

B.Sc. IV Year

BBO -E701  
DSE-7 Plant Biotechnology

Semester - VII

MM : 100  
Time : 3 hrs  
L Credit  
44  
Total Hours: 60

Sessional : 30  
ESE : 70  
Pass Marks : 40

**Learning objective:**

- To understand the basic knowledge of Plant Biotechnology.
- To acquire the basic information about the global impact and current excitement of plant biotechnology.
- To acquire an overall knowledge on the application of plant cell, tissues and organ culture.
- To become familiar with plant tissue culture and cryopreservation.
- To acquire the information on recombinant DNA technology.

**Learning outcomes:**

- The student shall be able to familiar with the historical back ground and recent advance in plant biotechnology.
- The student shall be able to understand about the global scenario and recent trends in plant biotechnology.
- The student shall be able to understand the various methods used for Cryopreservation.
- The student shall learn and understand the various methods used in tissue culture and micro-propagation.
- The student shall learn various techniques used in DNA fingerprinting and molecular DNA markers, sequencing, PCR, rt-PCR; hybridoma and monoclonal antibodies, ELISA, immune detection, and gene therapy.
- The student shall be able to take the decisions for carrier point of views in research, industries and academia entrepreneurs etc.

**Unit 1: Scope and Importance**

(14 Lectures)

Historical back ground and recent advance in plant biotechnology: emergence of modern biotechnology as an interdisciplinary area. Global impact and current excitement of plant biotechnology; Global scenario and recent trends in plant biotechnology. Plant biotechnology techniques for conservation of plant genetic resources.

**Unit 2: Application of Plant Cell, Tissues and Organ Culture**

(8 Lectures)

Application in agriculture, improvement of hybrid, production of encapsulated seed/artificial seeds, Production of disease and stress free plants. Production of transgenic plants for crop improvement, virus resistant transgenic plants, insect resistant transgenic plants, Herbicide resistant transgenic plants, Molecular farming from transgenic plants.

**Unit 3: Cryopreservation**

(12 Lectures)

Introduction and difficulties in cryopreservation; methods for cryopreservation, selection of material, addition of cyoprotectors, storage in liquid nitrogen, thawing, washing and reculturing regeneration of plantlets; Plant cell bank; Pollen bank. Stage of cryopreservation and standardization of culture, achievement through cryopreservation.

**Unit 4: Plant Tissue Culture**

(10 lecture)

Totipotency, method of tissue culture. micro-propagation; haploid production through androgenesis and glycogenesis; brief account of embryo & endosperm culture with their applications.

**Unit 5: Recombinant DNA Techniques**

(18 Lectures)

Blotting techniques: Southern, Western and Northern Blotting, DNA fingerprinting; molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR and reverse transcriptase-PCR; hybridoma and monoclonal antibodies, ELISA and immune detection; gene therapy.

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DSE 7 SEMESTER VII / BBO-E751 (LAB COURSE CC-07)

The practicals based on BBO E701 will be performed.

Spotters/Photographs

1. Callus culture from explants.
2. Protoplast isolation.
3. Plasmids – Ti plasmids
4. Gene cloning in *E. Coli*.
5. *Agrobacterium* mediated gene transfer.
6. Blotting techniques.
7. Colony hybridization technique.
8. Transgenic plants prescribed in the syllabus.
9. Familiarization with basic equipment's in tissue culture.
10. Study through photographs: anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation.
11. Study of molecular techniques: PCR, ELISA, AGE and PAGE.

Suggested readings:

1. Slater, A., Scott, N.W. & Fowler, M.R. 2008 Plant Biotechnology: The Genetic Manipulation of Plants, Oxford University Press.
2. Bhojwani, S.S. and Razdan 2004 Plant Tissue Culture and Practice. Publisher: Elsevier, North Holland
3. Chrispeel, M.J. and Sadava, D.E. 1994 Plants, Genes and Agriculture. Jones and Barlett Publishers.
4. Reinert, J. and Bajaj, Y.P.S. 1997 Applied and Fundamental Aspects of Plant Cell, Tissue and Organ Culture. Narosa Publishing House.
5. Smith, R. 2000 Plant Tissue Culture: Techniques and Experiments, 2nd edition, Academic
6. Gardner, E.J. Simmonns, M.J. Snustad, D.P. 2008 8th edition Principles of Genetics. Wiley India.
7. Russell, P.J. 2009 Genetics – A Molecular Approach. 3rd edition. Benjamin Co.
8. Raven, P.H., Johnson, G.B., Losos, J.B. and Singer, S.R. 2005 Biology. Tata MC Graw Hill.
9. Brown, T. A. Gene cloning and DNA analysis 2016: An Introduction. Wiley-Blackwell Publication.
10. Sambrook & Russel. Molecular Cloning: A laboratory manual. (3rd edition) 2001 J.F. Sambrook and D.W. Russell, ed., Cold Spring Harbor Laboratory Press,

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