

EFFECT OF PROBIOTICS ON WATER QUALITY PARAMETERS IN *PENAEUS MONODON* CULTURE PONDS OF KAKINADA, ANDHRA PRADESH, INDIA

S. Murali Mohan^{1*}, G. Harold Philip² and K.V. Siva Reddy³

¹Reader in Zoology, Sri Sai Baba National Degree College (Autonomous), Anantapur, Andhra Pradesh

²Professor of Zoology, Sri Krishnadevaraya University, Anantapur, Andhra Pradesh

³M.Sc., Department of Zoology, Yogi Vemana University, Kadapa, Andhra Pradesh

*Corresponding Author Email: murali8383@yahoo.co.in

Biological SCIENCES

RECEIVED ON 12-08-2011

Research Article

ACCEPTED ON 01-10-2011

ABSTRACT

The study was carried out for 120 days to assess the water quality parameters of *P. monodon* by applying probiotics in the culture ponds. Two ponds (0.8 ha) were selected of which one is control and second one is probiotic treated pond. The total amount of ammonium nitrogen levels was significantly reduced in the experimental ponds than control one. Hence the findings of the current study suggest that the application of probiotics in culture ponds of *P. monodon* has glorious future in terms of water quality.

KEYWORDS: Probiotics, water quality, pH, salinity and Dissolved oxygen.

Introduction

In recent days shrimp culture has gained importance, though it is frequently affecting by viral and bacterial diseases which leads to massive loss to the farmers (Karuna Sagar et al., 1994). To prevent the infestations caused by several kinds of microorganisms, farmers routinely using antibiotics and other chemicals beyond the recommended levels. Hence in recent days attention has paid towards the application of probiotics for sustainable aquaculture practices. Based on the previous research results on probiotics suggest that the use of probiotic bacteria in aquaculture has tremendous scope and the study of the application of probiotics in aquaculture have a glorious future (Moriarty, 1997; Chen et al., 1992). Keeping in view of above context, the present study was aimed to examine the effect of a probiotics on the water quality parameter of the shrimp *P. monodon* was studied.

Materials and Methods

The study was carried out in the commercial shrimp farms located at Kakinada, Andhra Pradesh, India. For this study we have selected two culture ponds, in which one treated as control and another as Experimental pond (Probiotic treated) each pond with 0.8 ha area.

Monitoring water quality parameters

In control and experimental pond (probiotic treated) the salinity, dissolved oxygen, pH and total ammonia nitrogen (TAN) were monitored regularly during study period. The water salinity was measured by using a hand refractometer (Erma, Japan). The Dissolved oxygen was estimated by modified Winkler's method as described by Strickland and Parsons (1972).

The pH of the pond water was measured by using electronic pH pen (Erma-Japan). Total ammonia nitrogen (TAN) of the pond water recorded by using ammonia test kit (Advance Pharma, Thailand).

