

Optional Course

LS 568— PLANT BIOTECHNOLOGY [2 credits]

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S No	Topic	Contact Hours	Faculty
1.	Plant transformation: Mechanism of Agrobacterium mediated transformation, binary vectors; other methods, particle bombardment, protoplast transformation, plastid transformation, detection of transgene, identification of integration site, determination of copy number, inheritance of transgene.	4	AJS
2.	Expression systems: Constitutive and inducible expression systems, transactivation systems of plants, mGAL4- UAS/VP16-system, GVG/dex system, tTA/Top10/pTAX /TetON/OFF systems	3	PKV
3.	Mutagenesis in plants: T-DNA/transposon mutagenesis, selection of mutants from random library, promoter/enhancer trap, gene-trap constructs.	2	PKV
4.	Hybrid seed production: Negative selection markers, male sterile and restorer lines, self-incompatibility, hybrid vigor, RILs.	2	BC
5.	Genome editing: Zinc finger nuclease, TALEN, CRISPR technology, selection and application.	2	PKV
6.	Molecular markers: SSR/SSLP, CAPS/deCAPS, application of markers in forward genetics and breeding	2	BC
7.	In vitro propagation: Somatic embryogenesis, clonal multiplication and shoot tip culture, somaclonal variations, organogenesis, embryogenesis, haploid culture.	3	BC
8.	Transgenic crops for improved yield and nutritional quality: Delayed fruit ripening, improved protein and vitamin contents, plant architecture and productivity.	5	AJS
9.	Transgenic crops with improved stress resistance: GM plants with enhanced resistance against biotic and abiotic stresses.	5	BC-3; AJS-2
10.	Safety and societal concerns with GM crop	2	PKV

Suggested reading

1. Genetic transformation of plants by Kirsi Marja Oksman Caldentey
2. Plant Biotechnology; the Genetic Manipulation of plants by Adrian Slater
3. Plant Biotechnology by W G Hopkins
4. Plant cell culture basics by C Evans

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5. Plant Biotechnology: current and future applications of genetically modified crops (2006) by N G Halford
6. Handbook of plant cell culture 3 vols by Evans
7. Agribiotechnology and plant tissue culture by Bhojwani
8. Plant cell culture by G Dixons
9. Recent advances in plant biotechnology and its applications by A Kumar and S K Sopory