Evaluation of agroindustrial residues as substrates for cellulolytic enzymes production under solid state fermentation

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Agroindustrial residues have a great potential to be used as raw materials for the production of important industrial enzymes and chemicals[1]. The present study evaluated different agroindustrial residues (wheat bran, rice hulls and açai seeds) as substrates for cellulolytic enzyme production by *Aspergillus niger*. The solid state fermentation system (SSF) was carried out in a column type biorreactor with controlled temperature and air flow rate (set at 32ºC and 30 mL min^{-1}, respectively). The different sterilized and inoculated ($1*10^7$ spores/g) substrates were fermented during 72 hours. Table 1 shows the substrates contents in terms of cellulose, lignin and protein, as well as the results obtained for enzyme production as determined by standard methodologies[2, 3].

Table 1: Chemical composition of the substrates and its cellulolytic enzyme productivity.

	Chemical Composition (%)			Enzyme activity(U/g substrate)		
Carbon Source	Cellulose	Lignin	Protein	CMCase	Xylanase	Polygalacturonase
Wheat bran	10,9	4,9	17,6	31,09	54,48	20,77
Açai seeds	53,2	22,3	5,2	1,54	1,73	1,44
Rice hulls	44,8	18,7	2,4	1,85	0,29	1,72

The results showed that all the materials produced a very different amount of enzymes depending on its chemical composition and structure. Wheat bran exhibited the best productivity (30 times higher) at the conditions used. Probably the amount of lignin and its association with cellulose and hemicellulose, contributed significantly in reducing the enzyme induction. Thus their removal or partial degradation through different pre-treatments may improve the fungal growth and, consequently, increase the enzyme production. Complementary, further investigations will be required to determine the optimal nutritional and environmental conditions to improve the enzyme productivity.

Keywords: Agroindustrial residues, Solid State Fermentation, enzymes, lignocelullosic material.
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