World Academy of Science, Engineering and Technology
International Journal of Biotechnology and Bioengineering
Vol:10, No:01, 2016

Genetic Change in Escherichia coli KJ122 That Improved Succinate Production from an Equal Mixture of Xylose and Glucose

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Abstract : Escherichia coli KJ122 was engineered to produce succinate from glucose using the wild type GalP for glucose uptake instead of the native phosphotransferase system (ptsI mutation). This strain ferments 10% (w/v) xylose poorly. Mutants were selected by serial transfers in AM1 mineral salts medium with 10% (w/v) xylose. Evolved mutants exhibited a similar improvement, co-fermentation of an equal mixture of xylose and glucose. One of these, AS1600a, produced 84.26±1.37 g/L succinate, equivalent to that produced by the parent (KJ122) strain from 10% glucose (85.46±1.78 g/L). AS1600a was sequenced and found to contain a mutation in galactose permease (GalP, G236D). Expressing the galP* mutation gene in KJ122ΔgalP resembled the xylose utilization phenotype of the mutant AS1600a. The strain AS1600a and KJ122ΔgalP (pLOI5746; galP*) also co-fermented a mixture of glucose, xylose, arabinose, and galactose in sugarcane bagasse hydrolysate for succinate production.

Keywords : xylose, furfural, succinate, sugarcane bagasse, E. coli
Conference Title : ICBBB 2016 : International Conference on Bioscience, Biotechnology, and Biochemistry
Conference Location : Paris, France
Conference Dates : January 21-22, 2016