SEMESTER-V

BTC DSC 301T

PLANT BIOTECHNOLOGY

Contact Hours: 45

Full Marks = 100 [ESE (70) CCA (30)]

Course Objective: *The Plant Biotechnology course is designed to provide students with a comprehensive understanding of the principles and techniques involved in the manipulation of plants for various applications. The objective is to introduce students to plant tissue culture, in vitro haploid production, protoplast isolation and fusion, somaclonal variation, industrial applications of plant tissue culture, and the creation of genetically modified plants.*

UNIT 1 *(10 Lectures)*

Plant tissue culture: definition; general techniques of plant tissue culture; culture media. **Types of culture:** seed culture; embryo culture; callus culture; organ cultures; endosperm culture. **Micropopagation:** meristem and shoot tip culture, organogenesis, embryogenesis, advantages and disadvantages of micropropagation.

UNIT 2 *(8 Lectures)*

In vitro **haploid production:** androgenic methods - Anther culture and Microspore culture; Gynogenic haploids - ovule culture and ovary culture; Significance and uses of haploids.

UNIT 3 *(10 Lectures)*

Protoplast isolation and fusion: methods of protoplast isolation (mechanical and enzymatic methods); protoplast purification. **Somatic hybridization:** mechanism of fusion - spontaneous fusion and induced fusion methods; identification and selection of hybrid cells; cybrids..

UNIT 4 *(9 Lectures)*

Somaclonal variation: methods, applications and disadvantages. **Industrial application of plant tissue culture:** secondary metabolite production; synthesis of useful compounds; biotransformation using plant cell culture.

UNIT 5 *(8 Lectures)*

Genetically modified plants: definition; methods of production (Bt cotton, golden rice and flavr savr tomato); advantages; ethical concern.

Course Outcome: *Upon successful completion of this course, students will have a solid grasp of plant biotechnology. They will be able to explain the fundamentals of plant tissue culture and its various techniques, including micropropagation and in vitro haploid production. Students will also understand protoplast isolation, fusion methods, and somatic hybridization, as well as the significance and uses of haploids. They will be familiar with somaclonal variation and its applications, particularly in industrial settings for secondary metabolite production and biotransformation. Additionally, students will comprehend the methods and ethical concerns related to genetically modified plants, such as Bt cotton, golden rice, and flavr savr tomato. This knowledge will equip them to work in various areas of plant biotechnology and contribute to advancements in agriculture and biotechnology.*

SUGGESTED READING

1. Bhojwani, S.S. and Razdan 2004 Plant Tissue Culture and Practice.
2. Brown, T. A. Gene cloning and DNA analysis: An Introduction. Blackwell Publication.
3. Gardner, E.J. Simmonns, M.J. Snustad, D.P. 2008 8th edition Principles of Genetics. Wiley India.
4. Raven, P.H., Johnson, GB., Losos, J.B. and Singer, S.R. 2005 Biology. Tata MC Graw Hill.
5. Reinert, J. and Bajaj, Y.P.S. 1997 Applied and Fundamental Aspects of Plant Cell, Tissue and Organ Culture. Narosa Publishing House.
6. Russell, P.J. 2009 Genetics – A Molecular Approach. 3rdedition. Benjamin Co.
7. Sambrook & Russel. Molecular Cloning: A laboratory manual. (3rd edition)
8. Slater, A., Scott, N.W. & Fowler, M.R. 2008 Plant Biotechnology: The Genetic Manipulation of Plants, Oxford University Press.