

BTY540:PLANT BIOTECHNOLOGY

L:3 T:0 P:0 Credits:3

Course Outcomes: Through this course students should be able to

- CO1 :: define the core concept of plant cell and tissue culture
- CO2 :: understand the major in vitro plant propagation methods
- CO3 :: determine the different methods of germplasm conservation and bioactive synthesis
- CO4 :: deduce the methods of haploid and variant production
- CO5 :: classify the various direct and indirect methods of DNA transfer
- CO6 :: summarize the recent advancements in the field of plant biotechnology

Unit I

Introduction : historical background, concepts and basic techniques in tissue culture, media preparation and optimization, cell, tissue and organ culture, organogenesis, explant preparation & sterilization techniques

Callus and Suspension Culture : : Initiation and maintenance of callus cultures, initiation and maintenance of suspension cultures, types of callus culture

Unit II

Micropropagation : micropropagation and its stages, somatic embryogenesis, embryo culture, embryo rescue, , applications of micropropagation

Somatic Hybridization : protoplast isolation and fusion, selection of hybrid cells, symmetric and asymmetric hybrids, cybrids

Unit III

Plant bioactives and single cell culture : techniques for single cell culture, applications of single cell culture, techniques of secondary metabolite production, applications of secondary metabolites and bioactives

Germplasm preservation methods : cryoprotectants, cryopreservation, short or Medium term storage, long term storage

Unit IV

Haploid Production : anther culture, ovule culture, production of haploid plants by androgenesis and gynogenesis. application of haploids

Somaclonal variations : methods and techniques for isolation and selection of the variants, applications of somaclonal variations

In vitro Plant microbe interactions : assay development, limitations and applications

Unit V

Plant transformation technology : agrobacterium mediated gene transfer (indirect method), study of mechanism of agrobacterium infection, crown gall disease, Ti Plasmid and T-DNA, vir region and vir regulon, functions of vir genes, T-DNA transfer and integration of T-DNA in plant genome, plant co-culture and in-planta transformation

Direct DNA transfer methods : chemical methods and electroporation, particle gun method, lipofection, microinjection and macroinjection

Unit VI

Recent advancement in Plant biotechnology : thin cell layer technology (TCL), nanoparticles as sterilizing agent and media components, noble plant growth regulators (metatopolin, melatonin)

Molecular Markers : RFLP, RAPD, SSR/ISSR, AFLP, SCAR, applications of molecular markers in plant biotechnology and tissue culture

Text Books:

1. INTRODUCTION TO PLANT TISSUE CULTURE by MK RAZDAN, OXFORD & IBH
2. PLANT TISSUE CULTURE by AFROZ ALAM AND VINAY SHARMA, DREAMTECH PRESS
3. BIOTECHNOLOGY-V INCLUDING ANIMAL CELL BIOTECHNOLOGY, IMMUNOLOGY & PLANT BIOTECHNOLOGY: V. V (BIOTECHNOLOGY: INCLUDING ANIMAL CELL BIOTECHNOLOGY, IMMUNOLOGY AND PLANT BIOTECHNOLOGY) by MK SATEESH, NEW AGE INTERNATIONAL

References:

References:

1. PLANT BIOTECHNOLOGY: THE GENETIC MANIPULATION OF PLANTS by SLATER, Oxford Paperbacks