Gracilariopsis heteroclada as an extractive species in an aquaculture system

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Introduction

In intensive aquaculture systems, the quality of water in the culture environment usually deteriorates fast when not properly managed because of excessive chemical inputs. The accumulation of various forms of metabolites or wastes in the rearing environment becomes toxic when they reach very high levels. This condition can then lead to mass kills of the cultured organisms and to the deterioration of the surrounding environment if these toxic compounds are released without prior treatment.

Some species of marine algae have been utilized as biofilter in wastewater treatment of an aquaculture system. Here, *Gracilariopsis heteroclada* (**Figure 1**) was grown in filter tanks to determine the growth, agar quality, and uptake pattern of nitrogen and to observe the water quality in a recirculating water system with seaweed.

Figure 1. *Gracilariopsis heteroclada* grown in a tank

Materials and Methods

The study was conducted within the integrated finfish broodstock facility complex of SEAFDEC/AQD at Tigbauan, Iloilo, Philippines. The broodstock facility has a water recirculating system. The 500-ton capacity broodstock/spawning tanks were stocked with 25 grouper (*Epinephelus coioides*) and 90 milkfish (*Chanos chanos*) breeders. Water from the broodstock tanks passes through the sedimentation tank, then through the filter tank before it goes back to the broodstock tanks. The filter tank has an area of 20 m^2, a water depth of 25 cm, and a water flow rate of 43 L sec^{-1} (≈3720 m^3 day^{-1}).

Results and Discussion

The rapid uptake of nitrogen in *G. heteroclada* was observed within the first 24 h of culture. Filling up of the nitrogen pools in the cell may have continued until the 5th day of culture. This suggests that, upon intracellular saturation of nitrogen on the 5th day, the plants started to increase in weight, proportionate to the uptake rate of nitrogen during the experiment.

G. heteroclada stocked at 1 kg m^{-2} achieved an SGR of approximately 10.4 % day^{-1} during 15 days of culture, at total ammonia-nitrogen and nitrite-nitrogen levels of less than 0.27 mg L^{-1} and 0.19 mg L^{-1} respectively in the filter tank.

G. heteroclada stocked at 1 kg m^{-2} in the filter tank has achieved an SGR of approximately 10 % day^{-1} in 15 days of culture at total ammonia nitrogen and nitrite levels of not less than 0.03 mg L and 0.04 mg L^{-1}, respectively. *G. heteroclada* required approximately 3.35 g N kg^{-1} (f.w. *G. heteroclada*) day^{-1} and attained an SGR as mentioned above in this study.