

ABSTRACT

Freshwater Plankton Studies In Prawn Aquaculture Ponds

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The role of seasonality and succession in the limnological dynamics of six ponds and the reservoir of a prawn aquaculture project at the Orange Grove Estate, Trinidad was studied for approximately fifteen months. The operations of the ponds were interrupted with periods of draindown and refilling except for the brood pond (B1) and the reservoir which were never drained. All ponds except the reservoir were fertilized periodically and stocked with *Macrobrachium rosenbergii* and some with *Hoplosternum littorale*. The reservoir was considered a natural control and B1 was a 'manipulated' control, typical of the pond management system.

Field measurements of pH, temperature, dissolved oxygen and turbidity were made at weekly intervals. Water samples were analyzed every fortnight to determine the levels of phosphate, nitrite, nitrate, hardness and alkalinity. Weekly samples were taken for the determination of species composition, estimation of plankton densities, and chlorophyll-a concentrations.

Thirty-nine plankton species were identified of which the dominant yellow-green and green algae were *Botrydiopsis* and *Botryococcus* respectively and the dominant blue-green algae were *Anabaena*, *Oscillatoria*, *Anacystis* and *Coccochloris*. *Mesocyclops* was the dominant copepod and *Brachionus* and *Keratella* were the dominant rotifers. Phytoplankton density was high in all ponds in comparison to zooplankton density.

Physicochemical parameters and chlorophyll-a differed between the reservoir and B1 as expected showing that manipulation has an obvious effect in the aquaculture system. There was no evidence of seasonality in both the physicochemical parameters and the plankton community.

The existence of common responses to draindown and refilling as well as fertilization were tested for green algae, blue-green algae, zooplankton and chlorophyll-a levels. There was no similarity in the responses of chlorophyll-a and species density to draindown and refilling. Average algal densities were independent of nutrient levels. Blue-green algal densities, however, generally increased in response to urea addition.

A successional sequence from green algae to blue-green algae was observed in the phytoplankton community in B1 and the reservoir for the entire study period. This general pattern was observed in the other ponds in spite of their inherent differences.

Pond management affected community structure in so far as species diversity was concerned. Species diversity was generally higher in the reservoir than in B1 for both the phytoplankton and zooplankton communities. The reservoir generally had low densities and some of the genera present differed from those found in B1.

Densities of *Keratella* and *Brachionus* were positively correlated with each other and *Brachionus* and copepod nauplii were positively correlated with the blue-green alga, *Oscillatoria*. This suggests a similarity in ecological responses of the zooplankton and perhaps grazing.

The reservoir, ironically, had ideal physicochemical conditions for prawn aquaculture when compared to B1. Pond management, notably addition of fertilizer, influenced the water quality and consequently the plankton community. There was a

general failure to predict and to observe specific trends in the plankton community and hence any common trends were generalized.

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