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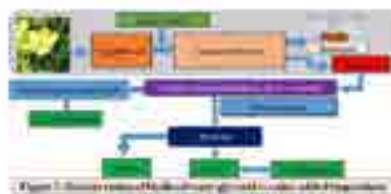
BIOFUELS AND BIOENERGY

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Effective microbial production of 2,3-butanediol from biodiesel derived crude glycerol

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Biodiesel, a renewable biofuel, is produced from vegetable oils and animal fats by transesterification. The booming of biodiesel industry all over the world has led to generate a large amount (10% v/v) of crude glycerol, created an oversupply problem. The high volume of this non bio-degradable glycerol is becoming of a great environmental and economic concern for the development of biodiesel industries. Herein, we report the product concentrations of major metabolic products attained from pure and crude glycerol biotransformation process using an adapted mutant strain *Klebsiella variicola* SW3. Real-time qPCR and glycerol dehydrogenase (GDH) enzyme activity assay revealed that the overexpression of GDH gene resulted in an increased GDH enzyme activity, led to a markedly boosted 2,3-butanediol (2,3-BD) production. Based on these results, the SW3 strain obtained from wild type strain *Klebsiella variicola* SRP3 displayed a 1.39-fold increased 2,3-BD production of 82.5 g/L from 59.3 g/L, yielding 0.62 g/g using pure glycerol. However, in a batch culture, a final 33.5 g/L of 2,3-BD was accumulated within 96 hours from 50 g/L glycerol. Moreover, the strain SW3 withstanding high concentration (200 g/L) of crude glycerol displayed 64.9 and 29.25 g/L 2,3-BD in fed-batch and batch cultures respectively. These results indicated that our newly developed adapted mutant can tolerate high concentration of glycerol, have a high glycerol utilization rate and high product yield of 2,3-BD. It is demonstrated that the mutant strain *K. variicola* SW3 has an ability to produce fewer co-products at trace concentrations at higher glycerol concentrations and could be a potential candidate for 2,3-BD production in an industrial bioconversion process. Therefore, this bioconversion of crude glycerol to 2,3-BD; a value-added green product with potential industrial applications as a liquid fuel or fuel additive would represent a remarkable alternative to add value to the biodiesel production helping biodiesel industries development.



Biography

Wensheng Qin has received his BSc and MSc in Agriculture and Biotechnology from Zhejiang University in China. He has earned his PhD in Molecular Biology and Biotechnology in 2005 from Queen's University in Canada. He further received Postdoctoral training at Stanford University in Biochemistry and Biotechnology. During his studies, he was awarded multiple fellowships and scholarships such as NSERC Fellowship and Ontario Graduate Scholarship. He has also worked in several other institutions including University of Toronto and University of Waterloo in Canada, Kansas State University and Yale University in USA, National Polytechnic Institute of Mexico. He has published 98 peer-reviewed papers. He has extensive research experience and holds expertise in the fields of biorefining, biofuels, microbial engineering, molecular biology and biochemistry.

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