Biosynthesis of D-Ribose from Xylose by Metabolically Engineered *Bacillus subtilis* JY200

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D-Ribose is a five-carbon sugar used for commercial syntheses of riboflavin, antiviral agents and flavor enhancers. Mechanisms of D-ribose biosynthesis from xylose were investigated by genetically engineered *Bacillus subtilis* JY200 showing the transketolase deficiency. The transketolase disruption cassette in plasmid pUNKC was introduced into the chromosomal transketolase gene in the wild type of *B. subtilis* 168. In batch fermentation of *B. subtilis* JY200, the *tktA* gene disruption caused loss of cell viability after glucose depletion, and hence prevented further accumulation of D-ribose. Fed-batch fermentation by feeding 400 g/l glucose solution was carried out to supply ATP to the xylose metabolism and to maintain cell viability throughout cultivation. Fed-batch fermentation of *B. subtilis* JY200 in MY medium containing 11 g/l xylose and 5 g/l glucose initially gave the best result of 10.1 g/l D-ribose concentration, yield of 0.24 g ribose/g sugar and 0.29 g/l-hr productivity, corresponding to 40-, 5- and 12-fold increases compared with those in the batch culture. A kinetic study of D-ribose production in fed-batch fermentations of *B. subtilis* JY200 suggested that xylose uptake might be a key factor for maximizing D-ribose biosynthesis from xylose.