

DEPARTMENT OF BOTANY

ADD ON COURSE IN PLANT TISSUE CULTURE (54 Hours)

Course Objectives

The student should be able:

1. To familiarize with the tools and techniques of plant tissue culture
2. To understand the possibility for the production of elite plants
3. To apply the technique in micropropagation of plants
4. To establish a commercial micropropagation unit

Paper I. Fundamentals of Plant Tissue Culture 1 credit

Paper II. Applications of Plant Tissue Culture 1 credit

Paper III – Practical, Field Work, Project, Training 1 credit

Paper I – Fundamentals of plant tissue culture - 18 hours - 1 credits

1. Introduction and historical background of Plant Tissue Culture.
2. General Laboratory Techniques.-Maintenance of Laboratory.-Laboratory Space.-Culture Room Culture vessels and washing
3. Equipments Principle and working - pH meter, Hot air oven, Autoclave, LAF, Rotary Shaker.
4. Sterilization techniques- Dry heat sterilization, Wet Heat sterilization and Surface sterilization of explants-Surface sterilants -different Methods.
5. Media preparation, Composition of Nutrient Media, Role of components, Method of preparation of Stock solution, preparation of Growth regulators. Calculations
- 6 Inoculation -Laminar Air Flow, Procedure of inoculation
7. Incubation -Maintenance of inoculation record, subculture and temperature control, Humidity
8. Hardening Techniques.

Paper II. Applications of Plant Tissue Culture - 18 hours - 1 credits

1. Callus culture, suspension culture- choice of explants subculture Estimation of growth of cells in culture.
2. Regeneration -Shoot regeneration, Somatic embryogenesis.
3. Brief study of - Anther culture, Ovary culture, Meristem culture, Embryo culture, Protoplast culture, hybridization.
4. Somaclonal variation - genetic basis of somaclonal variation.
5. Synthetic seeds - Preparation and Importance.

Paper III practical - 18 hours - 1 credits

1. Preparation of Standard tissue culture media -MS and White's. Preparation of Stock solution, Preparation of hormones, cotton bungs.
2. Method of preparation of Media, Sterilization of media.

3. Collection of explants Sterilization, inoculation of explants-leaf; root, shoot, anther, ovary and embryo.
4. Preparation of synthetic seeds
5. Maintenance of cultures, Sub culturing at periodical intervals.
6. Hardening of rooted plantlets.

Field work, project, training

Collection of plant Material with medicinal and economic importance. Establishment in field, Selection of explants, contamination free cultures

References

1. Keshavachandran R & Peter KV (2008) Plant Biotechnology: Methods in Tissue Culture and Gene Transfer. Orient & Longman (Universal Press)
2. S S Bhojwani, M K Razdan (1996). Plant tissue culture: Theory and Practice. Elsevier.
3. L Gamborg, G C Philips (Eds.) (2005). Plant cell, tissue and organ culture: Fundamentals. Narosa Publishing House.
4. S Ignacimuthu (2006). Biotechnology: An introduction. Narosa Publishing House.
5. Edwin F George (1993) plant propagation by tissue culture part I and II The technology. Exegetics ltd.
6. Kalian Kumar De (2003) An introduction to plant tissue culture, New central book agency pvt. Ltd.

EVALUATION

Paper I. Fundamentals of Plant Tissue Culture 1 credit

Paper II. Applications of Plant Tissue Culture 1 credit

Paper III – Practical, Field Work, Project, Training 1 credit

- There shall be a maximum of four papers of 100 marks for the course
- The fourth paper shall be the field work/project work/training. The other three papers shall be theory/and practical papers.
- For the first three papers 50% marks will be set apart for continual internal evaluation and 50% marks will be for the final written examination.
- A separate minimum of 50% marks should be secured for a pass in both internal and written examination.
- The report of the field work/project work/training will be evaluated by the duly appointed examiners and the same may be presented before the career orientation council for approval at the end of the course.
- Students who failed to attain the minimum required marks in the continual internal evaluation should repeat the course, and those failed in the written examination can appear along with subsequent junior batch.
- The continual evaluation marks for each paper may be recorded in form A and the consolidated marks for each paper in form B. The grading can be done in the following way:

- Range of % of total marks Grade

[90 – 100] Outstanding (A+)

[80 – 89] Excellent (A)

[70 – 79] Very good (B+)

[60 – 69] Good (B)

[50 – 59] Satisfactory (C)

Below 50% Failed

- The continual evaluation marks can be awarded in the following manner:

Test papers (minimum 2) 20 marks

Seminar/viva 10 marks

Assignments 10 marks

Attendance 10 marks

Total **50 marks**

MODEL QUESTION PAPER

S. B. COLLEGE CHANGANACHERRY ADD-ON COURSE EXAMINATION PLANT TISSUE CULTURE

Time – 2 Hrs.

Max. mark - 40

Part A

(Answer all questions. Each carrying 1 mark)

1. Give an example for a synthetic auxin
2. What is the pH of MS medium?
3. Name any chemical fusogen
4. Give the sterilization temperature and pressure
5. What is the use of polyoxy ethylene?
6. What are cybrids?
7. What is callus?
8. What is the use of EDTA in MS medium?
9. What is androgenesis?
10. Who is the father of plant tissue culture?

Part B

(Answer any 15 questions. Each carrying 2 marks)

11. Differentiate between dedifferentiation and redifferentiation
12. What is indirect somatic embryogenesis?
13. What are hydrated synseeds?
14. What is the relevance of synthetic seeds?
15. Differentiate between wet heat and dry heat sterilization
16. How protoplast is isolated for protoplast culture?
17. What are the applications of meristem culture?
18. What is surface sterilization?
19. Briefly explain the components of MS medium
20. Write a short note on hormones used in tissue culture
21. Differentiate between habituation and acclimatization
22. List the applications of tissue culture?
23. What is embryo rescue?
24. Differentiate between batch callus culture and continuous callus culture.
25. What is paper raft nurse technique?
26. Explain organogenesis
27. Explain the significance of haploid culture
28. What is somaclonal variation?
29. What are the limitations of tissue culture?
30. Explain about the products of somatic cell hybridization.