



Course outline for Introduction to Plant Tissue Culture and Propagation

Course Code: Biol 3131:

Course Credit: 2 (1 theoretical classes + 1 practical /week)

Pre-requisite: Plant Physiology (Biol2024)

Course status: Elective

Target group: 3rd Year Biology Students

Instructors Name: *Muhammed Seid*

1. Course Description

Laboratory organization of plant tissue culture; medium and sterilization techniques; different types of cultures; micro propagation; cell suspension and secondary metabolites; in vitro production of haploids; protoplast isolation and fusion; somaclonal variation; germplasm storage and cryopreservation; micropropagation and other propagation methods.

2. Course objectives

After completing the course, the students should be able to:

- ✚ Master the basic principles and skills regarding techniques, practices and procedures of plant tissue culture (Micropropagation), asepsis, laboratory plan, equipment and facilities, and green house growing.
- ✚ Discuss applications of plant tissue culture.
- ✚ Practice the most common methods of plant cell and tissue culture.
- ✚ Propagate rare and endangered plant species by laboratory method.

3. Tentative Course Schedule

Time	Topics/Contents	Readings
Week one	1. Introduction 1.1. Definition 1.2. Applications 1.3. History 2. Facilities and supplies	George, E., M. Hall, G. Klerk (eds.), 2007. Plant propagation by tissue culture. 3 edition.vol.1
Week two	2.1. Organization of a tissue culture laboratory 2.2. Equipment and supplies 2.3. Basic technique 3. Tissue culture media	George, E., M. Hall, G. Klerk (eds.), 2007. Plant propagation by tissue culture. 3 edition.vol.1
Week three	3.1. Media components 3.2. Media preparation 4. Callus and cell culture 4.1. Callus induction 4.2. Callus culture Test One=10%	George, E., M. Hall, G. Klerk (eds.), 2007. Plant propagation by tissue culture. 3 edition.vol.1
Week Four	4.3. Cell suspension culture 5. Micropropagation 5.1. Applications 5.2. Micropropagation types 5.3. Micropropagation stages	George, E., M. Hall, G. Klerk (eds.), 2007. Plant propagation by tissue culture. 3 edition.vol.1
Week Five	6. Organogenesis 7. Embryogenesis 8. Anther/microspore culture Test Two=10%	George, E., M. Hall, G. Klerk (eds.), 2007. Plant propagation by tissue culture. 3 edition.vol.1
Week six	9. Embryo culture 10. Protoplast culture 11. Somaclonal variation Assignment=10%	George, E., M. Hall, G. Klerk (eds.), 2007. Plant propagation by tissue culture. 3 edition.vol.1
Week Seven	12. Plant transformation 13. Germplasm preservation	George, E., M. Hall, G. Klerk (eds.), 2007. Plant propagation by tissue culture. 3 edition.vol.1
Week Eight	✚ Final Exam=50%	

Laboratory schedule for the course Biol3131 * ???**

Time	Activity	Topics/Contents	Readings
Week three	Session one	☞ Meristem culture (could be done from many plant species)	Laboratory Manual
Week four	Session Two	☞ Tissue culture (explants from tobacco could be used)	Laboratory Manual
Week Five	Session Three	☞ Cullus culture: initiation and regeneration	Laboratory Manual
Week Six	Session Four	☞ Haploid culture (pollen could be used)	Laboratory Manual
Week Seven	Session Five	☞ Protoplast isolation	Laboratory Manual

3. Mode of Assessment Methods:

Tests	20%
Assignment.....	10%
Laboratory Activities and Reports.....	20% *** ???
Final written exam.....	50%
Total	100%

4. References:

1. Agrawal, R.L., 1998. Fundamentals of plant breeding and hybrid seed production. Oxford and IBH publishing, New Delhi.
2. Bhojwani, S. and M. Razdan, 1996. Plant tissue culture: Theory and Practice. Department of Botany University of Delhi. Amsterdams, the Netherlands, revised edition. pp. 26 - 33
3. George, E., M. Hall, G. Klerk (eds.), 2007. Plant propagation by tissue culture. 3 edition. vol.1
4. IAEA (International Atomic Energy Agency), 2004. Low cost options for tissue culture technology in developing countries. Proceedings of a technical meeting organized by the joint FAO/IAEA division of nuclear techniques in food and agriculture and held in Vienna, 26–30. http://www-pub.iaea.org/MTCD/publications/PDF/te_1384_web.pdf
5. Mineo, L., 1990. Plant tissue culture techniques. <http://www.ableweb.org/volumes/vol11/9-mineo.pdf>
6. PTL (PhytoTechnology Laboratories), 2008. African violet multiplication kit. <http://www.phytotechlab.com/pdf/AfricanVioletKit.pdf>
7. Seymour, W. Mitchell and M. Ahmad, 2003. A novel surface sterilization method for reducing microbial contamination of field grown medicinal explants intended for *in vitro* culture. Biotechnology Centre, U.W.I, Mona, Kingston 7, Ja. W.I. Part II