

ABSTRACT

Muhammad Rendy Kurnia, 24020222130037. Analysis of the Bacterial Community in Green Mussels from the Lorok Pond Area Based on 16S rRNA Metabarcoding and Prediction of Genes with Potential for Pb and Cu Bioremediation. Under the supervision of Drs. Agung Suprihadi, M.Si. and Irfan Anwar Fauzan, S.Si., M.Si.

Heavy metal contamination by lead (Pb) and copper (Cu) in the green mussel (*Perna viridis*) aquaculture area of Tambak Lorok, Semarang, located near Tanjung Mas Port. This study aims to determine the levels of Pb and Cu contamination, analyze the biodiversity of the green mussel symbiotic bacterial community using the 16S rRNA metabarcoding approach, and predict the potential of heavy metal bioremediation genes using PICRUST2 bioinformatics analysis. Green mussel samples were collected from Tambak Lorok, and heavy metal concentrations were measured using *Atomic Absorption Spectrophotometry* (AAS). Total DNA was isolated from mussel tissue, amplified in the V3-V4 region of the 16S rRNA gene, and sequenced using the Illumina Next-Generation Sequencing (NGS) platform. Sequence data were processed using the DADA2 pipeline to generate *Amplicon Sequence Variants* (ASVs), followed by analyses of diversity, taxonomic composition, and functional prediction. Measurement results showed Pb concentrations in the water of 1.6 mg/L and Cu of 0.22 mg/L, both exceeding the seawater quality standard for biota (0.008 mg/L). Lead (Pb) concentrations in mussel tissue reached 9.14 mg/kg, exceeding the SNI maximum limit, and copper (Cu) at 6.5 mg/kg exceeded the FAO maximum limit. Taxonomic composition analysis revealed dominance by the phyla Bacillota, Bacteroidota, Actinomycetota, and Pseudomonadota. Functional prediction using PICRUST2 successfully identified the metallothionein gene as the mechanism for the bioremediation of heavy metals (Pb and Cu) in the symbiotic bacterial community of green mussels. PCR amplification results support the finding that the symbiotic bacteria of green mussels in Tambak Lorok have the potential to serve as agents for the bioremediation of heavy metals (Pb and Cu).

Key words: Green Mussels, Heavy Metals, Metabarcoding, Bioremediation, PICRUST2.