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Biography

Ashok Kumar Srivastava has received his PhD degree from the McGill University, Montreal in 1990. He has 40 years of industrial research teaching experience in Biochemical Engineering and Biotechnology. He has 110 international journal papers, 154 international/national presentations and two patents to his credit. He has supervised 16 PhD (five continuing) and 73 master's theses. His major interest is in modelling simulation, optimization and control of bioprocesses, microbial/plant cell/hairy root cultivations for important metabolite production (bio/copolymer production, podophyllotoxin, azadirachtin, ajmalicine, shikimic acid production etc) and novel bioreactor development.

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PLANT CELL CULTIVATION OF A *INDICA* IN BIOREACTOR FOR MASS PRODUCTION OF AZADIRACHTIN

Presently bio-pesticide (azadirachtin) is produced by solvent extraction of *Azadirachta indica* (Neem) seeds. However, this protocol features low variable yield and severe contamination problems. *In-vitro* plant cell cultivation in bioreactors can serve as an alternate for mass production of azadirachtin. Successful attempt was made to initiate callus from the seed kernel of high yielding variety of *Azadirachta indica*. This was followed by development of shake flask suspension culture under statistically optimized culture conditions for maximum growth and azadirachtin production. The biomass and azadirachtin yield enhancement strategies were then applied (which included addition of elicitors, precursors, growth factors and permeabilizing agents) to enhance azadirachtin production. Batch growth and azadirachtin production kinetics of the cell suspension culture was thereafter established in a stirred tank bioreactor. Engineering optimization was then attempted where in a mathematical model was developed using the batch kinetic data. This served as an excellent tool to understand the culture behaviour under different cultivation conditions and facilitate the design of an appropriate feeding strategy(ies) in fed-batch/continuous mode(s) of cultivation. A pre-optimized computer simulated continuous cultivation strategy with cell retention was experimentally implemented which featured high biomass and azadirachtin production from *A indica* cells in the bioreactor. The experimental verification resulted in a biomass accumulation of 61.4 g/L and azadirachtin production of 751.9 mg/L with 14% release of azadirachtin (105.0 mg/L) in the culture medium. This was significantly higher than the azadirachtin production from seeds from natural plant of neem.



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