

Optimization of fed-batch fermentation for organic solvent tolerant and thermostable lipase production from recombinant *E. coli*

ABSTRACT

Objective: Lipases are industrially important enzymes especially the thermostable and organic solvent tolerant lipases. This study was planned to enhance the production using fed batch fermentation technique. Materials and Methods: The possibility of using fed-batch fermentation for improvement of organic solvent tolerant and thermostable lipase production by recombinant *E.coli* BL21 was studied in 2 L stirred tank bioreactor. Exponential fed-batch fermentations were operated at different specific growth rates (μ). The effect of antibiotics addition in feed medium, on the number of plasmid bearing cells was also investigated. Kinetics of the fed-batch fermentation was evaluated for the generation of kinetic parameter values. Effect of yeast extract in feed medium was also investigated. Results: The number of plasmid bearing cells was increased from 13 % to 91 % with the addition of antibiotics (2 g/L ampicillin and 1.4 g/L chloramphenicol) in the feed medium. Among the different investigated ($0.05, 0.10$ and 0.15 h^{-1}), the highest cell concentration (30.32 g/L) and lipase production (130.5 IU/mL) were obtained in exponential fed-batch fermentation, where μ was controlled at 0.10 h^{-1} with 800 g/L glucose in the feed medium. No significant improvement was achieved on growth and lipase production in fed-batch fermentation with addition of yeast extract in feed medium, though μ was controlled at 0.10 h^{-1} . Conclusion: Fed-batch was found a good technique for enhancement of lipase production from recombinant *E.coli* BL21 on the cost of increasing time of fermentation (fermentation time for batch fermentation was 16 h and for fed-batch was 26 h) and quantity of some medium ingredients as compared to the batch mode.

Keyword: *E.coli*; Fed-batch culture; Recombinant; Thermostable lipase