Effective fermentation of sugarcane bagasse whole slurries using robust xylose-capable *Saccharomyces cerevisiae*

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Abstract

The pre-treatment of lignocellulose material toward cellulosic bioethanol production releases microbial inhibitors that severely limit the fermentation ability of *Saccharomyces cerevisiae*. This study evaluated to what degree robust xylose capable strains may improve the fermentability of non-detoxified sugarcane bagasse (SCB) slurries derived from steam explosion (StEX), and further compared this to slurries derived from ammonia fibre expansion (AFEX) pre-treatment. Initial screening in separate hydrolyses and co-fermentation processes using StEX-SCB hydrolysates identified *S. cerevisiae* TP-1 and CelluXTM4 with higher xylose consumption ([?] 88%) and ethanol concentrations ([?] 50 g/L). Subsequent fermentations compared StEX and AFEX pre-treated SCB material under industrially relevant fed-batch pre-hydrolysis simultaneous saccharification and co-fermentation (PSSCF) conditions, which resulted in only 3 g/L differences in ethanol titres for StEX and AFEX PSSCF fermentations. The study achieved non-detoxified whole-slurry co-fermentation using StEX pre-treated SCB, with higher ethanol yields than previously reported, by utilising robust xylose-capable strains.

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