ABSTRACT

Diva Alfiatuzzahra. 24020222120007. **Characterization and Optimization of Biosurfactants from Superior Yeast with Palm Oil Mill Effluent and Crude Oil Substrates Using Response Surface Methodology** under the guidance of Sri Pujiyanto and I Made Sudiana.

Environmental pollution caused by oil spills and hydrocarbon compounds is currently a serious concern because it damages soil and water quality. Surfactants are used to overcome this problem to reduce surface tension and act as oil emulsifiers. Biosurfactants are amphiphilic molecules consisting of two parts, namely hydrophilic and hydrophobic, which can be used for bioremediation. Biosurfactants are produced by microorganisms such as yeast. Biosurfactant production is hampered by high production costs and low yields. This study aims to characterize biosurfactants produced by superior yeast, evaluate the potential of POME and crude oil as fermentation substrates, and determine the optimum conditions for biosurfactant production. The optimum conditions were determined using the Response Surface Methodology method with factors such as substrate concentration and incubation time, as well as the response of the emulsification index and surface tension. Optimization data were analyzed using Design-Expert software. POME concentration, crude oil concentration, and incubation time significantly affected the emulsification index and reduced surface tension ($p<0.05$). Optimum biosurfactant production at 15% POME substrate concentration, 0.8% crude oil substrate concentration, and 99 hours incubation time. The resulting biosurfactant has a compound component composition dominated by Hexadecanoic acid; l-(+)-Ascorbic acid 2,6-dihexadecanoate; Palmitic acid; 9-Octadecenoic acid (Z); Methyl stearate. Based on the component composition, the resulting biosurfactant is characterized as Mannosylerythritol Lipids (MELs).

Keywords: Biosurfactant, Crude Oil, Palm Oil Mill Effluent (POME), Response Surface Methodology (RSM), Yeast