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Removal of Inorganic Nitrogen by Integrating Seaweed (*Sargassum* sp.) into Western King Prawn (*Penaeus latisulcatus*, Kishinouye 1896) Culture

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Abstract

Effluent water from intensive prawn ponds typically has high concentrations of dissolved nutrients such as nitrogen. An experiment was conducted for 28 days to investigate the nitrogen flow in a treatment where seaweed (*Sargassum* sp.) was integrated into western king prawn (*Penaeus latisulcatus*) culture. Three treatments were used, each consisting of four, 0.1 m^3 plastic tanks. Treatments 1 and 2 were the monocultures of western king prawns (5.48 ± 0.29 g) and seaweed (young seaweed), respectively. Treatment 3 was an integrated culture of prawns and seaweed. Five prawns were stocked in each tank of treatment 1 and 3. About 137 ± 0.36 g of biomass seaweed was stocked in the treatments 2 and 3. Prawns in treatments 1 and 3 were fed twice a day at a rate of 2.5 % of total body weight.

The concentration of dissolved inorganic nitrogen (DIN) discharged from the prawn only treatment increased from 0.126 to 10.98 $mg\,l^{-1}$ during the experiment. The concentration of total ammonium nitrogen (TAN), nitrite-nitrogen (NO_2^-) and nitrate-nitrogen (NO_3^-) in the integrated culture treatment was significantly lower at the termination of the trial than the prawn monoculture treatment ($p < 0.05$). The concentration of TAN, NO_2^-, NO_3^- and DIN in the integrated culture treatment remained within non-toxic limits for the duration of the experiment. Integrating *Sargassum* sp. with prawns did not alter the specific growth rate (SGR) and survival rate of the prawns ($p < 0.05$). The mean biomass of seaweed in the integrated culture treatment increased at the rate of 3.16 ± 0.74 % g per day in the first week, which was significantly higher than the growth rate of the seaweed in the monoculture treatment (5.70 ± 0.82 % g per day) ($p < 0.05$). The results suggest that integrating seaweed into prawn culture can benefit prawn farming by assisting in the maintenance of optimum water quality and thereby, also reduce environmental impacts on surrounding areas.

Keywords: Aquatic nitrogen flow, *Sargassum* sp., seaweed, western king prawn

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