

INTISARI

Kawasan mangrove merupakan ekosistem unik dengan tingkat keragaman mikroba yang tinggi dan berpotensi dimanfaatkan untuk mengatasi masalah yang dihadapi dunia industri. Dua diantaranya adalah masalah lingkungan akibat polusi sampah plastik dan masalah penyakit di dalam industri akuakultur, khususnya penyakit akibat infeksi *Vibrio parahaemolyticus* pada budidaya udang vaname (*Penaeus vannamei*). Penelitian ini bertujuan untuk mendapatkan isolat mikroba dari sedimen mangrove dengan potensi produksi bioplastik, aktivitas penghambatan *Vibrio parahaemolyticus* secara in-vitro, dan peningkatan tingkat ekspresi gen imun pada udang vaname. Penapisan untuk mendapatkan isolat bakteri dan yeast dilakukan secara pendekatan kultur dan molekuler dengan target gen 16S rRNA, gen 26S rRNA, gen *pha-A*, gen *pha-B*, gen *pha-C*, dan metode *Enterobacterial Repetitive Intergenic Consensus* (ERIC) PCR. Penapisan secara molekuler menghasilkan tiga kandidat isolat dengan kemampuan produksi bioplastik, yaitu isolat B1.4 B, B3.4 B, dan B3.4 C. Analisis *Basic Local Alignment Search Tool* (BLAST) terhadap sekuen gen 16S rRNA ketiga isolat menunjukkan kedekatan dengan *Priestia aryabhatai*. Analisis *Fourier Transform Infrared Spectroscopy* (FTIR) dan *Gas Chromatography Mass Spectrometry* (GC-MS) terhadap biomassa sel dari ketiga isolat menunjukkan keberadaan polimer bioplastik mirip polyhydroxyalkanoate (PHA) yang tersusun atas molekul *decanoic acid*. Aktivitas anti-vibrio dengan metode difusi sumur hanya ditemukan pada isolat B1.4 B dan B3.4 C dengan rata-rata ukuran zona bening 1,9 cm hingga 2,8 cm. Bioassay dengan penggunaan udang vaname menunjukkan adanya efek imunomodulator oleh isolat B1.4 B yang didasarkan pada peningkatan ekspresi gen *Crustin*, *Anti-LPSF*, *Penaeidin-3*, dan *HSP70*. Penelitian ini telah berhasil mendapatkan satu isolat bakteri dari lingkungan mangrove dengan kemampuan produksi bioplastik dan efek imunomodulator pada udang vaname.

Kata Kunci: bioplastik, anti-Vibrio, udang vaname, isolat bakteri sedimen mangrove

ABSTRACT

Mangrove ecosystem is a unique ecosystem with high level of microbe diversity which can be utilized to solve issue faced by industry. Two of which are environmental issues related to plastic waste pollution and disease problems in aquaculture industry, especially on disease caused by *Vibrio parahaemolyticus* in vaname shrimp culture (*Penaeus vannamei*). This study aims to obtain microbe isolates from mangrove sediments with capability to produce bioplastic, to inhibit *Vibrio parahaemolyticus* by in-vitro analysis, and to increase immune related gene expression on vaname shrimp. Screening to obtain bacterial and yeast isolates were conducted using culture-dependent method and molecular screening on 16S rRNA gene, 26S rRNA gene, *pha-A* gene, *pha-B* gene, *pha-C* gene, and ERIC (*Enterobacterial Repetitive Intergenic Consensus*) PCR method. Molecular screening produced three candidate isolates which are B1.4 B, B3.4 B, and B3.4 C with bioplastic producing capability. BLAST (*Basic Local Alignment Search Tool*) analysis on 16S rRNA sequence showed high similarity with *Priestia aryabhatai*. FTIR (*Fourier Transform Infrared Spectroscopy*) and GC-MS (*Gas Chromatography Mass Spectrometry*) analysis showed the presence of PHA-like bioplastic compound which consisted on decanoic acid. Anti-vibrio activity by well diffusion method showed activity only on B1.4 B and B3.4 C isolates with mean diameter of clear zone from 1,9 cm to 2,8 cm. Bioassay using vaname shrimp showed immunomodulatory effect from B1.4 B based on increased expression of *Crustin* gene, *Anti-LPSF* gene, *Penaeidin-3* gene, dan *HSP70* gene. This study has obtained one bacterial isolate from mangrove sediment with bioplastic producing capability and immunomodulatory effect on vaname shrimp.

Keyword: bioplastic, anti-Vibrio, vaname shrimp, mangrove sediment bacterial isolates