

**SYLLABUS FOR  
VALUE ADDED COURSE ON  
ADVANCES IN TISSUE CULTURE  
18BOTVAC01**

Course Coordinated & Guided by  
**Dr. Jose John**

**Course Objectives:**

The Students shall be able to;

1. Create basic understandings of Plant tissue culture and Micropropagation.
2. Get acquainted with a tissue culture lab.
3. Develop skills in preparing various tissue culture media.
4. Select, sterilize, and inoculate suitable explants.
5. Subculture and harden the tissue cultured plantlets for planting.

**Theory (18 hrs)**

**Module 1: Introduction** – The concept of Plant Biotechnology, landmarks in Plant Biotechnology. (2hr)

**Module 2: Plant tissue culture** – Principles and techniques - Cellular totipotency, in vitro differentiation – de-differentiation and re-differentiation, callus induction, organogenesis and somatic embryogenesis. (6 hrs)

**Module 3: Tissue culture medium** – Basic components in tissue culture medium – Solid and liquid medium – suspension culture. Murashige and Skoog medium – composition and preparation. Aseptic techniques in tissue culture – sterilization – different methods – sterilization of instruments and glass wares, medium, explants; working principle of laminar air flow and autoclave; preparation of explants – surface sterilization. Inoculation, incubation, sub culturing. (9 hrs)

**Module 4 : Micro propagation - Different methods** – axillary bud proliferation, direct and indirect organogenesis and somatic embryogenesis. Different phases of micropropagation – hardening, transplantation and field evaluation Advantages and disadvantages of micropropagation. Somaclonal variation. (8 hrs).


**Module 5 : Methods and Applications of tissue culture** - Shoot tip and meristem culture, Synthetic seed production, embryo culture, In vitro mutagenesis, Protoplast isolation culture and regeneration – transformation and transgenics, Somatic cell hybridization- cybrids. In

in vitro secondary metabolite production — cell immobilization, bioreactors. In vitro production of haploids – anther and pollen culture, In vitro preservation of germplasm.

(5 hrs)

**Suggested Readings:**

1. Edwin F. George, Michael A. Hall, Geert-Jan De Klerk (2008). *Plant Propagation by Tissue Culture (Vol I): The Background*. Springer. Michael R. Davey, Paul Anthony (2010). *Plant Cell Culture: Essential Methods*. Wiley-Blackwell A John Wiley & Sons, Ltd.
2. Hamish A Collin, Sue Edwards (1998). *Plant tissue culture*. Bios scientific publishers.
3. R A Dixon, R A Gonzales (2004). *Plant cell culture, a practical approach (II Edn)*. Oxford University Press.
4. S. S. Bhojwani, M. K. Razdan (1996). *Plant tissue culture: Theory and Practice*. Elsevier.
5. Susan R. Barnum (1998). *Biotechnology an introduction*. Thomson Brooks/cole.
6. Nicholas C Price, Lewis Stevens (1999). *Fundamentals of enzymology (III Edn)*. Oxford university press.
7. Trever Palmer (2004). *Enzymes: Biochemistry, Biotechnology, Clinical chemistry*. T Palmer/Harwood Publishing Limited.
8. E M T El-Mansi, C F A Bryce, A L Demain, A R Allman (2007). *Fermentation Microbiology and Biotechnology (II Edn)*. Taylor & Francis.
9. O. L. Gamborg, G C Philips (Eds.) (2005). *Plant cell, tissue and organ culture: Fundamental methods*. Narosa Publishing House.
10. *In vitro cultivation of plant cells. Biotechnology by open learning*. Elsevier.
11. D E Evans, J O D Coleman, A Kearns (2003). *Plant Cell Culture*. BIOS

  
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