

Intisari

Isolasi dan Karakterisasi Bakteriofag Pengendali *Vibrio parahaemolyticus* dari Tambak Udang Vaname (*Penaeus vannamei* Boone, 1931) di Kabupaten Bantul

Infeksi *Vibrio parahaemolyticus* menyebabkan kerugian industri budidaya udang vannamei (*Penaeus vannamei*). Pengendalian dengan antibiotik dapat memicu resistensi serta menimbulkan residu di lingkungan sehingga bakteriofag dipilih sebagai alternatif pengendalian *V. parahaemolyticus* karena lebih aman dan ramah lingkungan. Penelitian ini bertujuan untuk mengisolasi dan mengarakterisasi bakteriofag pengendali *Vibrio parahaemolyticus* dari air tambak udang vannamei di Kabupaten Bantul, Daerah Istimewa Yogyakarta, Indonesia. Isolasi bakteriofag dari sampel air tambak dilakukan dengan metode *double-layer agar*. Karakterisasi bakteriofag dilakukan dengan pengamatan bentuk plak, morfologi virion, dan uji daya hambat terhadap tiga spesies *Vibrio* patogen. Penelitian berhasil mengisolasi bakteriofag PA1 yang membentuk plak bulat kecil berdiameter $0,61 \pm 0,31$ mm dengan kepadatan sebesar $1,54 \times 10^6$ PFU/mL. Analisis morfologi dengan *Transmission Electron Microscopy* (TEM) menunjukkan kemiripan morfologi bakteriofag PA1 dengan famili *Siphoviridae*. Uji in vitro menunjukkan bakteriofag PA1 mampu menekan pertumbuhan *Vibrio parahaemolyticus* BKIPM, *V. parahaemolyticus* CVB, *V. alginolyticus* KL1HS4, dan *Photobacterium damsela* subsp. *damsela* GD05 pada enam jam inkubasi. Hasil penelitian ini mengindikasikan potensi *Siphoviridae* PA1 sebagai biokontrol terhadap *Vibrio parahaemolyticus*, *Vibrio alginolyticus* dan *Photobacterium damsela* subsp. *damsela*.

Kata kunci: biokontrol, *Siphoviridae*, udang vaname, *transmission electron microscopy*, *Vibrio parahaemolyticus*

Abstract

Isolation and Characterization Of Bacteriophages for Controlling *Vibrio parahaemolyticus* from Pacific White Shrimp (*Penaeus vannamei* Boone, 1931) Pond in Bantul Regency

Vibrio parahaemolyticus infections cause significant economic losses in the Pacific white shrimp (*Penaeus vannamei*) industry. To mitigate the risk of antibiotic resistance and environmental residue associated with antibiotics, bacteriophage have emerged as a safer, eco-friendly alternative for controlling *Vibrio parahaemolyticus*. This study aimed to isolate and characterize bacteriophages capable of controlling *V. parahaemolyticus* from shrimp pond water in Bantul Regency, Special Region of Yogyakarta, Indonesia. Bacteriophage isolation from water samples was performed using the double-layer agar method. Characterization included plaque and virion morphology, and inhibition assay against three pathogenic *Vibrio* species. This study successfully isolated PA1 phage, which produced small circular plaques ($0,61 \pm 0,31$ mm in diameter) with a titer of $1,54 \times 10^6$ PFU/mL. Morphological analysis via Transmission Electron Microscopy (TEM) revealed that PA1 exhibits structural characteristics consistent with the *Siphoviridae* family. *In vitro* assays demonstrated that PA1 phage effectively suppressed the growth of *V. parahaemolyticus* BKIPM, *V. parahaemolyticus* CVB, *V. alginolyticus* KL1HS4, and *Photobacterium damsela* subsp. *damsela* GD05 within six hours of incubation. These findings indicate the potential of the *Siphoviridae* PA1 phage as a biological control agent against *V. parahaemolyticus*, *V. alginolyticus*, and *P. damsela* subsp. *damsela*.

Keywords: biocontrol, Pacific white shrimp, *Siphoviridae*, transmission electron microscopy, *Vibrio parahaemolyticus*,