

Response surface optimization of process variables for catechin production in recombinant Escherichia coli BL (DE3) harbouring an artificial gene cluster

ABSTRACT

Response surface methodology was used to optimize critical process variables in the production of catechins by an engineered strain of *E. coli* BL (DE3) carrying an artificial gene cluster of catechin biosynthetic genes. Variables initially identified in literature for metabolic engineering of natural and non natural products including concentrations of inducer, precursor, temperature and substrate were used to produce optimum yields of catechins. Response optimization of parameters showed the optimum conditions for engineering catechin production from the recombinant *E. coli* strain to be IPTG (0.9148 mM), glucose (10.0637 g/l), eriodictyol (1.0071 mM) and temperature (27.9560°C) were predicted to produce a response of 0.97178 mg/l with 80.981% desirability. A verification experiment carried out at the optimum produced a yield very close to the predicted value in which the gallated catechins [(-)-epigallocatechin gallate) and (-)-epicatechin gallate] were metabolically engineered for the first time.

Keyword: Catechins; *Escherichia coli* BL (DE3); Optimization; Response surface methodology