

Syllabus: Plant Cell, Tissue, and Organ Culture – Lecture

School Year 2006-2007, Spring Term 2007

- 15.3.07 Introduction: Definitions, Culture Vessels and Different Types of Culture, History and Procedure Development, Literature, Conditions of Axenic Culture, Laboratory Design, Nutrient Media Preparation and Sterilization.
- 29.3.07 Phytohormones and Growth Regulators: Auxines, Gibberellines, Cytokinines, Abscisic Acid, Ethylene, Further Regulatory Substances (Brassinosteroids, Jasmonic Acid, Polyamines, Oligopeptides)
- 5.4.07 Micropropagation: Types of Regeneration: Restitution, Reproduction (Propagation by Axillary Bud Proliferation), *de novo* Regeneration (Adventitious Shoot Proliferation), Primary Culture Initiation, Meristem Cultures, Virus Elimination, Herb and Wood Meristem Thermotherapy, Mas Propagation.
- 12.4.07 Callus Culture: Callus Initiation, Callus Culture Utilization,
- 19.4.07 Secondary Metabolites and Biotechnology: Elicitation, Suspension Culture, Bioreactors, Immobilization, and Bioconversion. Fungi Culture: Suspension Culture of Wood-Destroying Fungi.
- 26.4.07 A. Test-tube Pollination/Fertilization: Barriers of Incompatibility and Possibilities of their Overcoming *in vitro*, Remote Hybridization, Pollen Quality and its Evaluation. B. Zygotic Embryo Culture: Developmental Stages of Zygotic Embryo, Isolation and Culture of Young and Mature Zygotic Embryos *in vitro*, Method Utilization (Break of Dormancy, Shortening of Breeding Cycle, Embryo Rescue Technique, Source of Meristematic Material for Propagation). C. Somatic Embryogenesis: Direct and Indirect Somatic Embryogenesis, Factors of SE, and Origin of SE, Artificial Seeds, Conversion of Somatic Embryos.
- 3.5.07 A. Induction of Haploid Plants: a) Direct and Indirect Androgenesis: Anther and Microspore Cultures, Pollen Embryogenesis, Dihaploidization, Influence of Ontogenetic Stage of Pollen Development, Influence of Iron Concentration on *Nicotiana* Androgenesis, b) Gynogenesis. B. Cryopreservation: Cryoprotective Substances, Methods of Slow and Quick Freezing, Vitrification, Encapsulation /Dehydration, Thawing, Tests of Plant Material Viability, Utilization – Gene banks.
- 10.5.07 Plant Genome Transformation: Genetic Modified Organisms (GMOs), Legislative, Structure of Chimeric Genes, Detection of Transgenesis - Marker and Selectable Genes, Methods of Transformation – Disc method, Vacuum Infiltration, Biolistic Method, Agrobolistic Method.
- 17.5.07 Excursion at the Plant Tissue Culture Lab of Mendel Agriculture and Forestry University and Credit.

Recommended Literature

1. FOSSARD, de R.A. (1976): Tissue Culture for Propagators.- Univ. New England Printery.
2. GAMBORG, O. L. *et* PHILLIPS, G. C. (1995): Plant Cell, Tissue and Organ Culture. Fundamental Methods, Springer Berlin. Heidelberg.
3. PIERIK, R.L.M. (1987): *In vitro* Culture of Higher Plants. - Martinus Nijhoff Publishers, Dordrecht, Boston, Lancaster.
4. RAGHAVAN, V. (1976): Experimental Embryogenesis in Vascular Plants.- Academic Press London, New York, San Francisco.
5. REINERT, J. *et* BAJAJ, Y.P.S./eds./, Applied and Fundamental Aspects of Plant Cell, Tissue and Organ Culture.- Springer Verlag, Berlin, Heidelberg, New York, 1977.
6. REINERT, J. *et* YEOMANN, M.M.(1982): Plant Cell and Tissue Culture. A Laboratory Manual.- Springer Verlag Berlin etc.
7. SASSON, A. (1988): Biotechnologies and Development.- UNESCO, Paris.
8. THORPE, T.A. (1995): *In vitro* Embryogenesis in Plants.- Kluwer Academic Publishers, Dordrecht, Boston, London.