

Chapter 5



UNIT VIII: Biotechnology

Plant Tissue Culture



Learning Objectives

The learner will be able to

- ❖ Perceive the concepts of tissue culture.
- ❖ Cognize the steps of tissue culture techniques and its types.
- ❖ Understand the protoplast culture in detail.
- ❖ Elicit the list of secondary metabolites obtained through cell suspension culture.
- ❖ Learn plant regeneration pathway.
- ❖ Appreciate the uses of micro propagation, somatic hybridization, shoot meristem culture and germplasm conservation.
- ❖ Acquire the knowledge of patenting Biosafety and Bioethics.



Chapter outline

- 5.1 Basic concepts of Tissue Culture
- 5.2 Plant tissue culture techniques and types
- 5.3 Plant regeneration pathway
- 5.4 Applications of plant tissue culture
- 5.5 Conservation of plant genetic resources
- 5.6 Intellectual Property Right (IPR), Biosafety and Bioethics
- 5.7 Future Biotechnology



Growing plant protoplasts, cells, tissues or organs away from their natural or normal environment, under artificial condition, is known as Tissue Culture. It is also known as *in vitro* (*In vitro* is a Latin word, it means that - in glass or in test-tube) growth of plant protoplasts, cells, tissues and organs. A single explant can be multiplied into several thousand plants in a short duration and space under controlled conditions.



Gottlieb
Haberlandt

Tissue culture techniques are often used for commercial production of plants as well as for plant research. Plant tissue culture serves as an indispensable tool for regeneration of transgenic plants. Apart from this some of the main applications of Plant tissue culture are clonal propagation of elite varieties, conservation of endangered plants, production of virus-free plants, germplasm preservation, industrial production of secondary metabolites. etc., In this chapter let us discuss the history , techniques, types , applications of plant tissue culture and get awareness on ethical issues.

Gottlieb Haberlandt (1902) the German Botanist proposed the concept **Totipotency** and he was also the first person to culture plant cells in artificial conditions using the mesophyll cells of *Lamium purpureum* in culture medium and obtained cell proliferation. He is regarded as the father of tissue culture.