National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: MASS PRODUCTION OF Bacopa SAPONINS FROM CELL SUSPENSION CULTURE OF Bacopa monnieri IN A BIOREACTOR
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Venue	: Seminar Room (BM Department)
Date and Time	: 09 May 2025 (11:00 AM)
Abstract	: *Bacopa monnieri* also known as &lsquoBrahmi', is one of the most important Indian medicinal herbs which is used for the treatment of various neurological and psychological diseases like Parkinson&rsquos disease and Alzheimer&rsquos disease. The main bioactive compounds in Brahmi are triterpenoid saponins of dammarane type called as &ldquobacosides&rdquo. Bacosides (0.05%-0.85%) are synthesized in less amount in plants. Plackett-Burman design was used to screen significant factors for bacoside A production. It was observed that agitation speed and inoculum age affected bacoside A production the most. Central composite design was performed and using predicted optimal values of factors 31.43 mg/l bacoside A, 4.079 g/l DW cell biomass, and 94.62 % cell viability were obtained. One variable at a time approach was used for selection of suitable elicitation strategy for enhancement of bacoside A. The synergistic influence of combined elicitation (60 µM salicylic acid, 80 µM methyl jasmonate, and 230 µM copper sulphate) treatment resulted in 46.392 mg/l bacoside and 2.562 g/l DW biomass. Substrate inhibition studies were performed. The optimized conditions were used for batch bioreactor study and mathematical model based fed batch cultivation was performed in 5-l stirred tank bioreactor using two different feeding strategies.The maximum biomass concentration in fed-batch culture was 6.57 g/l DW and 89.02 mg/l bacoside A by feeding during the stationary phase. The concentration of individual *Bacopa* saponins was also considerably higher in fed batch cultivation as compared to batch culture. Elicitation study in batch bioreactor resulted in maximum bacoside A of 123.63 mg/l and biomass of 3.815 g/l DW. Transformed callus was developed using *Agrobacterium tumefaciens* (EHA 105 harbouring binary vector pCAMBIA 1301) and *Agrobacterium rhizogenes* (R1000 and MTCC 2364) strains. Screening and successful insertion of transgene was confirmed by PCR analysis. Using transformed cell suspension culture, the maximum biomass (7.41 g/l DW) and bacoside A (285.80 mg/l) were obtained at the end of cultivation which is highest reported bacoside A yield as compared to other studies. Enhancement of bacoside yield through various bioreactor-based cultivation processes has high commercial value due to its pharmaceutical applications.

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