

**SYLLABUS FOR
VALUE ADDED COURSE ON
VEGETATIVE PROPAGATION FOR CROP IMPROVEMENT
17BOTVAC01**

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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