

Repeated Batch Production of Biosurfactant from *Pseudomonas mendocina* NK41 Using Agricultural and Agro-Industrial Wastes as Substrate

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Abstract : The potential of an alkaliphilic bacteria isolated from soil in Thailand to utilize agro-industrial and agricultural wastes for the production of biosurfactants was evaluated in this study. Among five isolates, *Pseudomonas mendocina* NK41 used soapstock as substrate showing a high biosurfactant concentration of 7.10 g/L, oil displacement of 97.8 %, and surface tension reduction to 29.45 mN/m. Various agricultural residues were applied as mixed substrates with soapstock to enhance the synthesis of biosurfactants. The production of biosurfactant and bacterial growth was found to be the highest with coconut oil cake as compared to Sacha inchi shell, coconut kernel cake, and durian shell. The biodegradability of agro-industrial wastes was better than agricultural wastes, which allowed higher bacterial growth. The pretreatment of coconut oil cake by combined alkaline and hydrothermal method increased the production of biosurfactant from 12.69 g/L to 13.82 g/L. The higher microbial accessibility was improved by the swelling of the alkali-hydrothermal pretreated coconut oil cake, which enhanced its porosity and surface area. The pretreated coconut oil cake was reused twice in the repeated batch production, showing higher biosurfactant concentration up to 16.94 g/L from the second cycle. These results demonstrated the capability of using lignocellulosic wastes from agricultural and agro-industrial activities to produce a highly valuable biosurfactant. High biosurfactant yield with low-cost substrate reveals its potential towards further commercialization of biosurfactant on large-scale production.

Keywords : alkaliphilic bacteria, agricultural/agro-industrial wastes, biosurfactant, combined alkaline-hydrothermal pretreatment

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