engineering in floral industries, Genetic engineering of seed storage proteins. Vaccine production in plants, Edible vaccine, Transgenic plants as bioreactors.

References

1. Chrispeels M.J. and Sadava D.E. (2002). Plants, genes and agriculture. The American Scientific publishers.
2. Chawla H.S. (2004) Biotechnology in crop improvement. International book Distribution Company.
3. Donal Grierson and Convey S.V. (1984). Plant Molecular Biology by Blackie & Son Limited, Newyork.
4. Hammond J. Mc Garvey P. and Usibov V.Y (Eds) (2000). Plant Biotechnolgy Springer Veriag.
5. Moncia, A. Hughes. (1999). Plant Molecular genetics by Pearson education limited, England.

6. Razdan M.K. (2003). Introduction to plant tissue culture Oxford-IBH publishing Co. Pvt. Ltd.
7. Slater, A. Scott, N and Fowler, M. (2003). Plant Biotechnology: The genetic manipulation of plants. Oxford press.
8. Plant Biotechnology and Genetics: Principles, Techniques and Applications, 2008; **C. Neal Stewart Jr.** (Editor) ISBN-10: 0470043814 | ISBN-13: 978-0470043813
9. Plant Molecular Biotechnology , 2009; S. Mahesh(Author) ISBN-10: 1906574146 | ISBN-13: 978-1906574147 (Amazon.com)
10. **RNA: A Laboratory Manual**, 2010 by Donald C. Donald C. Rio (Author, Editor), Manuel Ares (Author, Editor), Jr. (Author, Editor), Gregory J. Hannon (Author, Editor), Timothy W. Nilsen (Author, Editor) ISBN-10: **0879698918** | ISBN-13: **978-0879698911** |(Amazon.com)
11. **Alternative pre-mRNA Splicing: Theory and Protocols** by Stefan Stamm, Chris Smith and Reinhard Lhrmann (Feb 14, 2012) (Amazon .com)