

**TITLE:** PARTIAL CHARACTERIZATION OF CELLULASE ACTIVITY FROM SOIL BACTERIA

**AUTHORS:** ALVES, B.A.; FERREIRA MACHADO, A.B.; PAIVA, A.D.

**INSTITUTION:** UNIVERSIDADE FEDERAL DO TRIÂNGULO MINEIRO, UBERABA, MG (Campus I - Praça Manoel Terra, 330, CEP 38025-015, UBERABA- MG, BRAZIL)

**ABSTRACT:**

Cellulases are glycosyl hydrolases (GHs) that catalyze the hydrolysis of 1,4- $\beta$ -D-glycosidic bonds of cellulose, lignin and  $\beta$ -D-glycans. Cellulases are mainly composed of three types of synergistic enzymes: endoglucanases, that hydrolyze the exposed cellulose chains of the cellulose polymer; exoglucanases, that release cellobiose from the reducing and nonreducing ends;  $\beta$ -glucosidases, that hydrolyze cellobiose to glucose. Cellulases have great potential for application in industries, as food, detergent, laundry, textile and biofuels. In this study, we analyzed the ability of bacteria isolated from natural reserves in the region of Uberaba-MG, to hydrolyze carboxymethylcellulose (CMC). Previously, our group isolated bacteria from soil samples collected from the ground under the plants in Mata do Ipê Ecological Park and in Jacarandá Park, in Uberaba, MG. In preliminary assays, of the 84 bacterial isolates cultivated in aerobiosis or microaerophilia, at 37°C, 14 showed hydrolyzing zones on agar plates containing CMC, after Congo-red staining. From these bacteria that presented cellulolytic activity (n=14), the enzyme activity index (I), i.e. the ratio between the diameter of the cellulose degradation halo and the diameter of the colony, was calculated in order to select the bacterial isolates. Those bacteria that presented  $I \geq 1$  (n=10) were selected for the enzyme quantification assay. Briefly, bacteria were grown overnight in CMC containing medium, centrifuged (12,000 rpm, 10min) and the supernatant was used to evaluate extracellular cellulase activity. Cellulase assay is based on the release of reducing sugar, using CMC as the substrate, and absorbance reading in 540nm. An enzyme activity unit (U) was defined as the amount that releases 1  $\mu$ mol of glucose from cellulose per minute. Among the ten isolates that presented promising enzymatic activity, 7 were Gram-positive and 3 were Gram-negative; 9 were rod-shaped and 1 was pleomorphic. All isolates evaluated showed similar cellulolytic activity, varying from 1.143 U/mL to 2.657 U/mL. It is important to mention, that 8 isolates presented lower bacterial growth and highest rates of enzymatic activity. Additional studies will be done in order to identify the cellulolytic bacteria and to define the optimal conditions for enzyme production.

**Keywords:** bioprospecting, enzymatic activity, cellulase, industrial biotechnology.

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