ENHANCE PRODUCTION OF BLACK TIGER SHRIMP *Penaeus monodon* POSTLARVAE BY PROBIOTIC BACTERIUM *Alteromonas* sp.

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ABSTRACT

Alteromonas sp. (coded as BY-9) bacterium isolated from the coastal water of Gondol Bali, Indonesia was purified and mass produced, then inoculated into the rearing media of *Penaeus monodon* larvae as a probiotic agent. Nauplii of *Penaeus monodon* were reared in concrete tanks capacity of 18 m^3 each with a density of 100 nauplii/L. The larvae were reared with and without *Alteromonas* sp. up to stage 10 postlarvae. At day 18 the growth and survival rates of the larvae reared with *Alteromonas* sp. were significantly higher than in the control ($P< 0.05$). Probiotic treatment produced an those average survival rate of 44.90 ± 8.30 %, whereas the control produced 10.15 ±1.91% survival rate. Application of *Alteromonas* sp. bacterium strain at a density of 10^6 cfu/mL to the culture media of larvae resulted in better growth of larvae and exhibited antagonistic activity against *Vibrio*, especially the luminous bacterium (*Vibrio harveyi*).

KEYWORDS: *Alteromonas* sp., *Penaeus monodon*, probiotic

INTRODUCTION

Farming the black tiger shrimp, *Penaeus monodon*, has considerable economic importance in Indonesia. It was estimated that in 1995 the production of cultured shrimp in the country was 80,000 metric tons, and the total number of postlarvae required for pond culture was about 6 billion per year (FAO, 1995). Ninety percent of the required postlarvae comes from hatcheries. Unfortunately, since 1991 hatcheries have faced epidemic outbreaks of the infectious luminous bacterium (*Vibrio harveyi*). A total of 70% the fry production failed due to these diseases (Rukyani, 1993; Lightner, 1996).

Most of the shrimp hatcheries apply specific management practices to prevent the outbreak of diseases. These include disinfecting the larval rearing water with chlorine, UV irradiation, ozone, improved filtering system, washing eggs, using clean natural feed, maintaining clean and hygienic hatcheries (Chamberlain, 1991; Garriques & Arevalo, 1995). Despite these efforts, mass mortalities of larvae have frequently occurred, limiting the success of the shrimp hatcheries. Shrimp hatcheries routinely use antibiotics in order to prevent bacterial infection. At present there are 15 types of antibiotics have been used (Taslihan & Kokarkin, 1994). Unfortunately, antibiotics have limited applicability, because bacterial pathogens have the ability to develop multiple antibiotic resistance (Riquelme *et al.*, 1997). An alternative method to prevent the outbreak of diseases is to use probiotic preparations of non-pathogenic bacteria. It has been suggested that some probiotics produce chemical substances inhibitory to the bacterial pathogens.

Recently, some researchers have successfully used bacterial strains as biological control agents for larvae of the crab *Portunus tuberculatus* (Maeda & Nogami; 1989; Maeda *et al.*, 1992; Maeda, 1994; Maeda & Liao, 1992; 1994). A strain of *Vibrio alginoliticus* was reported to be effective in reducing diseases of *Penaeus vannamei* larvae (Garriques & Arevalo, 1995). Rengpipat *et al.* (1998) recently found that the probiotic bacterium *Bacillus* S11, applied to a *P. monodon* pond could increase the survival and growth of the shrimp. Riquelme *et al.* (1997) used *Alteromonas haloplanktis* bacteria as a potential probiotic strain in the culture of chilean scallop *Argopecten purpuratus*, which exhibited inhibitory effects against pathogenic *Vibrio anguillarum*. The probiotic effect was examined by Douillet & Langdon (1994) and Gibson *et al.* (1998), who observed a strain of bacterium (CA2) and *Aeromonas media*, strain A199, respectively enhanced the survival and growth of Pacific oyster, *Crassostrea gigas* larvae. Consequently, probiotics were considered a possible solution to disease problems, and a potential means to stabilize the production of black tiger shrimp *P. 10 monodon* postlarvae.

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