



SECOND SEMESTER 2015-16

COURSE HANDOUT

Date: 05.01.2016

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No : BIO G643
Course Title : Plant Biotechnology
Instructor-In charge : SANDHYA MEHROTRA
Instructor : Jitendra Panwar

1. Course Description: Plant genetic systems and their implications for plant transformation and protein targeting, Cell and tissue culture, techniques for plant transformation; *Agrobacterium* mediated and biolistic methods, vectors for plant transformation, genetic manipulation of herbicide tolerance, pest resistance, disease resistance, stress tolerance, improvement of crop yield and quality, Public concerns of GM crops.

2. Scope and Objective of the Course:

This course will enable students to increase their knowledge in recent advances in plant cell and tissue culture techniques both theoretically and practically. It will provide an insight to the theory and practice of plant biotechnology with emphasis on the genetic engineering of plants to produce new products for medicine, industry and agriculture.

3. Text Books:

1. Narayanaswamy, S. Plant Cell and Tissue Culture, Tata McGraw Hill Publishing Company Limited, 1994 (Ninth Reprint 2008).
2. Adrian Slater, Nigel W. Scott, and Mark R. Fowler: Plant Biotechnology: The Genetic manipulation of plants (Second edition). Oxford University Press (2008).

4. Reference Books:

1. Bhojwani, S.S. and Razdan, M.K. Plant Tissue Culture: Theory and Practices, A Revised Edition, Elsevier, Reprint 2004.
2. Hammond, J. Mc Garvey, P. and Yusibov, Plant Biotechnology. Springer Verlag, Berlin, NY (1999), 2nd Printing 2000.
3. Recent research articles and reviews will be recommended regularly.

5. Course Plan:

Lec. No.	Learning Objective	Topic	Reference to chapter
1-2	Objective and scope of plant tissue culture	Historical introduction to plant tissue culture	Chap 1, TB 1 Chap 1, RB 1
3-4	Plant tissue culture laboratory	Lab organization (Lay out, requirements and general techniques)	Chap 2, TB 1 Chap 2, RB 1
5-6	Requirements to grow plants <i>in vitro</i>	Culture media constituents, media selection and preparation	Chap 3, TB 1 Chap 3, RB 1
7-8	<i>In vitro</i> techniques of clonal propagation	Micro propagation stages, factors affecting micropropagation, applications and limitations	Chap 7, TB 1 Chap 16, RB 1

9-10	Production of haploids	Haploid production through anther culture and microspore culture, applications and limitations	Chap 10, TB 1 Chap 7, RB 1
11-12	Producing disease free plants	Meristem culture and virus free plants	Chap 6, TB 1 Chap 15, RB 1
13-14	Creating variations <i>in vitro</i>	Somaclonal variations	Chap 9, RB 1
15-16	Somatic hybridization	Protoplast isolation and culture, somatic hybrids production	Chap 11, TB 1 Chap 12 & 13, RB 1
17-18	Storing plant genetic resources	Cryopreservation	Chap 15, TB 1 Chap 18, RB 1
19-20	Introduction to plant genetic system and transformation	Plant genetic systems and their implications for plant transformation and protein targeting, heterologous promoters, <i>Arabidopsis</i> and new technologies	Chap 1, TB2 Chap 1, RB2
21-23	Techniques for plant transformation	Agrobacterium mediated transfer and the Ti plasmid technology. Direct gene transfer methods: Particle bombardment.	Chap 1, TB2 Chap 1, RB2
24-26	Vectors for plant transformation	Desirable features of a vector, development of plant transformation vectors and optimization	Chap 2, TB2 Chap 2 and 3, RB2
27-32	Case studies	Genetic manipulation of pest resistance, Plant disease resistance, strategies for engineering stress tolerance, Strategies for improvement of crop yield and quality.	Chap 5, 6, 7, 8, and 10, TB2
33-36	Molecular farming	Starch, polyfructans, bioplastics, The oleosin system, custom made antibodies, edible vaccines	Chap 11, TB2 Chap 5 and 6, RB2
37-38	Science and society	Public concerns over GM crops and government regulations	Chap 12, TB2 Chap 1, RB2

6. Evaluation Scheme:

Component	Duration	Weightage (%)	Remarks	Date & Time
Mid-Semester Test	90 Min.	30	Close Book	15/3 11:00 - 12:30 PM
Lab assignment/ Quiz		20	Close Book	
Seminar		10		
Comprehensive Examination	3 hrs	40	Partly Open Book	5/5 AN

7. Chamber Consultation Hour: To be announced in the class.

8. Notices: Notices, if any regarding the course will be displayed on the Notice Board of Department of Biological Sciences.

9. Make-up Policy: Make-up decisions will be made on a case-by-case basis and only genuine cases as determined by the team and validated by Wardens and/or Medical Officer will be considered. No make-up will be granted for quizzes and practicals.

Instructor-in-charge
BIO G643



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