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Biodiesel production from granular sludge fed with sugar-containing wastewater

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ABSTRACT

Utilizing excess sludge from wastewater treatment plant to produce biodiesel is becoming increasingly popular, but it has been limited by the low lipid content in activated sludge. This study was designed to enhance biodiesel production from granular sludge fed with synthetic sugar-containing wastewater. The experiments were conducted in two 1.2-L sequencing batch reactors under different sludge settling times to cultivate granular sludge and activated sludge. The biodiesel yield of the granular sludge (30.14 ± 0.73 mg/g suspended solids [SS]) was higher than that of the activated sludge (21.56 ± 0.95 mg/g SS) with the same feedings. The distributions of fatty acid methyl esters varied among the seed sludge, the cultured sludge flocs and the granular sludge. Methyl 14-methylpentadecanoate (14MeC15:0), methyl oleate (C18:1) and methyl linoleate (C18:2) were the three components of the biodiesel produced from the granular sludge that increased the fastest, which might promote the heating value and the low temperature fluidity of biodiesel. The remarkable change of microbial community and the dominance of filamentous fungi *Phialophora* after sludge granulation might contribute to the intrinsic change in the fatty acids, which resulted in a higher yield and a better quality of biodiesel.

Keywords: Biodiesel; Fatty acid methyl esters; Granular sludge; Sugar-containing wastewater; Microbial population

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