

SUBJECT OUTLINE DETAILS

1. Subject: Plant Tissue Culture

- **Code:** BT 308/BT305C
- **Credits:** 3 credits
- **Hours:** 30 theory hours, 30 practice hours, and 60 self-study hours.

2. Management Unit:

- **Department:** Biochemistry and Plant Physiology
- **Faculty/School/Institute/Center/Department:** Agriculture and Applied Biology

3. Prerequisites: General Biology, Plant Physiology

4. Subject objectives:

4.1. Knowledge:

- 4.1.1. Upgrade terminology of tissue culture
- 4.1.2. Help students to understand principles of tissue culture from cell or tissue generating to plant
- 4.1.3. Supply a basic knowledges of plant physiology, function of hormone, mineral and environment effecting to asexual propagation

- 4.1.4. Apply knowledge in production

4.2. Skill: Students should be able to:

- 4.2.1. Know how to prepare explant, medium, inoculation, multiplication in lab
- 4.2.2. Design and to manage nursery of acclimatization stage
- 4.2.3. Enjoy internal lab or external lab of plant tissue culture
- 4.2.4. Work in group, prepare solutions and conduct lab. tissue culture experiments and exercises
- 4.2.5. Write individual or grouped report

4.3. Attitude:

Successful completion of this course, students should lead to the following outcomes:

- + To behave kindly to colleague
- + To have passion for tissue culture

5. Brief description of subject content:

Principles, methods, and applications of plant tissue culture. Laboratory is important part of course. Topic include callus culture, regeneration, somaclonal variation, micropropagation, anther culture. The course also is mentioned to problems of tissue culture and how to overcome it.

6. Subject content structure:

6.1. Theory

Content	Hours	Objectives
Chapter1. Introduction	2	
1.1. Introduction		4.1.1
1.2. Glossary of terms commonly used in plant tissue culture		4.2.1
Chapter 2. Principles of tissue culture	6	
2.1. Define of totipotency of plant cell		4.2.1
2.2. Initial materials for propagation		4.1.2
2.3 Laboratory requirements and general techniques		4.2.4
Chapter 3 Culture medium	8	
3.1. Components and fuction of minerals in culture medium		4.1.3
3.2. Briefly prepare culture medium		4.1.2
3.3. Preparation of explants for inoculation in vitro		4.1.3
3.4. Phytohormone used in plant tissue culture		
Chapter 4 In vitro plantlet problems and solving	8	
4.1. Contamaination		4.2.1
4.2. Genetic variation of plantlets in micropropagation		4.1.3 & 4.2.2
4.3. Morphological variation of plantlets		4.1.3 & 4.2.1
4.4. Hyperhydricity		4.1.3 & 4.2.2
Chapter 5 Application of plant tissue culture	6	
5.1. Micropropagation		4.1.4
5.2. Plantlet production of virus free		4.1.4
5.3. Hybrid plant		4.1.4
5.4. Production of in vitro plants		4.1.4

6.2. Practice

Content	Hours	Objectives
Unit 1. Preparation of culture medium	4	
1.1. Components of culture medium (macro, micro elements, vitamins, hormones, carbohydrates)		
1.2. Sterilization		
Unit 2. Aseptic manipulation and inoculation of plant material	4	
2.1. Aseptic explants		
2.2. Inoculation		
Unit 3. Subculture technique	10	
Unit 4. Acclimatization	12	
4.1. Preparation of plantlets for acclimatization		
4.2. Take care plantlets		

7. Teaching method:

Lectures will emphasize on theories, followed by worked examples during practical session and further applications to problems of interest in plant cell culture

8. Duties of student:

Students have to do the following duties:

+ Discuss basic laboratory requirements, media, and sterilization method for culturing plant

+ Should adhere to the rules of attendance as stated in the University Academic Regulation

+ Must attend not less than 80% of lecture hours as required for the course.

The student is prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given for the course

9. Assessment of student learning outcomes:

9.1. Assessment

No.	Point components	Rules and Requirement	Weights	Objectives
1	Assignment	Individual	10%	
2	Lab. report	Group	20%	
3	Final exam	Individual	70%	

9.2. Grading

- Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place.

- Subject score is the sum of all the components of the evaluation multiplied by the corresponding weight. The subject score is marked on a scale of 10 and rounded to one decimal place, then is converted to A-B-C-D score and score on a scale of 4 under the academic provisions of the University.

10. Materials:

Materials information	Code number
Plant tissue culture concepts and laboratory exercises / Edited by Robert N. Trigiano, Dennis J. Gray.- Boca Raton, Florida: CRC press, 1996.- 375 p., 26 cm, 0849394090.- 581.0724/ P713	MON.009712
Experiments in plant tissue culture / John H Dodds, Lorin W Roberts.- 2nd.- New York: Cambridge University Press, 1985, 232p., 0 521 30478 4.- 581.0724/ D639	NN.010699
Agrobiotechnology and plant tissue culture / Edited by Sant S. Bhojwani, Woong-Young Soh.- Enfield, N.H.: Science Publishers, 2003.- 197 p., 25 cm, 1578082439.- 631.5233/ A278	MON.014095
Plant tissue culture : Methods and applications in agriculture /	NN.011429

edited by Trevor A. Thorpe.- New York: Academic Press, 1981.- x, 379 p. ; ill., 24 cm, 0126906807.- 580.0724/ P713

Plant tissue culture and gene manipulation for breeding and formation of phytochemicals: Proceedings of the German-Japanese Joint Meeting on "Plant Tissue Culture", 19-21 February 1992, Tsukuba, Japan / Edit. by K. Oono... [et al.].- Tsukuba, Japan: National Institute of Agrobiological Resources (NIAR), 1992.- 395 p., 27 cm, 4990011031.- 631.5/ P713

[NN.015871](#)

1. Hand-out of plant tissue culture
2. George, E.F. 1993. Plant Propagation by Tissue Culture, 2nd edition, Exegetics Limited
3. Ranaweera, K.K.D.S, R. Pathirana. 1997. An introduction to the theory and practice of plant tissue culture. Dept. of Agronomy, Fal. Of Agriculture, Kamburupitiya
4. Bhojwani, S.S., Razdan, M.K. 1996. Plant Tissue Culture: Theory and Practice, a Revised Edition. Elsevier.
5. Hall, R.D. 1999. Plant cell protocol. Humana Press Inc. 999 River view Drive, Stute 208
6. Salisbury, F. B. Units, symbols, and terminology for plant physiology. New York Oxford. Oxford University Press. 1996
7. Taiz, L., Zeiger, E. 2002. Plant Physiology, 3rd ed. Sinauer

11. Self-study Guide:

Week	Content	Theory (hours)	Practice (hours)	Students' duties
1	Introduction	2		Read hand out, Plant Propagation by Tissue Culture, Units, symbols and terminology for plant physiology.
2-4	Principles of tissue culture + Lab. report	6	4	Read : An introduction to the theory and practice of plant tissue culture. Hand out of practice in lab, P.1-3
5-9	Culture medium + Lab. report	8	10	Read : An introduction to the theory and practice of plant tissue culture. Plant Physiology, 3rd ed. Sinauer. Hand out of practice in lab. P. 4-7
10-14	In vitro plantlet problems and solving + Lab. report	8	10	Plant Physiology, 3rd ed. Sinauer. Plant cell protocol. Hand out of practice in lab. P. 8-11
15-	Application of plant	6	6	Plant cell protocol. Hand out of

16	tissue culture + Lab. report			practice in lab. P. 12-13
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**ON BEHALF OF RECTOR
DEAN/ DIRECTOR**

HEAD OF DEPARTMENT