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EXTRACELLULAR CELLULOLYTIC ENZYMES PRODUCED UNDER EXTREME CONDITIONS OF SALT AND PH BY BACTERIA ISOLATED FROM DESERT SOIL OF DOUZ AND THE SALINE LAKE CHOTT EL FEDJEJ-TUNISIA

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Abstract

The aim of this study was to investigate the ability of different bacterial species isolated from chott and desert sand soil in South Tunisia to produce extracellular cellulases under extreme stress conditions. The preliminary screening was performed on agar media with 2% (w/v) sodium carboxymethyl cellulose as carbon source. After 72h of growth at 30°C on agar media at pH 7, cellulolytic activities were detected from 29% of the 81 bacterial isolates screened. Under alkaliphilic conditions (pH 9,5), cellulases were produced by 46% of the isolates. Production of the hydrolytic enzymes was also evaluated on agar media under halophilic (pH 7; NaCl concentrations up to 20%) and haloalkaliphilic (pH 9,5; NaCl concentrations up to 20%) conditions. Most of the isolates were able to grow and produce extracellular cellulases on media with 10% NaCl and some of them even in the presence of 20% NaCl at pH 9,5. Extracellular cellulolytic activities (crude enzyme) were measured from cell-free culture supernatants of the isolates. High activities were observed at pH 3.0-10.5. In particular the cellulase activity from different isolates was shown to be stable and even increase with increasing NaCl concentrations with an optimum at 15% NaCl and acidic or alkaline pH. From most of the isolates, cellulase activities were stable and retained up to 60% of relative activity after incubation at 80°C for 1h or even after heat treatment 15 mn at 100°C. The versatility of these strains even under extreme salinity and pH conditions makes them/their enzymes very promising for various biotechnological processes ranging from those based on the bioconversion of lignocellulosic materials to detergent, pulp and paper or textile industries.