The Role of Seaweed (*Gracilaria verucosa*) and Green Mussel (*Perna viridis*) in Reducing Organic Waste in Shrimp Culture

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Abstract

Seaweeds (*Gracilaria verucosa*) and green mussel (*Perna viridis*) improve water quality by removing organic wastes generated from shrimp culture. However, their respective optimum density needs to be determined, particularly in a semi-closed integrated brackish water culture systems. This study compared the effect of different densities of *G.verucosa* and *P. viridis* on the ammonia, nitrite, nitrate and organic matter concentrations in culture water.

Mesocosms were established in 36 non-transparent fiberglass tanks of 1x1x1 m under a transparent fiber glass roof. Each tank was filled with 10 cm mud-clay substrate and 800 L of water at the salinity of 25 ppt. Both *G. verucosa* and *P. viridis* were attached on hanging ropes for 30 days. The initial weight of each cluster was 50 g for *G. verucosa* and 30 g for *P. viridis*. A completely randomized design (CRD) was applied in four replications with four treatments of different densities ($g.m^{-2}$) of *G. verucosa*: 50 (S-50), 100 (S-100), 150 (S-150), and 200 (S-200) and *P. Viridis*: 60 (M-60), 90 (M-90), 120 (M-120) and 150 (M-200). Total ammonia (TAN), nitrate (NO_3), nitrite (NO_2) and TOM (Total Organic Matter) concentrations in the water were analyzed weekly by taking 300 ml water from each tank. At the end of the experiment, the removal rates (RR) were calculated.

At the highest density of *P. viridis* tested, the metabolic waste released to the water limited all RR (Figure 1). At the two lowest densities the RR of TAN by *G. verucosa* was slightly higher than by *P. viridis* while at the two higher densities this RR by *P. viridis* was negative. The RR of NO_3 by *G. verucosa* varied between 30 and 50%; at the two medium densities *P. viridis* these rates reached above 30% while these remained below 10% for the lowest and highest density. At the two low densities *G. verucosa* was more effective in removing NO_2, RR of 50% and higher compared to below 10% for all other treatments. In contrast, the removal rate of TOM by *P. viridis* at the two lowest densities was higher than that of *G. Verucosa*: around 30% compared to below 10%, respectively. Therefor an appropriate mix of both cultures might contribute to a better water quality in integrated brackish water culture systems.

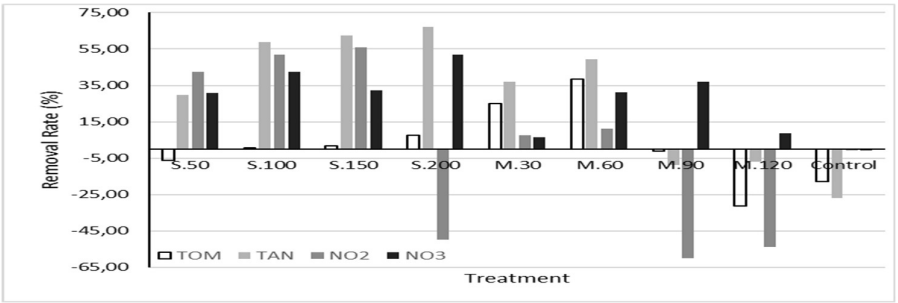

Figure 1. The removal rates of TOM, TAN, NO_2 and NO_3 in various densities of *G. verucosa* and *P. viridis*.

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