



PLANT CELL BIOPROCESSING

PROF. SMITA SRIVASTAVA

Department of Biotechnology
IIT Madras

PRE-REQUISITES : Basic knowledge of Fermentation Technology, Basics in plant cell and tissue culture, plant biotechnology

INTENDED AUDIENCE : Researchers and students in the area of Plant Biotechnology, Biochemical/Bioprocess Engineering and Biotechnology.

INDUSTRIES APPLICABLE TO : Himalaya Pvt. Ltd., Reliance life sciences, Dabur

COURSE OUTLINE :

This is a course designed primarily for students in the undergraduate or master's programs interested in bioprocess development for production of high value products from plant cells and tissue cultures. This course is expected to introduce the student to identify the industrial applications of Plant Cell/Tissue Culture Technology. The student will be able to develop plant cell/tissue culture based bioprocesses for large scale in vitro production of high value phytochemicals. Strategies that can be utilized to improve yield and productivity of phytochemicals from plant cell/tissue cultures with case studies will be discussed.

ABOUT INSTRUCTOR :

Prof. Smita Srivastava has expertise in the application of Chemical and Biochemical Engineering principles for the development of large-scale sustainable bioprocesses for commercial production of speciality chemicals. She is an Associate Professor in the Department of Biotechnology at IIT Madras. She has more than 10 years of Teaching experience in which she has taught many theory and lab courses related to the field of Bioprocess engineering, including Bioreactor Design and Analysis, Bioprocess Modeling and Simulation, Plant Cell bioprocessing, Bioreaction Engineering Lab and Bioprocess Engineering Lab, for the B.Tech/M.Tech/M.S/PhD students of the Institute. Her research experience in bioprocess engineering has resulted in 28 peer-reviewed international journal publications as first/corresponding author, 5 book chapters, 5 patent applications and several different international/national conference presentations in the broad area of bioprocess development and optimization.

To promote research in a specialized field like Plant Cell Bioprocess, she formulated and offered a new course in 2012 on Plant Cell Bioprocessing (as a professional elective) for the undergraduates and postgraduate students of IIT Madras. This course is also offered as an NPTEL course now. Dr. Smita is also affiliated to the Teaching and Learning Center at IIT Madras as a core faculty member, where she rendered her services as coordinator and resource person in various faculty development programmes/workshops and teaching assistant training programmes

COURSE PLAN :

Week 1: Introduction to plant cells

Week 2: In-vitro forms of plant tissue cultures for commercial applications and Culture initiation

Week 3: Somatic embryogenesis and culture preservation ; Secondary metabolism in plant cells: Its role and commercial applications

Week 4: Secondary metabolism in plant cells; Strategies to enhance yield and productivity of plant secondary metabolites in vitro cell/tissue cultures

Week 5: Strategies to enhance yield and productivity of plant secondary metabolites in vitro cell/tissue cultures; Biotransformation and Immobilization of plant cell cultures

Week 6: Genetic transformations in plant cells

Week 7: Scale-up considerations in plant cell/tissue cultures

Week 8: Case studies on in vitro production of high-value plant secondary metabolites for commercial applications: A Combinatorial/Integrated approach for synergistic effect on production rates.