Production of Cellulases by Amazon Forest Fungi

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Abstract:

The prospection of cellulase producing microorganisms is one of the possible strategies for obtaining the enzymes needed to hydrolyze lignocellulosic material and to contribute to the economic viability of cellulosic ethanol. Lignocellulosic materials are very attractive substrates for the production of ethanol because of their low cost and their large availability. In this work, we evaluated the production of cellulolytic enzymes by an Aspergillus fumigatus strain isolated from the natural Amazon forest cultivated under solid state fermentation (SSF). Different solid substrates such as wheat bran, sugar cane bagasse, sugar cane bagasse and wheat bran (1:1), soybean, orange peel and orange peel and wheat bran (1:1) were studied. The production of CMCase, FPase and ƒÀ-glucosidase enzymes were carried out at 35 •‹C during a 120 h period cultivation. Cellulotytic enzymes were extracted with citrate buffer (50 mM, pH 5.0), under agitation at 200 rpm for 30 min. The suspended material was separated by centrifugation (10.000 •~g for 10 min) and filtered through a glass microfiber filter (Whatman GF/A). The supernatant was used as crude enzyme solution. CMCase activities up to 265 IU/g was obtained when using soybean as solid substrate after 96 h of cultivation. Optimum temperature and pH conditions for CMCase were 65 •‹C and pH of 3.5, indicating that this microorganism produces a thermophilic and acid endoglucanases. This strain was also able to produce FPase efficiently (5.09 IU/g) when cultivated in SSF using a mixture of wheat bran and sugar cane bagasse as substrate after 96 h. ƒÀ-glucosidase production showed maximal activity when using wheat bran as carbon source (105.82 IU/g) after 96 h growth. These results indicates the potential of isolates from Amazonia as cellulase producers. Moreover, the results obtained in this work point to the need for a better understanding of the microbial diversity of the Amazon region towards bionergy purposes.

Key words: Amazon forest, Aspergillus fumigatus, celullases, lignocellulosic materials