

Introduction-

The success of plant biotechnology relies on the fundamental techniques of plant tissue culture. Understanding basic biology of plants is a prerequisite for proper utilization of the plant system or parts thereof. Plant tissue culture helps in providing a basic understanding of physical and chemical requirements of cell, tissue, organ culture, their growth and development. Establishment of cell, tissue and organ culture and regeneration of plantlets under in vitro conditions has opened up new avenues in the area of plant biotechnology.

PTC is a collection of technique used to maintain or grow plant cell, tissue or organs under sterile condition on a nutrient culture medium of known composition. PTC is used to produce clones of a plant in a method known as micropropagation. PTC is the rapidly expanding field of botany. This certificate course may help entrepreneurs & students for

- Getting hands on training of plant tissue culture.
- Setting a small scale or large scale commercial unit to produce seeds & crops for business purpose.
- Research and development in production of better varieties of plants, seeds, fruits, crops etc.

The motivation behind to start this course to produce a preliminary as well as introductory text to undergraduate, graduate, post graduate students so that student may very well understand the theoretical & applied aspects of plant tissue culture

Special care has been taken to present the subject matter as per need of students and include maximum recent information available up-to-date.

It is hoped that the course would be useful to students & entrepreneurs in generating enough interest to inspire the inquisitive mind.

Infrastructure –

1. Classroom

Spacious airy classroom with teaching aids – Public address systems, slides LCD projectors collar-mikes to address the students and set a stage for open discussion and debates among the students. The class rooms have capacity of 100 students at once.

2. Library –

More than 5000 books of different streams are available in the library.

- Well-stacked with books, newspapers, periodicals.
- Comfortable seating arrangement.

3. Lab Facilities –

We have separate commercial tissue culture laboratory. The laboratory is fulfilled with

1. Glassware washing room.
2. Media preparation room
3. Inoculation room
4. Growth room
5. Green House

4. Instruments & Equipment available:

1. Microscope
2. Incubator
3. Analytical & Digital Electronic Weighing Balance
4. Laminar Air flow
5. Homogenizer
6. Magnetic stirrer

5. COMPUTER LABORATORY –

To house at least 50 Personal Computers and students.

6. CANTEEN –

Canteen for food and snacks.

Admission Procedure

Eligibility Criteria -

12th Science (AB/B Group),
B.Sc. (Botany, Biotechnology Agriculture, Horticulture, Agriculture Diploma),
M.Sc. Biotechnology

Selection Process: -

Students desire in applying should submit duly filled in application form along with requisite certificate.

Attested document to be submitted with the application form.

The applications will be scrutinized & based on the Merit the applicants will be preferred.

Intake Capacity –

40 Students will be allotted in a batch.

Duration –

Duration of the course is of 6 months.

Medium of Instruction-

Medium of Instruction will be English.

Fee Structure

Sr. No.	Particulars	Fee (Rs.)
1	Admission Fee	150
2	Tution Fee	2100
3	Library Fee	200
4	Laboratory Fee	1200
5	Examination Fee	150
6	Laboratory Deposit	100
7	Certificate Fee	200
8	E-mail/Internet Fee	150
Total		4150/-

Lokmangal Biotechnology College, Wadala
Syllabus for Plant Tissue Culture-certificate course
(Implemented from November 2013 onwards)
(THEORY)
Paper

Syllabus for Certificate Course in Plant Tissue Culture (PTC)

Unit I - Introduction and History to Plant Tissue Culture

Concept of cell culture, development of tissue culture, role of hormones, Landmark contribution, The major tool in the study of fundamental and applied problems in plant science, objectives and goals, future prospects.

Unit II - Laboratory design & equipment for Plant Tissue Culture (PTC).

Laboratory organization, Preliminary design of a PTC-Washing and Storage facilities, Media preparation room, Transfer area, culture room, data collection area and specialized facilities, Transplantation area. Equipment, Instruments, Glassware and plastic ware

Unit III - Culture media for PTC.

