Analysis of NADPH regeneration systems in recombinant *Saccharomyces cerevisiae* for production of xylitol from xylose

권도현, 이태희, 김희정, 김정아, 유현아, 이원흥, 서진호*
서울대학교 농생명공학부
(jhseo94@snu.ac.kr*)

Xylitol has been used as a sugar substitute in the food industry due to a number of functional properties such as low caloric and anti-cariogenic characteristics. As NADPH plays an important role in xylitol biosynthesis from xylose in recombinant *Saccharomyces cerevisiae* containing the xylose reductase (XR) gene from *Pichia stipitis*, the NADPH regeneration system is required for effective production of xylitol. NADPH is mainly generated through the oxidative part of the pentose phosphate pathway by the action of glucose-6-phosphate dehydrogenase (G6PDH) and 6-phosphogluconate dehydrogenase (6PGDH) expressed by the *ZWF1* and *GND1* genes, respectively, in *S. cerevisiae*. To facilitate NADPH regeneration, the *ZWF1* gene was expressed in recombinant *S. cerevisi*ae harboring the XR gene from *P. stipitis*. Its effect on xylitol production was investigated in batch and glucose-limited fed-batch fermentations. In batch fermentations, xylitol productivity for *S. cerevisiae* BJ3505:δXR/pKZWF1 resulted in 1.7 g/L•hr, which was about 1.2-fold higher than that obtained from the control strain (1.4 g/L•hr). Glucose limited fed-batch fermentation was performed for sufficient supply of ATP as a maintenance energy and NAD(P)H as a reducing power for xylitol production. Overexpression of the *ZWF1* gene improved xylitol productivity from 1.7 g/L•hr to 2.3 g/L•hr in fed-batch fermentation of recombinant S. cerevisiae.