

Substrate Specificity of α -L-Arabinofuranosidase from the Hyperthermophile *Thermotoga maritima* toward Arabinose-containing Oligosaccharide

금인경, 윤지효, 김태집, 윤향식¹, 이우종², 김정호³, 한남수

충북대학교 식품공학과, 생물건강산업개발연구센터

¹충청북도농업기술원, ²AP테크놀로지, ³서원대학교 식품영양학과

Tel: (043) 261-2567, Fax: (043) 271-4412

Abstract

L-arabinose selectively inhibits intestinal sucrase in an uncompetitive manner and reduces the glycemic response in animals following sucrose ingestion. L-arabinose can be obtained from cereal hemicellulose, such as corn, wheat, rye, and rice, pectic substances of beet and apple pulps, and some plant gums by acid hydrolysis and enzymatic hydrolysis. As compared with acid hydrolysis, enzymatic method has advantages of high specificity on the substrate, mild reaction conditions, and no loss of saccharide due to side reactions¹⁾. Gene encoding an α -L-arabinofuranosidase from the hyperthermophile, *Thermotoga maritima*, was cloned, sequenced, and expressed in *E. coli* BL21(DE3) pLysS. The specific activity of recombinant enzyme toward *p*-nitrophenyl- α -L-arabinofuranoside was 475 units/mg at its optimal reaction condition at 100°C, pH 5.5. The enzyme released only the terminal arabinose of arabinose-containing oligosaccharide^{2),3)}. The enzyme demonstrated reactivity towards arabinan, debranched arabinan, oat spelt xylan and arabinoxylan as substrates but did not hydrolyse arabinogalactan or gum arabic. This enzyme hydrolysed almost the α -L-arabinofuranosyl residues, α -(1→2), α -(1→3), α -(1→5) and arabinosyl side-chains of arabinan, debranched arabinan, arabinoxylan. This enzyme reveals broader specificity toward arabinose-containing substrates than those reported so far, and this unique characteristic will enable this enzyme to be used in arabinose recovering process from hemicellulose.

References

1. Saha, BC. " α -L-Arabinofuranosidases: biochemistry, molecular biology and application in biotechnology"(2000), *Biotechnology Advances*. 18, 403-423
2. Coutinho, P. M. and B. Henrissat, (1999), Carbohydrate-Active Enzymes Server at URL: <http://afmb.cnrs-mrs.fr/CAZY/index.html>
3. Satoshi, K., Kazuaka H., Tsuneo, Y., and K. Isao. "Substrate Specificity of α -L-Arabinofuranosidase from *Streptomyces diastatochromogenes* 065 toward Arabinose-Containing Oligosaccharides"(1998), *Journal of Fermentation and Bioengineering*, 85(5), 518-520