

INTISARI

Fukoidan dapat menstimulasi respon innate imun dan ekspresi gen kekebalan udang vaname (*L. vannamei*), namun ekstraksi fukoidan membutuhkan waktu panjang, rumit serta menghasilkan rendemen sedikit, melatarbelakangi perlunya optimasi fukoidan sebagai imunostimulan. Penelitian ini bertujuan untuk mengetahui respon imun dan ekspresi gen kekebalan *L. vannamei* setelah diberi kombinasi fukoidan dari *S. crassifolium* dan multivitamin secara oral dengan dosis yang berbeda. *L.vannamei* (10 ± 2) g dipelihara 15 hari pada bak dengan volume 280L (berisi 250L air laut terfiltrasi; udang 30 ekor/bak). Pengambilan hemolim untuk mengetahui respon imun dilakukan pada hari ke-0, 2, 4, 8 dan 15. Pengamatan respon selular terdiri dari *total hemocyte count* (THC), serta aktifitas fagositosis dan indeks fagositosis (AF-IF) diamati secara langsung melalui mikroskop. Sedangkan respon humoral terkait, aktivitas *phenoloksidase* (PO), *superoxide dismutase* (SOD) dan total protein plasma (TPP) diamati dengan metode kolorimetri. Pengamatan ekspresi gen kekebalan meliputi gen LGBP, lectin, toll dan proPO dengan internal kontrol gen β -actin menggunakan qPCR. Analisis data parameter hematologi menggunakan uji ANOVA dan DMRT, serta analisis data ekspresi gen menggunakan metode komparative CT ($2^{-\Delta\Delta CT}$). Pengaruh kombinasi fukoidan dan multivitamin diketahui sejak hari ke 2 dari peningkatan nilai THC, AF dan PO. Hari ke 8 merupakan puncak dari peningkatan nilai seluruh parameter hematologi ($P < 0,05$) diikuti dengan peningkatan ekspresi gen LGBP. Dapat disimpulkan bahwa kombinasi fukoidan dan multivitamin tidak hanya menstimulasi respon selular dan humoral, namun juga ekspresi gen kekebalan. Lebih lanjut dapat diketahui bahwa kombinasi fukoidan dan multivitamin dalam dosis rendah dapat menstimulasi respon imun dan ekspresi gen kekebalan dengan optimal.

Kata Kunci: *Feed Additive; Immunomodulatory; Pattern Recognition Receptor*

ABSTRACT

Non-specific immune responses and immune genes of pacific white shrimp (*L. vannamei*) might be stimulated by fucoidan, but fucoidan is found in a small amount of yield with the complicated and time-consuming process. This study aimed to determine the immune response and immune genes expression of *L. vannamei* after being fed with dietary of fucoidan from *S. crassifolium* and multivitamin at different doses. *L. vannamei* (10 ± 2 g) was fed with enriched diet for 15 days in a tank with a volume of 280L (containing 250L of filtered sea water with 30 shrimps/tank). Haemolymph retrieval to determine the immune response was performed on days 0, 2, 4, 8 and 15. Cellular immune responses consisted of total hemocyte count (THC), as well as phagocytic activity and phagocytic index (PA-PI) were observed microscopically. Whereas the humoral immune responses of the activity of phenoloxidase (PO), superoxide dismutase (SOD) and total plasma protein (TPP) were observed colorimetrically. Immune gene expression of LGBP, lectin, toll and proPO genes were evaluated with β -actin as gene control using qPCR. Hematological parameter data were analyzed using ANOVA and DMRT test, and gene expression data were analyzed using CT comparative gene ($2^{-\Delta\Delta CT}$). The combination of fucoidan and multivitamin significantly increased THC, PA and PO as early as on two days of treatment. On the 8th day, an increase in all of the hematological parameters ($P < 0.05$) were followed by an up regulation of LGBP genes. Based on this study it can be concluded that the combination of fucoidan and multivitamin was able to stimulate cellular and humoral responses, but also activate immune genes. Furthermore, it can be seen that the combination of low dose fucoidan and multivitamin stimulate the immune response and expression of the immune genes optimally.

Keywords: Feed Additive; Immunomodulatory; Pattern Recognition Receptor