

**BBO-E601**  
**DSE-2 Plant Biotechnology**

MM : 100

Time : 3 hrs

Sessional : 30

ESE : 70

Pass Marks : 40

**Learning objective:**

- To understand the basic knowledge of Plant Biotechnology, global impact and current excitement of plant biotechnology.
- To acquire an overall knowledge on 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:**

At the end of course student will be able

- The student will be able to familiar with the historical back ground and recent advance in plant biotechnology, global scenario and recent trends in plant biotechnology.
- The student will be able to understand the various methods used for Cryopreservation, various methods of used in tissue culture and micro-propagation.
- The student will be learned 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 will be able take the decisions for carrier point of views in research, industries and academia entrepreneurship etc.

**Unit 1: Scope and Importance****(4 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; Potential of modern biotechnology for future and sustainable development. 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 improvements, virus resistant transgenic plants, insect resistant transgenic plants, Herbicide resistant transgenic plants, Molecular farming from transgenic plants, nutritional quality and immunotherapeutic drugs (edible vaccines, edible antibodies and edible interferon); Bioethics in plant genetic engineering.

**Unit 3: Cryopreservation****(12 Lectures)**

Introduction and Difficulties in Cryopreservation; Methods for Cryopreservation, Selection of material, addition of cyoprotectors, Storeg in liquid nitrogen, thawing, washing and re-culturing 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 and Western Blotting, Northern, 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-2 SEMESTER-VI BBO-E651(LAB COURSE-06)

1. Study of economically important plants: Wheat, Gram, Soybean, Black pepper, Clove Tea, Cotton, Groundnut through specimens, sections and microchemical tests
2. Familiarization with basic equipment's in tissue culture.
3. Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation.
4. Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE.

**Suggested readings:**

1. Dubey, R.C. A Text Book of Biotechnology. S. Chand & Company Pvt. Ltd. Ram Nagar, New Delhi-110 055.
2. Slater, A., Scott, N.W. & Fowler, M.R. 2008 Plant Biotechnology: The Genetic Manipulation of Plants, Oxford University Press.
3. Bhojwani, S.S. and Razdan 2004 Plant Tissue Culture and Practice.
4. Chrispeel, M.J. and Sadava, D.E. 1994 Plants, Genes and Agriculture. Jones and Barlett Publishers.
5. Reinert, J. and Bajaj, Y.P.S. 1997 Applied and Fundamental Aspects of Plant Cell, Tissue and Organ Culture. Narosa Publishing House.
6. Smith, R. 2000 Plant Tissue Culture: Techniques and Experiments, 2nd edition, Academic
7. Gardner, E.J. Simmonns, M.J. Snustad, D.P. 2008 8th edition Principles of Genetics. Wiley India.
- 8.
9. Russell, P.J. 2009 Genetics – A Molecular Approach. 3rd edition. Benjamin Co.
10. Raven, P.H., Johnson, GB., Losos, J.B. and Singer, S.R. 2005 Biology. Tata MC Graw Hill.
11. Brown, T. A. Gene cloning and DNA analysis: An Introduction. Blackwell Publication.
12. Sambrook & Russel. Molecular Cloning: A laboratory manual. (3rd edition)

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