**SYLLABUS OF CERTIFICATE COURSE**

**BOT1PTC: PLANT TISSUE CULTURE TECHNOLOGY**

Coordinator: Dr. Deepa P.

Duration: 30 Hours

**Objectives**

* To introduce students to the basic principles of plant tissue culture
* To provide students with hands-on experience in plant tissue culture techniques
* To teach students how to apply plant tissue culture techniques to solve real-world problems
* To prepare students for careers in plant tissue culture technology

**Outcomes**

* Micropropagation
* Somatic embryogenesis
* Haploid production
* Germplasm conservation
* Production of secondary metabolites

**Module I (12 Hours)**

1. Plant tissue culture – Principles and techniques; Cellular totipotency; *in vitro* differentiation – de differentiation and re-differentiation.

2. Tissue culture medium – Basic components in tissue culture medium – Solidand liquid medium; Murashige and Skoog medium – composition andpreparation.

3. Aseptic techniques in *in vitro* culture – sterilization – different methods –sterilization of instruments and glassware, medium, explants; workingprinciple of laminar air flow and autoclave.

4. Preparation of explants– surface sterilization, inoculation, incubation,subculturing.

5. Micropropagation - Different methods – apical, axillary bud proliferation,direct and indirect organogenesis and somatic embryogenesis.

6. Different phases of micropropagation – multiple shoot induction, shootelongation, *in vitro* and *in vivo* rooting hardening, transplantation and field evaluation; advantages and disadvantages of micropropogation, somaclonal variation.

**Module II (8 Hours)**

1. Methods and Applications of tissue culture:

1. Shoot tip and meristem culture
2. Somatic embryogenesis and synthetic seed production
3. Embryo culture
4. Protoplast isolation culture and regeneration - transformation andtransgenics
5. Somatic cell hybridization, cybridization.
6. *In vitro* secondary metabolite production - cell immobilization,bioreactors
7. *In vitro* production of haploids – anther and pollen culture
8. *In vitro* preservation of germplasm

**Practical (10 Hours)**

1. Preparation of nutrient medium – Murashige and Skoog medium using stock solutions,
2. Familiarize the technique of preparation of explants, surface sterilization,inoculation and subculturing.
3. Preparation of synthetic seeds
4. Demonstration of anther culture

**References**

1. Gamborg, O.L. & G.C. Philips (Eds.) (1995). Plant Cell, Tissue and Organ Culture: Fundamental Methods. Narosa Pulishing House, New Delhi.
2. Razdan MK (1995) Introduction to Plant Tissue Culture. Oxford & IBH publishing Co. Pvt. Ltd.
3. Reinert & Bajaj. Plant Cell, Tissue and Organ Culture.
4. Edwin F. George,Michael A. Hall and Geert-Jan De Klerk. (2008) Plant propagation by tissue culture Volume 1. The Background. Springer,P.O. Box 17, 3300 AA Dordrecht. The Netherlands.
5. Madhavi Adhav (2010) Practical book of Biotechnology and PlantTissue culture
6. Bhojwani, San Saran, Danu, Prem Kumar (2013) Tissue Culture : An Introductory Text