ABSTRACT

Salsabila Fatimahtuz Zahra, 24020122130059, Morphological and Physiological Characterization of Bacteria Originating from the Rhizosphere of Vegetation in Former Tin Mining Areas. Under the guidance of Sri Pujiyanto and Agusdin Dharma Fefirenta.

Post-tin mining lands generally have low soil fertility due to low nutrient availability, acidic pH, and the presence of heavy metals that can inhibit plant growth and land reclamation processes. One approach to support land recovery is the utilization of indigenous rhizosphere bacteria adapted to local environmental conditions. This study aimed to characterize the morphological and physiological properties of rhizosphere bacteria from different vegetation types in post-tin mining land and evaluate their potential as nutrient providers and bioremediation agents. Rhizosphere soil samples were collected from six vegetation types and one non-vegetated area in post-tin mining land in Bangka Belitung. Microbial metabolic activity was analyzed using the Fluorescein Diacetate (FDA) method as an initial screening, followed by bacterial isolation and characterization, including colony morphology, Gram staining, growth pattern, biomass production, phosphate solubilization, nitrogen fixation, colony characteristics on YEMA + Congo Red medium, cellulolytic activity, indole-3-acetic acid (IAA) production, siderophore production, and pathogenicity testing. The results showed that 25 bacterial isolates were successfully isolated and were dominated by Gram-negative bacteria, with the highest morphological variation found in the rhizosphere of *Anacardium occidentale*. Isolates BaR51, BaB142, BaR41, BaB41, and BaB151 showed increased growth up to 72 h of incubation, while BaB151 produced the highest biomass (5.392 mg/mL). Five isolates solubilized phosphate, 21 isolates grew on Jensen medium and 20 isolates on Burk's medium, indicating nitrogen fixation ability, five isolates exhibited Rhizobium-like characteristics on YEMA + Congo Red medium, nine isolates showed cellulolytic activity, five produced IAA, 13 produced siderophores, and 16 were non-pathogenic. Based on morphological and physiological characteristics, growth patterns, and biomass production, isolates BaB151, BaB41, BaB42, BaM41, and BaM45 were recommended as potential bacterial consortium candidates to support nutrient availability and post-tin mining land reclamation. However, these recommendations remain prospective and require confirmation through compatibility testing among isolates before further development as a bacterial consortium.

Keywords: *rhizosphere bacteria, post-tin-mining land, plant growth-promoting rhizobacteria (PGPR), bioremediation, Fluorescein Diacetate* (FDA)