Optimization of cellulase production by halobacillus sp. QLS 31 Isolated from lake qarun, Egypt.

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Abstract

A halophilic cellulase-producing bacterium was isolated from a sediment sample collected from Lake Qarun (Fayoum Province, Egypt). Molecular identification based on 16S rDNA amplification and sequencing revealed 99% homology with Halobacillus sp. and hence was designated as Halobacillus sp. QLS 31. Medium composition and culture conditions were optimized for enhancing the production of cellulase enzyme using the Plackett-Burman statistical design. Ten variables were evaluated for their influence on cellulase production. Carboxymethyl cellulose (CMC), zinc sulfate (ZnSO4), and inoculum size were found to exert a significant effect on cellulase productivity by Halobacillus sp. QLS 31. The maximum specific activity of cellulase enzyme was 48.08 U/mg. Following the predicted conditions, a 7.5-fold increase in cellulase specific activity (175.47 U/mg) was achieved compared to the basal medium (23.19 U/mg) under the following optimized conditions: temperature (30 ÁC), fermentation time (2 days), pH value (9), CMC concentration (1%), inoculum size (1%), yeast extract concentration (0.1%), ammonium sulfate ((NH3)2SO4) concentration (0.1%), sodium chloride (NaCl) concentration (20%), and metal inducers: ZnSO4 (0.1%) and Ca/Mg ratio (0.01%). Thus, the results of this study provide an important basis for more efficient, cheap industrial cellulase production from halophilic Halobacillus sp. QLS 31.

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