Poster code:

B19

Heterologous Expression of *cgt-BS* Gene Improved Recombinant Cyclodextrin Glycosyltransferase Production from *Escherichia coli*

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Abstract. Cyclodextrin glycosyltransferase (CGTase) (EC 2.4.1.19) represents one of the most important groups of microbial amylolytic enzymes that degrade starch which synthesize cyclodextrin through cyclization reactions. The cyclodextrins able to form inclusion complexes with variety of organic and inorganic guest molecules, thus bring to wide range of applications in food, pharmaceutical, chemical industries, agriculture and environmental engineering. However, the major concern in the CGTase production is the lower enzyme productivities and longer incubation time for maximum enzyme production by wild type bacteria. Besides that, the mixtures of α-, β- and γ-cyclodextrins produced in different ratios contributed to the high purification cost. In this study, the cgt-BS gene from Bacillus sp. NR5 UPM which consists of putative promoter region is used to enhance the recombinant β-CGTase production, in terms of enzyme yield and stability, as well as to reduce the cultivation time. Furthermore, the addition of glycine as an inducer is shown able to enhance the extracellular secretion of β-CGTase up to 1.5-fold by increasing the permeability of the membrane. Therefore, the heterologous expression of β-CGTase followed by optimization of glycine supplementation could be used to enhance the extracellular β-CGTase production, hence could improve the production of cyclodextrin.

Keywords: cyclodextrin glycosyltransferase, putative promoter, inducer, glycine