Sequential optimization of production of a thermostable and organic solvent tolerant lipase by recombinant Escherichia coli

ABSTRACT

Several medium formulations were screened for the production of a thermostable and organic solvent tolerant lipase by a recombinant Escherichia coli BL21. The highest lipase production (28.9 ± 4.1 IU/mL) was obtained in Luria Bertani medium with the addition of 1% (w/v) glucose. The medium formulation and fermentation conditions were then subjected to sequential optimization. Using a Plackett-Burman design, glucose, NaCl, temperature and induction time were found to be the most significant variables affecting lipase production, and these were then optimized using response surface methodology (RSM). The large value of R 2 (0.979) showed that the quadratic model used for the prediction is highly significant. The optimum levels of these four significant variables (glucose, NaCl, temperature and induction time) as predicted by RSM were 32.4 g/L, 5 g/L, 31.7°C and 2.1 h, respectively. The amount of lipase activity (50.2 ± 4.5 IU/mL) produced under these optimal conditions fitted well to the value (48.9 IU/mL) predicted by RSM. Production of lipase in optimized fermentation was about 2.5-fold higher than in non-optimized fermentation.

Keyword: Thermostable lipase; Solvent tolorent lipase; Escherchia coli; Fermentation; Optimization; Response surface methodology