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## Herbal Extract Effects on White Spot Syndrome Virus (WSSV) in Shrimp (*Penaeus monodon*)

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Synthetic drugs and chemicals used in aquaculture cause disadvantageous side effects, while medicines made from medicinal herbs are non-toxic, easy to use, and pollution-free. Many medicinal herbs have potent antiviral properties. The extract of *Phyllanthus amarus* is a lignan composed of the compounds: niranthin, phyllanthin, and hypophyllanthin which have an impact on the white spot syndrome virus (WSSV) in the shrimp, *Penaeus monodon*. The virucidal activities of the three substances were tested by mixing them with WSSV, followed by injection into healthy shrimp. The quantity of WSSV DNA on the gills of tested shrimp was measured before and seven days after injecting the mixture. The quantity decreased significantly after injection. Anti-virucidal activities were also assessed by observation of the mortality rates of injected shrimp. The lignan compound inactivated the virus when injected in *P. monodon* at a dose of 100 mg per kilogram body weight. The survival rate of the lignan injected shrimp was 96.67% , compared to the positive control in which it was only 3.33% .



*Phyllanthus amarus*



WSSV infected on *Penaeus monodon*



*Phyllanthus amarus*



WSSV infected on *Penaeus monodon*