Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Empowered Autonomous Institute)

NAAC A+ Grade (4th Cycle) with 3.49 CGPA,
UGC-CPE (Phase-III) & DST-FIST Status

Structure and Curriculum of Certificate Course

in

Plant Tissue Culture and Plant Molecular Biology

(Under PM-USHA)

Approved by

Board of Studies in Botany

Rajarshi Shahu Mahavidyalaya, Latur
(Empowered Autonomous Institute)

w. e. f. December, 2025

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

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Certificate Course under PM- USHA

Plant Tissue Culture and Plant Molecular Biology

SYLLABUS

(Free of Cost Certificate Course)

Credits: 02 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1 To analyse the effective media and plant tissue culture techniques.

LO 2 To understand different cells and organs used in tissue culture.

LO 3 To evaluate the various culture techniques in plant tissue culture.

LO 4 To explain genome organization, gene expression and regulation in eukaryotes.

Course Outcomes:

After completion of course, the student will be able to-

CO 1 Analyze the effective media and plant tissue culture techniques.

CO 2 Explain different cell and organs used in tissue culture.

CO 3 Evaluate the various culture techniques in plant tissue culture.

CO 4 Explain genome organization, gene expression and regulation in eukaryotes.

Unit No.	Title of Unit & Contents	Hrs.
I	**Introduction of Plant Tissue Culture**	**06**
	i. History of plant tissue culture ii. Tissue Culture Laboratory iii. Equipment's in Tissue Culture Laboratory iv. Preparation of Media, Media Composition, Plant Growth Regulators and their role v. Selection of explants and Sterilization Techniques vi. Process of plant tissue culture.	
	Unit Outcome: UO 1. Analyse the effective media and plant tissue culture techniques.	
II	**Cell and Organ Culture**	**04**
	i. Plant organ culture ii. Shoot apical meristem iii. Shoot tips Culture	

Unit No.	Title of Unit & Contents	Hrs.
	iv. Root, Leaf, Flower, Ovary culture v. Embryo rescue vi. Protoplast culture and Somatic Embryogenesis	
	Unit Outcome: UO.1 Explain different cell and organs used in tissue culture.	
III	**Single Cell Culture and Techniques**	**04**
	i. Regeneration of protoplast ii. Synthetic seeds iii. Cryopreservation of plant cells iv. Micropropagation v. Application of plant tissue culture	
	Unit Outcome: UO 1. Describe the various culture techniques of plant tissue culture.	
IV	**Plant Molecular Biology**	**02**
	i. Genome Organization in Higher plants **ii.** Gene Expression and Regulation in Eukaryotes	
	Unit Outcome: UO 1. Describe genome organization, expression and regulation in eukaryotes	

Practical No.	Unit	14
1	Study of Equipments used in Plant Tissue Culture.	
2	Study of Sterilizing techniques used in Plant Tissue Culture.	
3	Preparation of MS medium..	
4	Study of in-vitro selection, sterilization and inoculation of explants for callus culture.	
5	Study of characterization of callus.	
6	Study of Micro propagation.	
7	Study of Somatic Embryogenesis	
8	Study of embryo culture	

Learning Resources:

1. Plant cell culture: Secondary metabolism towards industrial application- Dicosmo F and Misawa M, Edt 1996, CRC press, Boca Raton, N.Y.
2. Principles of gene manipulation. Primrose SB, Twyman RM and Old RW, 6th Edition, Blackwell Science, Oxford, 2001
3. Secondary products from plant tissue culture- Charlwood B.V. and Rhodes MV Edt. 1999, Clarendon Press, Oxford. Shepherd RJ, NY Acad. Of Science Publishers 1996.
4. Robert Smith. Plant tissue culture: Techniques and Experiments. South Asia Edition.
5. Gamborg and Phillip. Plant Cell, Tissue and Organ Culture. Narosa.
6. Dixon and Gonzales. Plant Cell Culture.
7. Panima. Narayanswamy. Plant Cell and Tissue Culture.
8. Mc Graw Hill. Bhojwani, S.S. and Rajdan, M.K. Plant Tissue Culture: Theory and Practices arevised Edition. Elsevier.
9. Razdan, M.K. Introduction to plant tissue culture. Oxford & IBH Publishers.
10. Chawla, H.S. Introduction to Plant Biotechnology. Oxford & IBH Publishers.

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