Evaluation of autohydrolysis process for cellulases production by *Aspergillus niger* van Tieghem using corncob biomass

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Lignocellulosic residues, such as corncob, are a complex matrix composed by cellulose, hemicellulose and lignin that can be used for different biotechnological applications (e.g. enzymes production). However, the applications of these crude residues as substrate for enzymes production are often inefficient.

An efficient hydrolysis of these residues requires a pretreatment (e.g. autohydrolysis) that lead to a more accessible structure for microorganisms attack. Recently, fungi have received significant attention as a source of new thermostable enzymes for use in many biotechnological applications, including biomass degradation (cellulases are key enzymes for efficient biomass degradation) [1]. The enzymatic degradation of cellulose to glucose is achieved by the cooperative action of endoglucanases (EC 3.1.1.4, hydrolyze randomly the internal glycosidic linkages), exoglucanases (cellobiohydrolases, CBH, EC 3.2.1.91, hydrolyze cellulose chains by removing cellobiose mainly from the non-reducing ends) and β-glucosidases (EC 3.2.1.21, cleave cellooligosaccharides and cellobiose to glucose) [2].

In this context, this work evaluates the inclusion of pretreated corncob in the nutrient media for cellulase production by *Aspergillus niger* van Tieghem in comparison with non-treated corncob. Autohydrolysis pretreament conditions used were 180, 190 and 200 ºC for 10, 30 and 50 min, and two fractions were obtained: solid and liquid fractions enriched by cellulose and hemicellulose, respectively. Three different mixtures (for each condition) were used as carbon source in Mandels medium [3] during the cellulases production by the *A. niger* van Tieghem: a solid fraction (1% w/v in medium), a liquid fraction (100 % v/v in medium), and a mixture of the solid and liquid fractions (1% w/v + 10% v/v in medium). Fermentation conditions were at 30ºC, 100 rpm, and the cellulases and β-xylosidase were quantified by Miller [4] and Kersters-Hilderson [5] methods, respectively, after 6 days of fermentation.

Interestingly, the results showed that the highest cellulases production was obtained when the microorganism grows in medium containing the hemicellulose fraction (or liquid fraction) as carbon source. The exoglucanase and endoglucanase production using the liquid fraction obtained at 200ºC for 30 min, were three and twenty times higher, respectively, than the production obtained using corncob untreated, as carbon source. In relation to β-g production, the best autohydrolysis condition was 180ºC for 30 minutes; this production was fifteen percent higher than the production detected with crude corncob.

This work shows the potential of autohydrolysis retreatment of lignocellulosic residues as a strategy to increase and add-value the cellulase production by filamentous fungi.

Keywords: autohydrolysis; cellulase, corncob.

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