

20BT008 PLANT BIOTECHNOLOGY

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	-	-	-	-	-	-	-

Course Description and Objectives:

1. To understand the fundamental aspects of plant tissue culture and molecular biology of plants for the production of transgenics.
2. To understand the concepts of modern technology pertaining to large scale production of agricultural products.

Course Outcomes:

The student will be able to:

- learn the tissue culture techniques, sterilization methods, preparation of media, standardization of plant media hormones.
- understand the organ culture, somatic hybridization, fusion techniques with protoplast.
- learn genetic transformation using agrobacterium, gene organization.
- appreciate the improvement of crops using molecular markers.

SKILLS:

- ✓ Analyze the plant molecular organization, Transgenic plants.
- ✓ Analyze plant DNA sequencing

ACTIVITIES:

- o Screening of phytochemicals in any herbal species
- o Standardization of MS medium for callus induction in Tobacco plants.
- o Study on seed dormancy using mechanical scarification.

Unit - I

Plant Tissue Culture: Definitions, scope & history of plant tissue culture; Importance of plant tissue culture & biotechnology; *In vitro* culture techniques: Sterilization methods, Culture media – composition, types of medium and role of hormones in in-vitro culture; Inoculation, Incubation and Acclimatization; Callus, single cell and suspension culture and its significance.

Unit - II

Plant Tissue Culture Organ culture: Anther, Embryo & Meristem culture; Organogenesis; somatic embryogenesis and artificial seeds; Somatic Hybridization: Isolation, fusion and protoplast culture; Somoclonal Variation & cryopreservation.

Unit - III

Plant Molecular Biology: Organisation and function of Plant nuclear genome (*Arabidopsis thaliana*); Genetic transformation of plants by *Agrobacterium*: Genetic organization of Ti plasmids Functions encoded by integrated T- DNA; Molecular mechanism involved in Transformation of plants by *Agrobacterium tumefaciens*.

Unit - IV

rDNA Technology: Restriction enzymes, Cloning Vectors, gene library; cDNA library molecular probes; Molecular techniques: Electrophoresis, Southern, Northern, Western & Slot blots. Polymerase Chain Reaction. Gene delivery system: Particle gun bombardment, microinjection, electroporation; Plant Viruses, *Agrobacterium* mediated gene transfer (Biological); DNA sequencing

Unit - V

Crop Improvement and Transgenic plants: Crop improvement in terms of yield and quality; Molecular markers (RFLP, RAPD and DNA finger printing) in crop improvement program; Transgenic plants resistant to insect; Biosafety and bioethics.

TEXT BOOKS:

1. Gupta, P. K. 1994. Elements of Biotechnology. Rastogi Publications. Meerut.
2. Ignacimuthu, S., 2003. Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
3. Kalyan Kumar De., 1997. Plant Tissue Culture – New Central Book Agency (P) Ltd., Calcutta.
4. Mascarenhas A.F., 1991. Hand book of Plant Tissue Culture. Indian Council of Agricultural Research. New Delhi.

BOOKS FOR REFERENCE:

1. Grierson, D and Convey, S.N., 1988 . Plant Molecular Biology Published in the USA by Chapman and Hall, New York.
2. Dubey, R.C.1993. Text Book of Biotechnology. S. Chand & Company Ltd., New Delhi.
3. Ignacimuthu, S.1997. Plant Biotechnology . Oxford Publishing Co. Pvt. Ltd., New Delhi.
4. Trivedi P.C. 2001. Algal Biotechnology .
5. Rashid, A. 2009. Molecular physiology and Biotechnology of Flowering plants. Narosa Publishing House Pvt. Ltd., New Delhi.