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Comparison of ex-situ and in-situ transesterification for the production of microbial biodiesel
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Abstract
Microbial biodiesel is converted from microbial lipids via transesterification process. Most microbial biodiesel studies are focusing on the use of microalgal lipids as feedstock. Apart from using microalgae for lipid biosynthesis, lipids can also be extracted from other oleaginous microorganisms like fungi and yeast. However, there are gaps in the studies of lipid production from filamentous fungi, especially in-situ transesterification process. The aim of this project is to compare in-situ with the ex-situ transesterification of fungal biomass from Aspergillus oryzae. In ex-situ transesterification, two methods of lipid extraction, the Soxhlet extraction and the Bligh and Dyer extraction, were performed. For in-situ transesterification, two methods using different catalysts were investigated. Base-catalyzed in-situ transesterification of fungal biomass resulted on the highest Fatty Acid Methyl Esters (FAME) yield. The base-catalyzed in-situ transesterification was further optimized via Central Composite Design (CCD) of Response Surface Methodology (RSM). The parameters investigated were the catalyst loading, methanol to biomass ratio and reaction time. The optimization showed that the highest FAME yield was at 25.1% (w/w) with 10 minutes reaction time, 5% catalyst and 360:1 of the ratio of the methanol to biomass. Based on Analysis of Variance (ANOVA), the model was found to be significant according to the value of “Prob >F” of 0.0028. Copyright © 2021 by Authors, Published by BCREC Group. This is an open access article under the CC BY-SA License (https://creativecommons.org/licenses/by-sa/4.0).

Author Keywords
Aspergillus; Biodiesel; Ex-situ transesterification; In-situ transesterification; Lipid; Solvent extraction

Index Keywords
Analysis of variance (ANOVA), Aspergillus, Biochemistry, Biomass, Catalysis, Catalysts, Fatty acids, Lipids, Methanol, Microorganisms, Solvent extraction, Transesterification; Base catalyzed, Ex situ, Ex-situ transesterification, Fungal biomass, High fatty acids, In-situ transesterification, Situ transesterification, Transesterification process,]+ catalyst; Biodiesel

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