

ABSTRACT

Aurell Belva Kirana 24020121130084 **Exploration and Characterization of Lipopeptide Biosurfactants from Haloalkaliphilic Bacteria Bledug Kesongo Based on LC-MS Analysis and Molecular Identification.** Supervised by Wijanarka dan Dwi Retno Fatmawati.

Petroleum-based synthetic surfactants pose significant environmental risks due to their toxicity and low biodegradability. Biosurfactants are surface-active compounds produced by microorganisms through extracellular synthesis, including those produced by haloalkaliphilic bacteria. Biosurfactants offer a promising alternative to synthetic surfactants owing to their high biodegradability and eco-friendly nature. This study aimed to determine the potential and activity of biosurfactants produced by haloalkaliphilic bacterial isolates from Bledug Kesongo, to characterize the biosurfactant profile of the selected isolate using LC-MS analysis, and to identify the species of the most potent biosurfactant-producing isolate through molecular identification. The research stages included bacterial isolation using the streak plate method, primary screening using a modified blue agar plate method, and activity assays using the oil spreading test and emulsification index (IE₂₄). Biosurfactant compound profiles were identified using Liquid Chromatography-Mass Spectrometry (LC-MS) based on mass-to-charge ratio (m/z) values. Primary screening identified five isolates capable of producing biosurfactants (BK1, BK3, BK15, BK16, and BK32). Secondary screening narrowed the selection to two isolates producing lipopeptide-class biosurfactants (BK1 and BK32). Isolate BK32 demonstrated the highest activity, with an oil displacement zone diameter of 21.55 mm and a moderate emulsification index (IE₂₄) of 42%. Molecular identification confirmed that isolate BK32 belongs to the species *Bacillus licheniformis*. LC-MS analysis revealed that isolate BK32 produces lipopeptide biosurfactants comprising the Lichenysin A, Iturin A, and Fengycin A families. These findings indicate that haloalkaliphilic bacteria from Bledug Kesongo hold considerable potential as producers of lipopeptide biosurfactants with a diverse range of active compounds.

Keywords: *biosurfactant, lipopeptide, haloalkaliphilic, B. licheniformis, LC-MS*