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Enhanced Production of Endo-β-1,4-Xylanase from a Newly Isolated Thermophile Geobacillus stearothermophilus KIBGE-IB29 for Prospective Industrial Applications

Authors : Zainab Bibi, Afsheen Aman, Shah Ali Ul Qader

Abstract : Endo-β-1,4-xylanases [EC 3.2.1.8] are one of the major groups of enzymes that are involved in degradation process of xylan and have several applications in food, textile and paper processing industries. Due to broad utility of endo-β-1,4-xylanase, researchers are focusing to increase the productivity of this hydrolase from various microbial species. Harsh industrial condition, faster reaction rate and efficient hydrolysis of xylan with low risk of contamination are critical requirements of industry that can be fulfilled by synthesizing the enzyme with efficient properties. In the current study, a newly isolated thermophile Geobacillus stearothermophilus KIBGE-IB29 was used in order to attain the maximum production of endo-1,4-β-xylanase. Bacterial culture was isolated from soil, collected around the blast furnace site of a steel processing mill, Karachi. Optimization of various nutritional and physical factors resulted the maximum synthesis of endo-1,4-β-xylanase from a thermophile. High production yield was achieved at 60°C and pH-6.0 after 24 hours of incubation period. Various nitrogen sources viz. peptone, yeast extract and meat extract improved the enzyme synthesis with 0.5%, 0.2% and 0.1% optimum concentrations. Dipotassium hydrogen phosphate (0.25%), potassium dihydrogen phosphate (0.05%), ammonium sulfate (0.05%) and calcium chloride (0.01%) were noticed as valuable salts to improve the production of enzyme. The thermophilic nature of isolate, with its broad pH stability profile and reduced fermentation time indicates its importance for effective xylan saccharification and for large scale production of endo-1,4-β-xylanase.

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