

Screening of β -glucosidase for biomass conversion

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Abstract

Cellulose is a major polymer in plants composing of glucose monomeric units linked by β -1,4-glycosidic bond. Complete hydrolysis of cellulose to glucose residues by enzymatic process is catalysed by synergistic action of the so-called cellulolytic enzymes, comprising of exo-, endo-cellulases and β -glucosidase, which possess different specificities on cellulosic substrate. β -glucosidase (EC 3.2.1.21) catalyses the hydrolysis of terminal, non-reducing β -D-glucose residues within short β -D-glucose oligomers (i.e., cellubiose to cellobiose) to D-glucoses. β -glucosidase isolated from seeds, fungi and bacteria have been widely used in fermentation industries and cellulosic biomass conversion. The aim of this work is to screen for efficient β -glucosidase for cellulose hydrolysis. Forty selected fungal isolates from BIOTEC Culture Collection (BCC) previously known to possess cellulase activity were assayed for β -glucosidase activity using the chromogenic substrate p-nitrophenol- β -D-glucopyranoside (PNPG). A few fungal isolates producing β -glucosidase with high potential for industrial applications were then identified. BCC2871 (*Periconia sp.*) was found to produce a better or comparable thermotolerant β -glucosidase to those currently used in industries. The crude enzyme shows optimal temperature of 70°C and a broad working pH range of 4-5. The enzyme retains more than 90% of maximal activity after long incubation at high temperature (60°C, 1 hour). The gene encoding this enzyme is being identified by PCR using primers based on conserved regions of fungal β -glucosidases. Biochemical characterisation and heterologous expression of the enzyme will also be further studied.