

Novel Glucosidase (Gluc1C) from natural isolate

During hydrolysis of cellulosic biomass, the substrates for Glucosidases are generated in the form of cellobiose or cellodextrin via the action of endo- or exoglucanase, which are then hydrolyzed into monomers. Thus, glucosidase is very important to completely hydrolyze complex cellulose into monomeric sugar units. This prompted us to isolate glucosidase from *Paenibacillus* sp. ICGEB2008, since this strain showed significant pNPG activity (2.4 mU/108 cells) in the intracellular fraction. An open reading frame (ORF) of 1,347 bp was amplified that encoded a 448-amino-acid-long 51.7-kDa polypeptide with a theoretical pI of 5.06. The ORF sequence (GenBank accession no. JQ713769) containing the glycosyl hydrolase superfamily 1 domain, without any signal sequence, was expressed in *E. coli* along with the 6-histidine tag, and purified through metal affinity chromatography, and characterized for its activity.

The biochemical properties, such as optimal pH and temperature for enzyme activity, K_m , and k_{cat} , were found to be similar to those of type I glucosidase i.e., 50°C and pH 6 as temperature and pH optima respectively. Gluc1C was found to hydrolyze cello-oligosaccharides with a chain length of up to five sugars, with highest efficiency toward cellobiose.

Graphical Description

Substrate	%Substrate Utilized	Product Formed
Cellobiose (C2)	95	Glucose (C1)
Cellotriose (C3)	91	Glucose (C1)
Cellotetraose (C4)	12.3	Glucose (C1)
Cellopentaose (C5)	19.6	Glucose (C1)
Cellohexaose (C6)	1.52	Glucose (C1)

Table 1: Extent of hydrolysis of various cellodextrin by Gluc1C

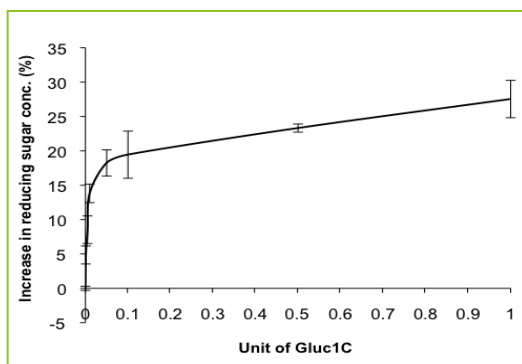


Figure 1: Impact on reducing sugar concentration upon addition of Gluc1C to Endo5A

Exploitable Technology

The lab scale recombinant enzyme technology is now ready to be upscaled industrially to meet the energy needs of human beings.

Reference for the Invention

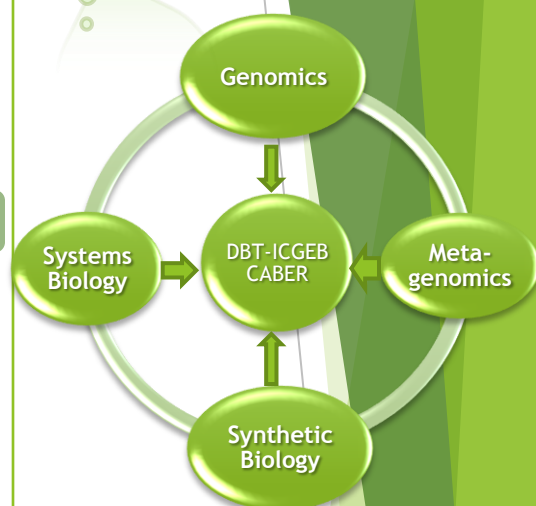
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