World Academy of Science, Engineering and Technology
International Journal of Biotechnology and Bioengineering
Vol:9, No:01, 2015

Optimization of Fermentation Conditions for Extracellular Production of the Oncolytic Enzyme, L-Asparaginase, by New Subsp. Streptomyces Rochei Subsp. Chromatogenes NEAE-K Using Response Surface Methodology under Solid State Fermentation

Authors : Noura El-Ahmady El-Naggar

Abstract : L-asparaginase is an important enzyme as therapeutic agents used in combination therapy with other drugs in the treatment of acute lymphoblastic leukemia in children. L-asparaginase producing actinomycete strain, NEAE-K, was isolated from soil sample and identified on the basis of morphological, cultural, physiological and biochemical properties, together with 16S rDNA sequence as new subsp. Streptomyces rochei subsp. chromatogenes NEAE-K and sequencing product (1532 bp) was deposited in the GenBank database under accession number KJ200343. The study was conducted to screen parameters affecting the production of L-asparaginase by Streptomyces rochei subsp. chromatogenes NEAE-K on solid state fermentation using Plackett–Burman experimental design. Sixteen different independent variables including incubation time, moisture content, inoculum size, temperature, pH, soybean meal+ wheat bran, dextrose, fructose, L-asparagine, yeast extract, KNO3, K2HPO4, MgSO4.7H2O, NaCl, FeSO4. 7H2O, CaCl2, and three dummy variables were screened in Plackett–Burman experimental design of 20 trials. The most significant independent variables affecting enzyme production (dextrose, L-asparagine and K2HPO4) were further optimized by the central composite design. As a result, a medium of the following formula is the optimum for producing an extracellular L-asparaginase by Streptomyces rochei subsp. chromatogenes NEAE-K from solid state fermentation: g/L (soybean meal+ wheat bran 15, dextrose 3, fructose 4, L-asparagine 8, yeast extract 2, KNO3 1, K2HPO4 2, MgSO4.7H2O 0.5, NaCl 0.1, FeSO4. 7H2O 0.02, CaCl2 0.01), incubation time 7 days, moisture content 50%, inoculum size 3 mL, temperature 30°C, pH 8.5.

Keywords : streptomyces rochei subsp. chromatogenes neae-k, 16s rrna, identification, solid state fermentation, l-asparaginase production, plackett-burman design, central composite design
Conference Title : ICBB 2015 : International Conference on Biotechnology and Bioengineering
Conference Location : Jeddah, Saudi Arabia
Conference Dates : January 26-27, 2015