Xylanase Production by Thermophilic Fungus (Fcup1) Using Corn-Cob: Immobilization in Amino and Glutaraldehyde Agarose

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Xylanolytic enzymes from several microorganisms have been widely studied in the last 10 years, mainly due to the biotechnological potential of these enzymes in different industries, such as food, paper and cellulose, textil and pharmaceutic. A thermophilic filamentous fungus (FCUP1) classified as *Rhysopus* sp. was isolated from decomposing fruit and proved to be a good producer of xylanolytic enzymes. The aim of the present study was to determine the optimal culture conditions for xylanase production and carry out immobilization in amino and glutaraldehyde agarose supports. Using a medium containing 0.1% $CaCO_3$, 0.5% NaCl, 0.25% gelatin, 0.5% corn steep liquor and 1% corn-cob at 37ºC for 12 hours, specific activity was 0.076 U/mg Prot at an initial pH of 8.0. When using wheat bran, soy hull and sugarcane bagasse, there was no difference in production between 12 and 16 hours and specific activities ranged from 0.030 to 0.080 U/mg Prot. Using the medium containing 0.1% $CaCO_3$, 0.5% NaCl, 0.1% NH_4Cl, 0.5% corn steep liquor and 1% carbon source after 16 hours of cultivation at an initial pH of 8.0, values of 0.362 and 0.302 U/mg Prot were obtained using powdered corn-cob and wheat bran, respectively. The use of sugarcane bagasse and soybean hull resulted in relatively lower activities. Using the extract with the higher specific activity, the proteins were precipitated with acetone, with a 1.6-fold increase in xylanase activity. Xylose did not inhibit the synthesis of xylanase and xylan provided better production in relation to the other carbon sources used. In stationary growth, 0.145 U/mg Prot was obtained in six days of culturing. The enzyme showed optimal values at pH 5.0 and at temperature of 60ºC. Xylanase releases xylooligosaccharides and xylose from xylan in long reaction times. When associated with xylosidase from *Humicola*, it releases xylose in just 10 minutes of reaction. Immobilization of xylanase in amino and glutaraldehyde agarose was achieved, producing active derivates.

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