

TITLE: HYDROLYSIS OF XYLANS EXTRACTED FROM CORN COBS BY FREE AND IMMOBILIZED XYLANASE PRODUCED BY *Aspergillus labruscus* ITAL 22.223

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ABSTRACT

The agricultural activities are the main responsible for the generation of lignocellulosic waste disposed in the natural environments. For example, the corn cobs, constituted by cellulose, hemicellulose and lignin, are obtained from corn crop processing. Despite the high added value of corn cobs and the importance of lignocellulosic materials in the scenario of bioenergy, they are little used. The present study aimed applying free and immobilized xylanase produced by the fungus *Aspergillus labruscus* ITAL 22.223 to hydrolyze xylans extracted from corn cobs obtaining fermentable sugars. Initially, the fungus was cultivated in Solid State Fermentation (SSF) for 168 h at 25 °C, in the presence of wheat bran as solid substrate, for production of hemicellulytic enzymes. The xylanase activity was determined using xylan (1% w/v and 10% w/v) as substrate through DNS methodology. The extract containing these enzymes were used for immobilization procedure in sodium alginate matrix (1.5% w/v). The corn cobs was crushed in knife mill (20 mesh sieve and larger particles) and subjected to extraction with NaOH 4% at a rate of 1:20 (m/v), followed by filtration and precipitation of xylans. The xylans were analyzed by Fourier-transform infrared (FTIR) spectroscopy and the extraction efficiency determined. Four xylans extracts were obtained from corn cobs, identified as AS20, BS20, AST and BST, whose recovery of xylan were 5.2%, 11.3%, 10.8%, 8.9%, respectively. The FTIR analysis indicates the presence of the characteristic peaks of cellulose, hemicellulose and lignin for all extracted xylans. The hydrolysis of the xylans BS20 and BST was better than that observed for the commercial xylan using free enzyme. The residual activities of the free enzyme in both xylans (BS20 and BST) were 78.6% and 81.8%, respectively. The immobilized xylanase regarding activities were 14.4% and 60.4% using BS20 and BST, respectively. AS20 and AST xylans presented a hydrolysis lower than 8.5-fold and 2.7-fold compared to the maximum values obtained in the other xylans with the immobilized and free enzyme, respectively. The content of proteins (0.26% to 0.43% w/v) and phenols (0.05% to 0.09% w/v) in the extraction of xylan of corn cobs confirm to these reported in the literature. The hydrolysis of corn cob xylans by immobilized xylanase is a promising possibility for future applications in enzymatic bioreactors to obtain fermentable sugars for bioethanol production.

Keywords: Corn corb, hemicellulose, xylanase.

Development Agency: FAPESP and CAPES