

Branch Name:	B.Sc. Biotechnology
ProgramCode:	SC101
CourseName:	Plant Biotechnology
CourseCode:	2SC1010604
Pre-requisiteCourse:	

Course Objectives:

1. The course is designed to acquire basic knowledge of plant tissue culture and simple outline of how the micropropagation done.
2. This will enable the student to understand basics of plant gene transfer. It will also help in acquiring knowledge on artificial gene transfer tools and methods for transgenesis.
3. This course is designed to enable students in understanding the basics and applications of plant tissue culture.
4. Understanding the Applications and Scope of Plant Genetic Engineering.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	--	3	70	30	--	--	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Overview of Tissue Culture Plant Tissue culture : History The laboratory facilities: Equipments and apparatus, Design Concepts of totipotency of cells, Concept of cytodifferentiation/ morphogenesis. Plant tissue culture media: Media composition, Types of media Selection, isolation and preparation of explant Micropropagation and its stages	12	28%
2	Techniques of tissue culture Culture of organized tissues: Root culture, shoot culture, meristem culture, embryo culture, Pollen and anther culture (production and uses of haploids.) Callus culture Protoplast culture: Somatic hybridization and its application. Somatic embryogenesis & Synthetic seeds Cell suspension culture and production of secondary metabolite Cryo preservation of germplasm	16	35%
3	Physical and chemical methods used for gene transfer in plants Agro bacterium mediated gene transfer in plants, Other biological gene transfer methods Structure of plant gene, Use of different promoters, selectable markers, reporter genes, Plant cloning vectors: Seed terminator technology	17	37%

	Chloroplast transformation – a potential alternative to nuclear transformation Transgenic plants: Insect resistance-BT Cotton, herbicide resistance, Disease resistance, Stress tolerance, improvement of crop quality molecular pharming Post-harvest technology: RNAi and antisense RNA technology for extending shelf life of fruits (delay of softening and ripening of fleshy fruits eg. tomato)		
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Text Books:

- Biotechnology in crop improvement – H S Chawla.
- Biotechnology-U. Satyanarayan.

Reference Books:

- Plant biotechnology – J Hammond, et. al., Springer Verlag.
- Practical application of plant molecular biology – R J Henry, Chapman & Hall.
- Elements of biotechnology – P K Gupta.
- An introduction to plant tissue culture – M K Razdan.
- Plant propagation by tissue culture: The technology (Vols. 1 & 2) – Edwin George.
- Handbook of plant cell culture (Vols. 1 to 4) – Evans et. al., Macmillan.
- Plant tissue and cell culture – H E Street, Blackwell Scientific.
- Cell culture and somatic cell genetics of plants (Vols. 1 to 3) – A K Vasil, A. Press.
- Plant cell culture technology – M M Yeoman.
- Plant tissue culture and its biotechnological applications – W Bary, et. al., Springer Verlag.
- Principles of plant biotechnology: An introduction to genetic engineering in plants – S H Mantel, et. al.
- Applied and fundamental aspects of plant cell tissue and organ culture edited by Reinert & Bajaj Y P S, Springer Verlag.
- Plant cell and tissue culture – S Narayanswamy, Tata McGraw Hill Co
- Das and Mookerjee. Outline of biology.
- Plant tissue culture K.K. De.
- Plant and tissue culture Radint and Bhojwani.

List of Open Source Software/learning website:

<https://www.youtube.com/watch?v=EDReGW95EGk>

<https://www.youtube.com/watch?v=HHYDmfj4ojk>

<https://www.youtube.com/watch?v=vPkI34wXAHl>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Discuss the developing an understanding towards fundamentals of plant biotechnology.	2 Understanding
CLO2	List the applications of Plant Biotechnology.	1 Remembering
CLO3	Enabling students to understand types, advantages and disadvantages molecular markers.	2 Understanding,
CLO4	Development of capacity to formulate application of plant biotechnology for production of commercial transgenic plants.	3 Applying, 2 Understanding
CLO5	Learn about biocatalysts, evaluate diseases resistant associated with plant, identify and compare the conventional propagation and micropropagation.	5,3, 4 Evaluate,Applying, Analyze
CLO6	Discuss the mechanisms involved in gene transfer in plant.	6 Creating

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	M	M	H	H		M	H	L		L	L	H		M	L
CLO2	M	H		M	M	M	M	H	M		M	L	M		
CLO3		M	H			M	M		L	H		H	H		M
CLO4	H	H		M			H	M	H		M	L		M	L
CLO5	H	M	M	L	H	M	M			M		M	M		M
CLO6	M	L	M		M	L		M			M		L	M	

H:High, M:Medium, L:Low