Subject Code : P8BOE3

PLANT TISSUE CULTURE

Unit-I

Introduction - History, Scope and Concepts of basic techniques in plant tissue culture. Laboratory requirements and organisation. Sterilization-filter, heat and chemical. Media preparation - inorganic nutrients, organic supplements, carbon source, gelling agents, growth regulators and composition of important culture media (MS, Whites and Gamborg's media).

Unit-II

Cell, tissue and organ culture - Isolation of single cells, selection and types of cells, tissue explants and organs for culture - Paper, raft nurse technique, Plating method, Microchamber techniques, cell suspension cultures - batch, continuous, chemostat culture - Synchronization of suspension culture, cellular totipotency, Cytological, cytochemical and vascular differentiations - Totipotency of epidermal and crown - gall cells.

Unit-III

Micropropagation - Clonal propagation of elite germplasm, factors affecting morphogenesis and proliferation rate, technical problems in micropropagation.

Organogenesis - formation of shoots and roots - Role of growth regulators and other factors, somaclonal and gametoclonal variations.

Somatic embryogenesis - Process of somatic embryogenesis, structure, stages of embryo development, factors affecting embryogenesis, synthetic seeds.

Unit-IV

Haploid production - Androgenesis, gynogenesis - Techniques of anther culture - segmentation pattern in microspore - isolated pollen culture - plantlets from haploids - diploidisation - factors influencing androgenesis, haploidy through gynogenesis, haploid mutants, utilization of haploids in plant breeding.

In vitro pollination - ovule and ovary culture, importance, techniques overcoming incompatibility barriers, embryo rescue.

Protoplast culture: Isolation of protoplasts - mechanical and enzymatic sources, culture of protoplasts, viability. Protoplast fusion - Spontaneous, mechanical, induced electrofusion, selection of somatic hybrids, cybrids, importance.

Unit-V

In vitro production of secondary metabolities - Classification of secondary metabolites, biosynthetic pathways, cell suspension cultures, immobilized cell cultures and biotransformation, elicitors and hairy root culture.

Cryopreservation and gene bank - Modes of preservation, preparation of materials for deep freezing, cryopotectors, storage strategies, assessment of successful cryopreservation, application and limitations.

Application of tissue culture in forestry, horticulture, agriculture and pharmaceutical industry.

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***Note*:** No Practical for this paper.