

21ELCT362 MICRO-PROPAGATION TECHNOLOGIES

Hours Per Week :

L	T	P	C
1	-	4	3

Total Hours :

L	T	P
15	-	60



Source:

<https://www.mdpi.com/2223-7747/10/4630>

COURSE DESCRIPTION AND OBJECTIVES:

Main objective is to learn about the tissue culture and micro propagation technology

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Students will be aware about types of cultures (seed, embryo, organ, callus and cell)
2	Students will be aware about stages of micro propagation, axillary bud proliferation
3	Students will understand the concept of organogenesis (callus and direct organ formation), somatic embryogenesis, cell suspension cultures.

SKILLS:

- ✓ *Depth understanding of in-vitro propagation techniques*
- ✓ *Preparation of standard medium*
- ✓ *Preparation of standard solution of growth regulators*
- ✓ *Expertise in different sterilization techniques*
- ✓ *Handling of equipment used in micro-propagation techniques*

ACTIVITIES:

- o Visit tissue culture laboratory
- o Conduct experiment on Organogenesis
- o Experimentation on determining optimum concentration of growth regulators
- o Experiments of synthetic seeds production and testing storability and germination efficiency

UNIT - 1

Meaning and concept of *in vitro* culture and micro-propagation; Historical mile stones, advances and future prospects; totipotency, dedifferentiation

UNIT - 2

Tissue culture methodology: Sterile techniques, synthetic and natural media components, growth regulators, environmental requirement, genetic control of regeneration

UNIT - 3

Plant regeneration pathways - Organogenesis and Somatic embryogenesis; Micro-propagation – Definition, methods, and stages and significance; Axillary bud proliferation approach – Shoot tip and meristem culture

UNIT - 4

Organogenesis - Purpose, methods and requirements, indirect and direct organogenesis; Somatic embryogenesis – Procedures and requirements, indirect and direct embryogenesis; Differences between somatic and gametic embryogenesis

UNIT - 5

Synthetic seed - Concepts, necessity, procedure and requirements for production of synthetic seeds

LABORATORY EXPERIMENTS**LIST OF EXPERIMENTS**

- 1-2 Organization of tissue culture laboratory
- 3-4 Sterilization techniques used in tissue culture – Glass, plastic and metalware
- 5-6. Study and use of laminar flow unit for tissue culture
- 7-8. Study and use of autoclaves for tissue culture
- 9-10. Preparation of stock and working solutions of Tissue culture media
- 11-12. Sterilization techniques used in tissue culture - Media, hormones and other thermolabile compounds (Filter sterilization)
- 13-14. Preparation and inoculation of explants for Direct organogenesis - shoot tip , nodal Explants
- 15-16. Preparation and inoculation of explants for callus production – Leaf, stem and root explants.
- 17-18. Determination of optimum concentration of hormones / growth regulators for direct organogenesis – Shoots
- 19-20. Determination of optimum concentration of hormones / growth regulators for direct organogenesis – Roots
- 21-22. Sub culturing for multiple shoots and calli produced *in vitro*
- 23-24. Determination of optimum concentration of auxins to generate shoots from *in vitro* generated calli
- 25-26. Production of somatic embryos *in vitro* in carrot

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- 27-28. Identification of different stages / phases of somatic embryos
 29. Preparation of synthetic seeds from somatic embryos
 30. Storage and germination of synthetic seeds

REFERENCES :

1. Gamborg, O.L. and Phillips, G.C. 1995. *Plant Cell Tissue Organ Culture : Fundamental Methods*. Springer, Berlin
2. Keshavachandran, R. and Peter, K.V. 2008. *Plant Biotechnology: Methods in Tissue Culture and Gene Transfer*. Universities Press, Hyderabad
3. Smith, R.H., 2013. *Plant Tissue Culture : Techniques and Experiments*. 3rd ed. Academic Press, San Diego, CA, USA
4. Bhojwani, S.S. and Razdan, M.K. 1996. *Plant Tissue Culture, Theory and Practice*. Elsevier, Netherlands
5. Bhojwani, S.S. and Dantu, P.K. 2013. *Plant Tissue Culture: An Introductory Text*. Springer, India, New Delhi

