ß-GLUCOSIDASE IN SACCHARIFICATION OF LIGNOCELLULOSE FOR BIOETHANOL PRODUCTION

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Vegetal biomass can be used as a feedstock to produce liquid fuels like bioethanol as a promising alternative source of energy.

Cellulases and xylanases have the potential to achieve the complete saccharification of lignocellulosic biomass for ethanol production as an alternative fuel. Hemicellulose is degraded mainly by xylanases to xylo-oligosaccharides and xylose while cellulose can be hydrolyzed by endoglucanases and exoglucanases to cellobiose and cellooligosaccharides. These are converted to glucose by the action of β-glucosidases. However this enzyme is a bottleneck in the degradation of cellulose because it limits the efficiency of hydrolysis of exoglucanase and endoglucanase, which are inhibited by the accumulation of cellobiose.

The cost of enzymes is one of the factors that determine the viability of the bioprocess. There are several ways to decrease the cost of production by constructing efficient enzymes, isolating hyper producer mutants, finding optimum culture conditions and using genetic engineering. Thus the quest of highly efficient enzymes and hyper producing mutants could reduce these limitations increasing the economic feasibility [1].

Mutant isolation has extensive results and using different screening methods and selection strategies allow the obtaining of a wide range of mutants with the desired improvement [2].

Cellulomonas flavigena PN-120 is a derepressed mutant that produces cellulases resistant to inhibition by high cellobiose concentrations [3]. This mutant hiperproduces an oligomeric β-glucosidase of the family 3 with three times greater affinity for cellobiose than its parental strain [4]. However, this enzyme remains intracellular in the bacteria limiting the hydrolysis of the extracellular cellulose and cellooligosaccharides.

The aim of the current work was to express extracellularly the catalitic fraction of the β-glucosidase from *C. flavigena* PN-120 in a recombinant strain of *S. cerevisiae*. As well as to evaluate the capacity of the recombinant enzyme for hydrolyzing cello-oligosacharides with diferents polimeration degrees and the inhibition of the recombinant enzyme at high glucose concentrations for using this yeast for bioethanol production from biomass.

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