Media Composition – Inorganic Nutrients (Macro & Micro nutrients), Carbon & energy source, organic supplements, (Vitamins, amino acids, other organic supplements, activated charcoal), Growth regulators (Auxins, Cytokine, ABA, GA, etc) Solidifying agent, pH.
Media Preparation- Stock solution preparation, selection of new media

Unit IV- Sterilization Techniques

Types and Methods of sterilization –

Moist heat, dry heat, Tyndalisation, filter sterilization, Air sterilization. Sterilizing the culture Vessels and instruments, sterilization of Nutrient Media, Sterilizing culture room and transfer area. Aseptic culture technique surface sterilization, Transfer of explants.

Contaminants of PTC – Bacteria, fungi, Yeast, Viruses and MLOs, Insects. Laboratory Safety.

Unit V – Cellular totipotency and cell culture.

Concept of cellular totipotency cytodifferentiation.

Callus Culture –introduction, definition, principle, Method, applications.

Cell culture-method of isolation of single cell.

Suspension culture – definition, principle, types, Methods. Culture Media, Measurement of growth culture. Viability testing. Culture of isolated single cell, plating technique, plating efficiency.

Unit VI – Micropropagation.

Definition, Introduction, Stages, application.

Micropropagation by using axillary bud, Advantages & disadvantages of Micropropagation.

Use of bioreactor for Micropropagation.

Unit VII -Organ Culture.

Definition, history, importance of organ culture.

Different types of organ culture-

Root culture- definition, principle, protocol, applications.

Shoot/Meristem culture- definition, principle, protocol, applications.

Flower culture/complete flower culture- definition, principle, protocol, applications.

Ovary and ovule culture- definition, principle, protocol, applications

Organogenesis-Definition, history, importance, principle, protocol, applications, factors affecting organogenesis.

Haploid production- Anther and pollen culture- Definition, history, importance, principle, protocol, androgenesis, homozygous plant, significance of haploid culture.

Unit VIII - Somatic embryogenesis and artificial seeds, embryo culture.

Somatic embryogenesis Definition, history, importance, principle, protocol, applications, embryonic potential, embryoid. factors affecting Somatic embryogenesis.

Artificial seed- Definition, method of preparation of artificial seed, importance.

Embryo culture-Definition, history, importance, principle, protocol, application, objectives.

Unit IX – Single cell and plant protoplast culture, fusion, somatic hybridization.

Single cell culture- Definition, history, importance, principle, protocol, applications, factors affecting single cell culture

Plant protoplast culture - Definition, history, importance, principle, protocol, methods of isolation of protoplast, protoplast culture technique properties of isolated protoplast applications.

Protoplast fusion and somatic hybridization- introduction methods of protoplast fusion, mechanism of protoplast fusion, hybrid identification hybrid isolation post fusion events cybrids, importance of protoplast fusion and somatic hybridization.

Somaclonal variation – mechanisms, application.

Unit X – Applications of Plant Tissue Culture

Production of disease free plants

Clonal propagation

Industrial applications: secondary metabolite production

Biodiversity and Conservation of Germplasm: Introduction, Cryopreservation, Reduced Growth Rate, Pollen bank, encapsulation, Practical application, Protocol for cryopreservation, Simple

Freezing Method, Restoration

PTC IV: Practicals in Plant Tissue Culture certificate course

1. Introduction to plant tissue culture laboratory and instruments
2. Preparation of stock solutions for plant tissue culture media preparation
3. Sterilization methods and preparation of sterile plant culture media
4. Isolation of explants and its surface sterilization for establishment of culture
5. Micropropagation by proliferation of axillary bud
6. Micropropagation by adventitious shoot proliferation
7. Maintenance and establishment of callus culture and suspension culture
8. Subculture of callus and organogenesis of explants
9. Microspore/anther culture for haploid production
10. Isolation and culture of protoplast
11. Embryogenesis and embryo culture
12. Preparation of synthetic seeds from somatic embryos
13. *In vitro* pollination and culture of ovary/ovule