

TITLE: BIOPROSPECTING OF INDUSTRIAL ENZYMES PRODUCED BY 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:

Enzymes are widely used in different industrial sectors, such as food, pharmaceutical, cosmetic, textile, paper, detergent, biofuel and bioremediation. Of all enzymes, the proteases, amylases, hydrolytic enzymes (cellulase and xylanase) and lipases stand out for their versatility and potential use in industrial applications. Considering the increasing market demand for new and better enzymes and the existing Brazilian environmental microbial diversity, the prospecting of enzymes with biotechnological interest is important and relevant. Therefore, the aim of this study was to isolate bacteria, which produce enzymes of industrial interest, from undisturbed forest sites. Soil samples were collected from the ground under the plants in Mata do Ipê Ecological Park and in Jacarandá Park, located in the city of Uberaba, MG. Each sample was diluted, homogenized and plated in different culture media containing the specific substrates (skim milk, starch, carboxymethylcellulose (CMC), xylan or tween 80) to detect the enzymatic activity. The plates were incubated in aerobiosis or microaerophilia, at 37°C; after 24 h, the presence of clear halos around the colonies was evaluated, indicating substrate degradation. The enzyme activity index (I), i.e. the ratio between the diameter of the halo of degradation and the diameter of the colony, was calculated in order to select the bacterial isolates. The Gram staining was used to the initial characterization of the selected isolates. Among the 117 isolates obtained, 32 were protease producers and 25 were amylase producers; cellulase and xylanase activity was observed in 14 and 20 isolates, respectively, while lipolytic activity was observed in 26 bacteria. From this screening, the bacterial isolates were selected, based on the enzyme activity index: $I \geq 1.5$ for protease ($n=15$), amylase ($n=10$) and lipase ($n=12$); $I \geq 1$ for hydrolytic enzymes ($n=10$ for cellulase; $n=13$ for xylanase). Among the isolates that presented promising enzymatic activity, 56 were Gram-positive and 4 were Gram-negative; 59 were rod-shaped and 1 was pleomorphic. This study represents the first step in bioprospecting of enzymes with biotechnological interest and produced by soil bacteria. Additional studies will be done in order to identify the selected bacteria and better characterize the enzymes produced by them.

Keywords: bioprospecting, enzymes, industrial biotechnology

Development Agency: CNPq, FAPEMIG, CAPES.