

## THE ROLE OF NATURAL FOOD IN MARINE SHRIMP POND

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### Introduction

Worldwide, the majority of shrimp culture takes place in earthen ponds. In these ponds, a substantial contribution to the nutrition of the shrimp is from naturally occurring pond biota (Maguire and Bell, 1981; Rubright et al. 1981). Although artificial feed is mainly used in commercial shrimp farming, studies have shown that natural food such as benthic organisms play important role in the survival and growth of shrimp (Shishehchian et al. 1999). Thus, living organisms in ponds, especially phytoplankton, zooplankton and benthos play important role as natural food source for shrimp at different stages of its life cycle. Unsuitable species of plankton or overfeeding with artificial feed results in enrichment of the water and sediments with nutrients which can eventually lead to bad water quality and poor growth. In the earthen ponds, sediment plays an important role as it provides the water with nutrient and serves as a biological filter through the adsorption of organic residues of food, shrimp excretions, and algal metabolites (Rubright et al. 1981; Ray and Chien, 1992; Allan et al. 1995). The objectives of this study were to determine the effects of different feeds on the growth and survival rate of *P. monodon* as well as on the water quality of the culture system.

### Materials and Methods

A series of experiments were run in the field and laboratory to achieve the above objectives. In the laboratory experiments, different types of natural organisms commonly found in ponds were mass cultured and used as feed for the juveniles of *Penaeus monodon* under different environmental conditions (with and without bottom sediments). The shrimps

were also fed with artificial food, which served as the control. The experiments were done in triplicates using appropriate aquaria. The growth, survival rate and body biochemical composition of shrimps from different treatments, were determined. Ingestion and excretion rates of shrimps, using different diets, were also determined.

### Results and Discussion

Results of these studies showed that shrimp fed with a combination of natural and artificial diets showed significantly higher ( $p < 0.05$ ) growth and survival rates compared to the other treatments. This indicates that shrimps also require natural diet to complement the artificial diet in commercial ponds. Use of natural food as the complementary diet also improves the water quality of culture system, as the former cause less fouling compared to the latter. The presence of bottom sediment also contributed to the high shrimp survival and growth rates. The body biochemical composition of those shrimps fed on natural diet alone or in combination showed significantly ( $p < 0.05$ ) higher content of protein and essential fatty acid. *Penaeus monodon* juvenile showed ingestion of about 1 mg/mg dry weight/hr of *Nannochloropsis oculata*, *Chaetoceros calcitrans* and *Tetraselmis tetrahele*. The excretion rate of ammonia in *Penaeus monodon* was significantly higher ( $p < 0.05$ ) in shrimps fed with artificial diet than those fed with natural diet such as chironomid larvae and algae. Results indicated the importance of natural live food in ponds, which not only contribute as food for the shrimp, but also improve water and sediment quality of the ponds. Thus, it is necessary to promote the growth of natural live food in the culture system to improve shrimp growth and production, and reduce feed cost.

### Conclusions

Dependence on artificial diet alone as practised in commercial shrimp farming results in bad water quality and bottom sediment due to accumulation of uneaten feed and high excretion rates of metabolites, in addition to high production cost. Accumulation of toxic compounds results in low or even absence of live food organisms towards the end of the culture cycle.

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