

**B.Sc. Biotechnology (Entire)
Diploma Course**

Plant Tissue Culture

Syllabus for Certificate Course (UG)
RayatShikshanSanstha's
YashavantraoChavan Institute of Science, satara
Syllabus Introduced from June, 2018
B. Sc. Part II Biotechnology (Entire)

Semester III

CT-III: D *T 303: Title:Plant Tissue Culture

Contact Hrs: 30

Credits:02

Learning Objectives:

1. Study of callus, organ, anther and pollen culture Technique.
2. Study of suspension and protoplast culture Technique.

Unit 1:

(15 Lectures)

Callus Culture Techniques- Introduction, principle, protocol, morphology and internal structure, genetic variations, applications. **Organogenesis** - Introduction, principle, protocol, applications.

Organ Culture Technique- Introduction, principle, protocol, applications, with respect to root tip culture, leaf culture, ovary and ovule culture.

Anther & Pollen Culture Technique- Introduction, principle, protocol, factors affecting, applications

Unit 2:

(15 Lectures)

Suspension Culture Technique- Introduction, principle, protocol, types, growth measurement, viability test, synchronization, applications.

Plant Protoplast Culture and Fusion :-History, Principle, protocol for isolation- Mechanical and Enzymatic, protoplast culture methods, viability test Applications

Learning Outcomes per unit

1. Knowledge about callus, organ, anther and pollen culture technique.
2. Know technique of suspension and protoplast culture.

Recommended Books:

1. Plant Biochemistry and Molecular Biology Second Edition Edited by Peter J. Lea and Richard C. Leegood, John
2. Wiley & Sons Ltd, Chichester, United Kingdom, 1999

3. Gone to seed. Union of Concerned Scientists. Mellon and Rissler. 2004.. Cambridge, USA
4. Unintended consequences of plant transformation: A molecular insight. Filipecki and Malepszy. 2006. J. Appl. Genet. 47(4): 277-286.

CL-III: D* L303: Title: Techniques in Plant Tissue Culture I

Contact Hrs: 60 Credits: 02

Learning Objectives:

1. Students will be able to work in tissue culture for every plant
2. Students will be able to work in tissue culture industry
3. Students will be able to various aseptic techniques
4. Students will be able to develop callus culture

Practical's:

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|---|------|
| 1. . Aseptic seed germination | (02) |
| 2. Synthesis of artificial seeds | (02) |
| 3. Embryo / Endosperm Culture | (02) |
| 4. Callus culture technique- Initiation of culture, callus morphology | (02) |
| 5. Cell suspension culture | (02) |
| 6. Anther and Pollen Culture technique | (02) |

Learning Outcomes:

After completion of the practical's, Student is able to work properly in tissue culture industry

Recommended Books:

1. Gone to seed. Union of Concerned Scientists. Mellon and Rissler. 2004.. Cambridge, USA
2. Unintended consequences of plant transformation: A molecular insight. Filipecki and Malepszy.

Semester IV

CT-IV:D *T 404: Title: Plant Tissue Culture

Contact Hrs: 30

Credits: 2

Learning Objectives:

1. Study of somatic embryogenesis and somaclonal variation.
4. Study of micropropagation Technique.

Unit 1:

(15 Lectures)

Somatic embryogenesis - Process of somatic embryogenesis, structure, stages of embryo development, factors affecting embryogenesis; production of artificial seeds; Cryopreservation
Somaclonal Variation- Introduction, terminology, origin, selection at plant level, selection at cell level, mechanism, assessment, applications and limitations. somaclonal variations for Biotic & Abiotic stress.

Unit 2:**(15 Lectures)**

Micropropagation- Introduction, stages of Micropropagation, factors affecting, advantages and applications. Different Pathways of Micropropagation- Axillary bud proliferation, organogenesis, meristem culture.

Learning Outcomes per unit

1. Learn technique of somatic embryogenesis and somaclonal variation.
2. Learn micro propagation Technique.

Recommended Books:

1. Plant Physiology (Taiz, L and Zeiger, E.) 1991; Biotechnology in Agriculture (Bajaj series, (Vol 1-20)1990-1999,
2. Journal of Plant Physiology; Agro-biotechnology related journals.
3. Introduction to Quantitative Genetics (Falconer, D.S.) 1989;
4. Developmental Regulation of Plant Gene Expression (Grierson, D. ed.) 1991; Reviews and current

CL-IV:D* L404: Title (Practical): Techniques in Plant Tissue Culture II

Contact Hrs: 60

Credits: 02

Learning Objectives:

- Students will be able to work with Genomic DNA
- Students will be able to Fusion technique
- Students will be able to do professionally individual tissue culture lab
- Students will be able to work in gene transferring techniques

Practicals:

1. Isolation of Protoplasts (02)
2. Protoplast fusion (02)
3. Somatic Embryogenesis : A) Direct Embryogenesis (02)
B) Indirect Embryogenesis (02)
4. Isolation of plant genomic DNA by modified CTAB method (02)
5. Separation of plant genomic DNA by Agarose gel electrophoresis (02)

Learning Outcomes:

After completion of the practical's, Student is able to work properly in tissue culture industry

Recommended Books:

1. The Genetic Analysis of Quantitative Traits (Kearsey, M.J. and Pooni, H.S.) 1996;
2. Plant Breeding: Theory and Practice (Stoskopf, N.C., Tomes, D.T. and Christie, B.R.) 1993.

CP-II:D *P202:Project

(Contact Hrs.60, Credits:2)

Industrial and or Incubation and or Research and or Field Training

(Contact Hrs.60, Credits: 2)

C: Course, T: Theory, L: Lab (Practical), P: Project

Total No. of Papers: 06 (Theory: 02, Practical: 02, Project: 01)

Theory and Practical: Semester, **Project: Annual**