

Title : Effect of sea lettuce (*Ulva rigida*) extract on histological and oxidative stress in whiteleg shrimp (*Litopenaeus vannamei*)

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Major : Zoology

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ABSTRACT

Sea lettuce (*Ulva rigida*) has been widely used as a feed additive for various aquatic animals, as previous research indicates that it can enhance oxidative stress responses and immunity. However, scientific data regarding its application in whiteleg shrimp remains limited. Therefore, this study aimed to evaluate the effects of dietary supplementation with sea lettuce extract on histology and oxidative stress parameters in whiteleg shrimp. Shrimp were fed diets supplemented with sea lettuce extract at doses of 0, 0.5, 1.5, and 5.0 g/kg for 14 days. At the end of the experimental period, samples of the hepatopancreas, muscle, intestine, and gill were collected for histological examination and oxidative stress assessment. Hemolymph samples were also collected to further oxidative stress analysis. Histological examination revealed no tissue alterations in any of the examined organs after 14 days of feeding the extract-supplemented diets. Oxidative stress was evaluated by measuring malondialdehyde (MDA), reduced glutathione (GSH), superoxide dismutase (SOD), catalase (CAT), glutathione reductase (GR), and glutathione peroxidase (GPx). The findings indicated that the sea lettuce extract significantly reduced lipid peroxidation ($P < 0.05$) as indicated by decreased MDA levels across all organs, maintaining levels comparable to those of the control group. Shrimp fed the 0.5 g/kg diets showed increased GSH content in the hepatopancreas and significantly

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elevated CAT activity in the intestine. Moreover, GR activity in the hemolymph significantly increased at all supplementation levels. Among the tested doses, 0.5 g/kg demonstrated the greatest antioxidant efficacy in mitigating oxidative stress in whiteleg shrimp. In conclusion, these findings suggest the sea lettuce (*U. rigida*) extract has potential as a functional feed additive to enhance oxidative resilience in whiteleg shrimp without adverse histological effects.

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