Highly efficient enzymatic preparation of isomalto-oligosaccharides from starch with enzyme cocktail

Dandan Niu, Jian Qiao, Pujun Li, Kangming Tian, Xiaoguang Liu, Suren Singh, Fuping Lu

PII: S0717-3458(16)30133-6
DOI: doi:10.1016/j.ejbt.2016.12.002
Reference: EJBT 214

To appear in: *Electronic Journal of Biotechnology*

Received date: 28 August 2016
Accepted date: 7 December 2016

Please cite this article as: Niu Dandan, Qiao Jian, Li Pujun, Tian Kangming, Liu Xiaoguang, Singh Suren, Lu Fuping, Highly efficient enzymatic preparation of isomalto-oligosaccharides from starch with enzyme cocktail, *Electronic Journal of Biotechnology* (2016), doi:10.1016/j.ejbt.2016.12.002

Proofs to: ddniu0529@fzu.edu.cn

Electronic Journal of Biotechnology
EJBT-D-16-00137 R1
Original Research Article
Received: August 28, 2016
Accepted:
Areas: Food Biotechnology; Process Biotechnology

Highly efficient enzymatic preparation of isomalto-oligosaccharides from starch with enzyme cocktail

Dandan Niu[a,b,d*], Jian Qiao[b,d], Pujun Li[b,d], Kangming Tian[c,d*], Xiaoguang Liu[c,d], Suren Singh[e], Fuping Lu[b,d]

[a] *Fujian Provincial Key Laboratory of Marine Enzyme Engineering, College of Biological Science and Engineering, Fuzhou University, Fuzhou 350116, China*
[b] *The College of Biotechnology, Tianjin University of Science and Technology, Tianjin 300457, China*
[c] *Department of Biological Chemical Engineering, College of Chemical Engineering and Material Sciences, Tianjin University of Science and Technology, Tianjin 300457, China*
[d] *The Key Lab for Fermentation Microbiology, Ministry of Education, Tianjin University of Science and Technology, Tianjin 300457, China*
[e] *Department of Biotechnology and Food Technology, Durban University of Technology, Durban, South Africa*

***Corresponding authors:** ddniu0529@fzu.edu.cn; kangmingtian@tust.edu.cn

Abstract

Background: Current commercial production of isomalto-oligosaccharides (IMOs) commonly involves a lengthy multi-stage process with low yields.
Results: To improve the process efficiency for production of IMOs, we developed a simple and efficient method for production of IMOs by using enzyme cocktails composed of the recombinant *Bacillus naganoensis* pullulanase produced by *Bacillus licheniformis*, α-amylase from *Bacillus amyloliquefaciens*, barley bran β-amylase and α-transglucosidase from *Aspergillus niger* to perform simultaneous saccharification and transglycosylation to process the liquefied starch. After a reaction of 13 h, 49.09% of IMOs (calculated based on the total amount of isomaltose, isomaltotriose and panose) was produced.
Conclusions: Our proposed method using an enzyme cocktail for efficient production of IMOs offers an attractive alternative to the current process for production of IMOs.

Keywords: *Aspergillus niger; Bacillus amyloliquefaciens; Bacillus licheniformis; Bacillus naganoensis* pullulanase; barley bran β-amylase; Isomalto-oligosaccharides production; Saccharification; Transglycosylation; α-amylase; α-transglucosidase.

1. Introduction

Isomalto-oligosaccharides (IMOs) are glucose oligomers of α-D-(1,6)-linkages with or without α-(1→4) linkages [1], including among others isomaltose, panose,