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Hydrothermal pretreatment of sugarcane bagasse enhances holocellulases production by *Aspergillus foetidus*

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Sugarcane bagasse (SCB) was subjected to hydrothermal pretreatment under different severities (153 - 187 °C for 5 - 55 min) and solid loadings (1 - 11 % w/w) to generate hemicellulose-rich liquors, which were chemically characterized and used as unconventional soluble carbon source for *A. foetidus*. Liquid chromatography analysis revealed that liquors were rich in oligomeric xylose and monomeric arabinose with minor quantities of glucose, mannose and galactose. Several xylan degradation products such as xylose, arabinose, xylooligosaccharides (XOS), feruloyl- and *p*-coumaroyl-arabinofuranose, and a diversity of lignin-derived aromatic compounds were identified in liquors by mass spectrometry. Liquors arising from pretreatments of different severities induced varying levels of xylanase (2.3 - 3.5 IU/mL after 7 days) from *A. foetidus*, with different lengths of lag phase caused by pretreatment-derived microbial inhibitors. Liquor generated at 170°C, 30 min, and 1 % w/w SCB was selected as a model substrate since it gave the highest xylanase yield per weight of biomass employed in pretreatment. Despite having much lower total carbohydrate content (1.55 g/L), the model liquor induced more xylanase (2.8 IU/mL) than untreated SCB at 10.0 g/L as carbon source (0.3 IU/mL). Model liquor also induced more xylanase than synthetic medium containing xylose as carbon source, suggesting XOS from liquor were more important than xylose for the purpose of enzyme induction. Cultivation of *A.*

foetidus on model liquor in a 7 L fermenter at 28°C, 200 rpm, pH 7.0, and aeration of 1 vvm resulted in similar xylanase production compared to erlenmeyer flasks cultivation. The solids arising from SCB pretreatment were also investigated as substrate for holocellulases (xylanase, endoglucanase, mannanase, and pectinase) production, and showed better induction performance than untreated SCB. Scanning electron microscopy revealed a greater porosity and surface area in pretreated SCB, which could increase acessibility to biomass polysaccharides and partially explains increased enzyme production. The highest holocellulase activities were obtained when both fractions - liquor and solids - from pretreatment were employed together as carbon source for *A. foetidus*. In conclusion, hydrothermal pretreatment of SCB enhanced holocellulases production by *A. foetidus* when using this material as carbon source.