**BOS505**(REV22)**- PLANT TISSUE CULTURE**

**Teaching Hours: 10/Unit**

**Course outcome:**

- Basics of plant tissue culture including laboratory set up and culture media are included
- Syllabus deals with the various applications of tissue culture including germplasm storage
- Methods and uses of culturing different kinds of plants are also included
- A unit on protoplast isolation and fusion is very useful for students
- The course is useful for further studies and has practical applications

**Unit I**

Laboratory organization, basic principles of cell and tissue culture.

Culture media: types of media, preparation, sterilization, role of macronutrients, micronutrients, organic nutrients, growth regulators and gelling agents, undefined supplements, different carbon sources used in tissue culture media. Micropropagation: explant selection, totipotency, induction of callus, meristem culture, embryo culture, factors affecting *in vitro* stages of micropropagation, applications and limitations of micropropagation.

**Unit II**

Cytodifferentiation and organogenesis, factors involved in vascular tissue differentiation and organogenesis. Somatic embryogenesis, synthetic seeds.

Germplasm storage and cryopreservation: long term storage – plant materials, pre – freezing treatments, cryoprotectants, freezing, thawing, reculture, checking the efficiency of cryopreservation. Advantages of cryopreservation.

**Unit III**

Cell suspension culture: isolation of cells, types of suspension cultures, synchronization, assessment of growth and viability in suspension culture, techniques involved in and

factors affecting single cell culture. Types of bioreactors, production of secondary metabolites, problems associated with secondary metabolite production.

**Unit IV**

Haploid production: Androgenic haploids – anther culture, microspore culture, factors responsible for the success of androgenesis, ploidy level, significance of haploids, problems involved in haploid culture. Gynogenic haploids – explants, pre – treatment, factors responsible for gynogenesis and importance of gynogenesis.

Triploid production: callusing, physical factors, organogenesis, factors responsible for shoot bud differentiation and applications of endosperm culture.

**Unit V**

Protoplast isolation and fusion: Methods of protoplast isolation, culture techniques, protoplast developments. Methods of protoplast fusion, selection, characterization of hybrids, cybrids, applications and limitations of somatic hybridization.

Somaclonal variation: somaclonal variants, isolation of somaclonal variants, basis for somaclonal variation, applications.

**Suggested Reading:**

Evans D. E., Coleman J.O.D., and Kearns A. 2008. Plant cell culture. Bio Scientific Publ. London

PUROHIT S. D., 2012. Introduction To Plant Cell Tissue And Organ Culture PHI Learning Pvt. Ltd., New Delhi

Roberta, H. Smith, 2012. Plant Tissue Culture: Techniques and Experiments 3 edition. Academic Press; US.

Bhojwani, S.S. and Razdan, M.K. 2004. Plant Tissue Culture: Theory and practice. Elsevier Science Publishers, New York, USA.

Chawla H.S., 2009, Plant Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi

Chrispeels, M.J. and Sadava, D.E. 1994. Plants, Genes and Agriculture, Jones and Bartlett Publishers, Boston, USA.