



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Biosciences

Course Hand-out

Plant Tissue Culture Techniques| BT 1308 | 4 Credits | 3 | 1 | 0 | 4

Session: 2018-2019 | Faculty: Dr. Jain Rohit | Class: III Semester

- A. Introduction:** This course is offered by Dept. of Biosciences as a core course in B.Sc. (Hons.) Biotechnology Programme targeting students who wish to pursue their career in the field of plant tissue culture and plant biotechnology. The focus of this course is to introduce the students to different methodologies of cell and tissue culture, which can be used for wide range of applications including conservation of endangered plant species, elite germplasms, mass multiplication of economically important plants and production of medicinally and nutritionally important compounds. The course also imparts the practical knowledge of various techniques associated with plant tissue culture, which is useful to gain positions at various plant tissue culture industries and national research centres.
- B. Course Outcomes:** At the end of the course, students will be able to:
- [BT 1308.1]. Define the nature of plant growth processes in the tissue culture environment.
 - [BT 1308.2]. Identify the role of different growth regulators in plant growth and development in plant tissue culture henceforth enhance the employability skills.
 - [BT 1308.3]. Apply the technique of micropropagation for *ex situ* conservation and mass multiplication of endangered and economically important plants therefore increasing the avenues for entrepreneurship
 - [BT 1308.4]. Analyze and relate morphological, physiological and somaclonal variations for crop improvement
 - [BT 1308.5]. Evaluate the clonal fidelity and polymorphism of the tissue cultured plants using molecular and statistical tools
 - [BT 1308.6]. Design and develop the protocols for enhanced production of bioactive compounds in cell suspension cultures and to develop genetically engineered crops thereby increasing the employability options.

SYLLABUS

Introduction and history of plant tissue culture. Introduction to techniques: laboratory facilities, tools and techniques; laboratory planning and design. **Concept of asepsis and methods of sterilization:** physical and chemical methods of sterilization. **Nutrient Media:** components of media, media preparation and its selection, growth hormones, vitamins, adjuvants. **Different types of media:** Murashige & Skoog, B5, Nitsch and Nitsch, Woody Plant Medium (WPM) **Tissue culture methodologies** - cellular totipotency, explant, callus culture, **somaclonal variation**, **cell suspension culture**, single cell culture, organ micro-culture, plant micropropagation, **somatic embryogenesis**, **synthetic seed technology**, protoplast culture. **Secondary metabolite production in tissue culture:** culture initiation, **biotransformation**, elicitation, **hairy root culture**, immobilization, permeabilization, introduction to bioreactor. **Green house operation and management: hardening and acclimatization** of tissue cultured plants.

C. TEXT BOOKS

1. Razdan, M.K. *An introduction of Plant Tissue Culture-* Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi. 2005.
2. Bhojwani, S.S. and Razdan, M.K. *Plant Tissue Culture theory and practice a Revised edition*, Elsevier Science Publishers, New York, USA, 2011.
3. Purohit. S.D. *Introduction to Plant Cell, Tissue and Organ Culture*. PHI Learning Pvt. Ltd. New Delhi, 2013

D. REFERENCE BOOKS

1. Gemborg O.L. and Phillips G.C. *Plant Cell Tissue and Organ Culture*. Narosa Publishing House, New Delhi. 1998.
2. Narayanaswamy S. *Plant Cell and Tissue Culture*. Tata Mc Graw Hill Publication, New Delhi. 9th reprint. 2008

