

ANALISIS RESISTENSI
UDANG WINDU (*Penaeus monodon* Fabricius, 1798)
HASIL PERSILANGAN SELEKTIF
TERHADAP *White spot syndrome virus* BERDASARKAN
EKSPRESI GEN *PmVRP15*

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INTISARI

White spot syndrome virus (WSSV) dapat menyebabkan infeksi berdampak serius dengan tingkat kematian dan morbiditas yang tinggi pada udang. Infeksi WSSV pada udang penaeid mempengaruhi sistem kekebalan tubuh dan mengubah tingkat ekspresi protein, termasuk ekspresi gen *PmVRP15* yang berfungsi sebagai media propagasi WSSV. Ekspresi *PmVRP15* pada hemosit tersebut mengalami peningkatan pada fase akut infeksi WSSV. Penelitian ini bertujuan untuk menganalisis tingkat ekspresi gen *PmVRP15* pada populasi udang windu (*Penaeus monodon* Fabricius) hasil persilangan selektif untuk dikaitkan dengan resistensinya terhadap WSSV. Hasil persilangan populasi dibatasi pada populasi hasil *inbreeding* yang disebut G₈ dan populasi hasil *outbreeding* yang disebut G_{7-Aceh} yang terdapat di tambak *National Shrimp Broodstock Center* (NSBC) Balai Besar Perikanan Budidaya Air Payau (BBPBAP) Jepara. Dua populasi tersebut diuji tantang dengan WSSV secara injeksi intramuskular pada konsentrasi inokulum 10⁻². Hemolimfe diambil dalam rentang waktu 48 jam setelah infeksi untuk isolasi hemosit. Pengamatan kematian kumulatif dilakukan dengan interval 6 jam. Konfirmasi infeksi WSSV dilakukan dengan *nested* PCR. Kuantifikasi ekspresi *PmVRP15* pada hemosit antar populasi udang windu dilakukan melalui qPCR dengan normalisasi menggunakan β -actin. *Median lethal time* (LT₅₀) G₈ lebih rendah secara signifikan daripada G_{7-Aceh}; mengindikasikan bahwa G₈ kurang resisten terhadap infeksi WSSV dibandingkan G_{7-Aceh}. Metode *comparative C_T* melalui qPCR juga membuktikan bahwa tingkat ekspresi relatif *PmVRP15* pada G₈ lebih tinggi daripada G_{7-Aceh}. Hasil penelitian menunjukkan bahwa populasi G_{7-Aceh} lebih resisten terhadap WSSV daripada populasi G₈. Tingkat ekspresi *PmVRP15* terbukti dapat digunakan sebagai parameter untuk menyeleksi populasi antara G₈ dan G_{7-Aceh} yang lebih tahan terhadap penyakit.

Kata kunci: *PmVRP15*, resistensi, *Penaeus monodon*, WSSV, *real time PCR*

ANALYSIS OF
White spot syndrome virus-RESISTANCE
IN THE SELECTIVE BREEDING POPULATIONS OF
GIANT TIGER SHRIMP (*Penaeus monodon* Fabricius, 1798)
BASED ON EXPRESSION OF *PmVRP15* GENE

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ABSTRACT

White spot syndrome virus (WSSV), the most serious viral disease, causes high mortality and morbidity in shrimps. Infection of WSSV into penaeid shrimps affect their immune defense and change their gene expression levels. *PmVRP15* has been reported as a part of WSSV propagation pathway which is highly up-regulated in hemocytes at acute phase of WSSV infection. This study was aimed to analyze the expression level of *PmVRP15* gene among selective breeding populations of giant tiger shrimp (*Penaeus monodon* Fabricius) to be associated with its resistance to WSSV. The selective breeding populations which were collected from National Shrimp Broodstock Center (NSBC) ponds of Main Center for Brackishwater Aquaculture Development in Jepara consisted of inbreeding population called G₈ and outbreeding population called G₇-Aceh. Those selective breeding populations were challenged using intramuscularly injection at 10⁻² WSSV extract concentration. Hemolymph was sampled at 48 h post-infection (hpi) and separated from hemocytes. Cumulative mortality was observed at 6 hours interval. The hemocytes were then used as samples to measure the expression levels of *PmVRP15* through relative quantification using qPCR which was normalized with β-actin. Confirmation of WSSV infection was conducted using nested PCR. Median lethal time (LT₅₀) of G₈ was significantly lower than G₇-Aceh, indicating that G₈ was less resistant to WSSV than G₇-Aceh. Comparative threshold cycle (C_T) methods of qPCR also showed that *PmVRP15* transcripts level of G₈ was higher than G₇-Aceh. The result of this study indicated that G₇-Aceh was more WSSV-resistant than G₈. *PmVRP15* expression level could be also used as parameter for disease resistance in G₈ and G₇-Aceh broodstock selection.

Key words: *PmVRP15*, resistance, *Penaeus monodon*, WSSV, real time PCR