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CHARACTERIZATION OF CELLULOLITIC FILAMENTOUS FUNGI ISOLATED FROM DIFFERENT BIOMES

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Abstract:

The production of biobased products and bionergy from less costly renewable lignocellulosic materials, to replace depleting fossil fuels, is important for the sustainable development of human beings. Cellulases are a group of enzymes which cleave the cellulose polymer by different ways and the synergistic action of these enzymes produce glucose as end product. This sugar is used as substrate reaction of those bioconversions. Cellulases are relatively costly enzymes and a significant reduction in cost will be important for their commercial use. The use of cheaper raw materials, microorganisms that produce high amounts of enzyme and semi-solid fermentation can reduce costs of cellulase production. Researches of Embrapa Food Technology and their partners have been screened filamentous fungi strains isolated from different biomes, aiming identify the best cellulase producers. In this work, eleven isolated strains were partialy identified and characterized for cellulase and accessory enzymes production. As the strains were isolated from biomes, some of them were not pure and it was necessary to carried out a process of isolation. Among the microorganisms characterized, there were Trichoderma, Penicillium and Aspergillus strains. The enzyme production was carried out, in duplicate, by semi-solid fermentation for 48 h, in 125 mL Erlenmeyers flasks containing 10 g of the sterilized medium (100 g of wheat bran was moistened with 60 ml of 0.91% w/v of ammonium sulphate in 0,1 N HCl). The crude enzymatic extracts were characterized by means of protein and activity of the following enzymes expressed in units for gram of dried substrate (U/gds): carboxymethylcellulase, Fpase, beta-glucosidase, xylanase and polygalacturonase. The best results obtained by the isolated strains were: carboxymetylcellulase (54 U/gds) and polygalacturonase (208 U/gds) by Aspergillus brasiliense, beta-glucosidase (2.35 U/gds) by Aspergillus ostiones and xylanase (196 U/gds) by Aspergillus niger. The FPase was not detected in the crude enzyme extracts. Among the strains characterized, the genus Aspergillus was the best to be applied to bioenergy because their enzyme activities were the highest. Financial support: Embrapa, UFRRJ

Key words: cellulase, screening, filamentous fungi, semi-solid fermentation