Lipid enhancement and biodiesel production by fermentation of activated sludge and food wastewater

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Biodiesel is a clean fuel that can be produced by trans-esterification of lipid sources from diverse feedstock. However, it has considered uneconomic energy source due to the high price of feedstock. In this study, activated sludge, main organic biomass was used as a feedstock for economic process. Food wastewater which has high portion of organic matter but relatively small portion of nitrogen was applied to control C:N ratio of each fermntation medium as one method to enhance the lipid production. The results showed 163%, 42% and 11% increase in total lipid contents at F5, F4 and F3, respectively. The content of fatty acid methyl esters (FAMEs) obtained from TAGs and concentration of FAMEs also increased significantly after the enhacement. In the composition of fatty acids, C16:0 was mostly converted to C18:1 which is an important result in terms of quality of biodiesel. This is the first effort to produce biodiesel using sewage sludge for the lipid accumulation and food wastewater as a carbon source which is not synthetic medium. Hence, this study provides one solution to treat organic wastes and to produce lipid effectively at the same time as an economical alternative for the biodiesel production.