PLANT CELL BIOPROCESSING

PROF. SMITA SRIVASTAVA
Department of Biotechnology
IIT Madras

TYPE OF COURSE : Rerun | Core | UG

COURSE DURATION : 8 weeks (23 Aug'21 - 15 Oct'21)

EXAM DATE : 24 Oct 2021

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:
Dr. Smita has experience in the application of Chemical and Biochemical Engineering principles to facilitate the development of sustainable bioprocesses for commercial production of high-value low-volume phytochemicals.

As faculty at IIT Madras, Dr. Smita and her research group have set up a plant cell cultivation facility up to reactor level in the Department of Biotechnology at IIT Madras, to facilitate research on mass cultivation of plant cells/tissues for in vitro production of high-value phytochemicals. Her research experience in the area of bioprocessing for phytochemicals is demonstrated by 19 peer reviewed international journal publications, 4 book chapters, 5 Indian patent applications and 29 different international/national conference presentations (as first/corresponding author) in the area of bioprocessing for phytochemicals.

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.