



# 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.

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Roll No: NPTEL20BT34571340564

To,  
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THONDAMURTHUR POST, SAMATHUR VIA,  
POLLACHI  
TAMILNADU - 642123  
PH. NO :7539905646



| Score | Type of Certificate    |
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| >=90  | Elite+Gold             |
| 75-89 | Elite+Silver           |
| >=60  | Elite                  |
| 40-59 | Successfully Completed |
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No. of credits recommended by NPTEL:2

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**Plant Cell Bioprocessing**

with a consolidated score of **81** %

|                    |          |                |          |
|--------------------|----------|----------------|----------|
| Online Assignments | 20.42/25 | Proctored Exam | 60.75/75 |
|--------------------|----------|----------------|----------|

*Devendra Jalihal*

Prof. Devendra Jalihal  
Chairman  
Centre for Continuing Education, IITM

Total number of candidates certified in this course: 144

*Andrew Thangaraj*

Prof. Andrew Thangaraj  
NPTEL Coordinator  
IIT Madras



Indian Institute of Technology Madras

Sep-Nov 2020  
(8 week course)



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