



# FUCOIDAN FROM PHILIPPINE BROWN SEAWEEDS: COMPARATIVE EFFICACY AGAINST WSSV BY NEUTRALIZATION AND FEEDING ASSAYS

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ABSTRACT

White Spot Syndrome Virus (WSSV) remains one of the most destructive diseases in shrimp aquaculture. This study evaluated the antiviral potential of semi-purified fucoidan-rich extracts from three brown seaweeds (*Hormophysa cuneiformis*, *Turbinaria ornata*, and *Sargassum sp.*) compared with a commercial fucoidan product in black tiger shrimp (*Penaeus monodon*).

Shrimp were treated with extracts (1000 mg kg<sup>-1</sup>) via oral feeding, injection, or virus neutralization assays prior to WSSV challenge. Survival was monitored and survivors were re-challenged to assess post-treatment protection.

Results showed significantly improved survival in shrimp treated with fucoidan extracts compared with controls. Among the seaweeds tested, *Turbinaria ornata* consistently provided the highest protection, achieving survival rates of 98.9–100% in injection trials and prolonged survival in feeding experiments (10–35%). Re-challenge assays further indicated enhanced resistance in treated shrimp.

Overall, fucoidan extracts—particularly from *T. ornata*—demonstrated strong antiviral activity against WSSV and may serve as a promising natural intervention for shrimp health management. Further studies are recommended to assess field application and cost-effectiveness.

INTRODUCTION

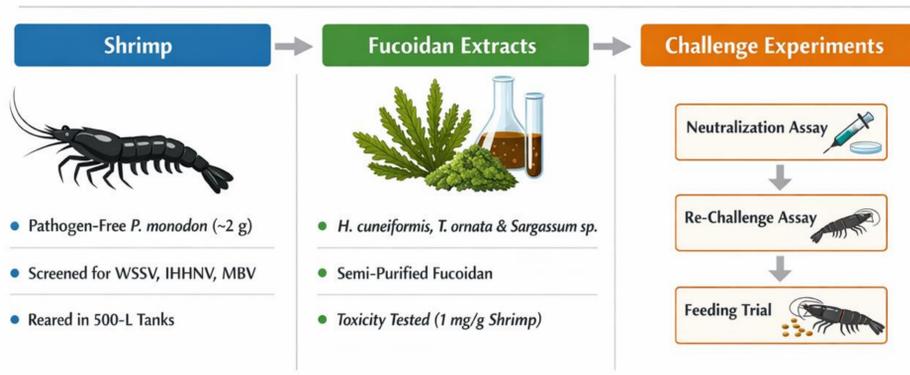
Seaweeds are valuable marine resources widely used in food, agriculture, cosmetics, and health-related industries. Brown seaweeds in particular are rich in sulfated polysaccharides such as fucoidan, which has demonstrated antimicrobial, antioxidant, immunostimulant, and antiviral properties. In aquaculture, fucoidan has been explored as a dietary supplement to enhance immune responses and improve resistance to infectious diseases.

One of the most serious threats to shrimp farming is White Spot Syndrome Virus (WSSV), a highly destructive pathogen responsible for severe economic losses worldwide. Although biosecurity measures can reduce outbreaks, effective and affordable antiviral interventions remain limited.

This study evaluated the antiviral efficacy of semi-purified brown seaweed extracts (*Hormophysa cuneiformis*, *Turbinaria ornata*, and *Sargassum sp.*) and a commercial fucoidan product, administered orally or by injection, in improving the survival of black tiger shrimp (*Penaeus monodon*) challenged with WSSV.

METHODOLOGY

## Materials & Methods



DISCUSSION

Fucoïdan extracts derived from *T. ornata*, *Sargassum sp.*, and *H. cuneiformis* significantly reduced shrimp mortality caused by WSSV, highlighting their strong antiviral potential. Variation in protective efficacy among treatments may be linked to differences in fucoidan structure, molecular weight, monosaccharide composition, and degree of sulfation across seaweed species. Neutralization assays via injection provided the highest survival, suggesting that fucoidan may directly inhibit viral attachment or entry by binding to envelope proteins. In contrast, feeding and immersion trials produced lower but still significant survival improvements, likely through immune stimulation and enhanced host resistance. Among the tested extracts, *T. ornata* consistently showed the most promising results, supporting its potential as a sustainable antiviral intervention for shrimp aquaculture.

## RESULTS



## CONCLUSIONS

Semi-purified fucoidan from *Turbinaria ornata*, *Sargassum sp.*, and *Hormophysa cuneiformis* reduced shrimp mortality from WSSV infection. *T. ornata* showed the most consistent antiviral efficacy across injection, re-challenge, and feeding trials. These findings support fucoidan as a promising antiviral candidate, requiring validation in commercial-scale aquaculture.

## ACKNOWLEDGMENT

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