Results and Discussion

Table 1. Water quality parameters in commercial shrimp culture ponds of Kakinada

Sampling (In days)	Salinity (Avg $\pm$ SD)		pH (Avg $\pm$ SD)		Dissolved oxygen (Avg $\pm$ SD)		Total ammonia Nitrogen (TAN) (Avg $\pm$ SD)	
	Treated	Control	Treated	Control	Treated	Control	Treated	Control
15	13.2 $\pm$ 0.89	13.7 $\pm$ 0.80	8.1 $\pm$ 0.3	8.2 $\pm$ 0.3	6.2 $\pm$ 1.2	5.3 $\pm$ 0.3	0.43 $\pm$ 0.1	2.1 $\pm$ 0.1
30	14.0 $\pm$ 0.94	14.5 $\pm$ 0.63	8.5 $\pm$ 0.1	8.7 $\pm$ 0.2	5.9 $\pm$ 1.2	4.2 $\pm$ 1.2	0.32 $\pm$ 0.1	2.5 $\pm$ 0.4
45	14.7 $\pm$ 0.86	14.8 $\pm$ 0.55	8.4 $\pm$ 0.3	8.8 $\pm$ 0.2	4.8 $\pm$ 1.3	4.1 $\pm$ 1.2	0.41 $\pm$ 0.2	2.7 $\pm$ 0.2
60	15.5 $\pm$ 0.94	15.6 $\pm$ 0.89	8.2 $\pm$ 0.2	8.5 $\pm$ 0.3	5.9 $\pm$ 1.2	4.5 $\pm$ 1.2	0.53 $\pm$ 0.4	2.4 $\pm$ 0.4
75	17.5 $\pm$ 0.98	17.4 $\pm$ 0.78	8.3 $\pm$ 0.4	8.1 $\pm$ 0.5	6.5 $\pm$ 0.4	5.1 $\pm$ 1.2	0.58 $\pm$ 0.2	2.5 $\pm$ 0.5
90	18.3 $\pm$ 0.83	18.8 $\pm$ 0.88	8.5 $\pm$ 0.3	8.5 $\pm$ 0.5	5.9 $\pm$ 0.1	4.6 $\pm$ 1.7	0.61 $\pm$ 0.1	2.1 $\pm$ 0.3
105	20.5 $\pm$ 0.74	20.5 $\pm$ 0.69	8.7 $\pm$ 0.1	8.6 $\pm$ 0.1	6.2 $\pm$ 0.3	5.3 $\pm$ 1.7	0.65 $\pm$ 0.2	2.6 $\pm$ 0.2
120	22.7 $\pm$ 0.56	24.8 $\pm$ 0.59	8.1 $\pm$ 0.2	8.2 $\pm$ 0.3	5.7 $\pm$ 0.5	5.1 $\pm$ 1.2	0.71 $\pm$ 0.1	2.3 $\pm$ 0.1

Water quality of any aquatic body promotes the growth and survival of the organisms in it. Adequate dissolved oxygen, pH, temperature, salinity reflect the quality of water. According to Soundarapandian and Gunalan (2008) the quality of the water in shrimp culture ponds are influenced by excess feed, faecal matter and metabolites. In the present study salinity was ranged between 13.2 $\pm$ 0.89 to 22.7 $\pm$ 0.56 ppt and 13.7 $\pm$ 0.80 to 24.8 $\pm$ 0.59 ppt in probiotic treated and control ponds respectively. Soundarapandian and Gunalan (2008) and Karthikeyan (1994) recommended a salinity range of 10-35 ppt was ideal for *Penaeus monodon* culture.

In the present study pH values were ranged between 8.1 $\pm$ 0.3 to 8.7 $\pm$ 0.1 and 8.1 $\pm$ 0.5 to 8.8 $\pm$ 0.2 in probiotic treated and control ponds respectively. Soundarapandian and Gunalan (2008) recorded pH values in between 7.6-8.0 in *P. monodon* culture. Ramanathan et al., (2005) was maintained the range of pH 6.8 to 8.7 for maximum growth and production of penaeid species. Reddy (2000) was recommended pH of 7.5 to 8.5 for *P. monodon* culture. In the present study the pH was alkaline throughout the culture period and did not show any significant difference between control and probiotics treated ponds.

Optimum ranges of dissolved oxygen tension in the water body is essential for the respiration of aquatic organism. Low levels of dissolved oxygen alter the metabolic activates in shrimp leads to growth retardation and cause mortality (Gilles Le Molluae, 2001). Soundarapandian and Gunalan (2008) recorded dissolved oxygen levels in between 3.9

ppm to 4.2 ppm in *P. monodon* culture. In the present study the dissolved oxygen values were ranged between 4.8 $\pm$ 1.3 to 6.5 $\pm$ 0.4 and 4.1 $\pm$ 1.2 to 5.3 $\pm$ 1.7 in probiotic treated and control ponds respectively. In the present study total ammonia nitrogen was 0.32 $\pm$ 0.1 to 0.71 $\pm$ 0.1 and 2.1 $\pm$ 0.1 to 2.7 $\pm$ 0.2 in probiotic treated and control ponds respectively. It is evident from the present results that the application of probiotic helps in maintaining good water quality. Thus, maintaining the ammonia level probiotic helps in maintaining good water quality and minimize the disease outbreaks in culture ponds. Soundarapandian et al., (2010) suggested that the optimum ammonia level should be less than one ppm (1) in culture ponds of shrimps.

References

1. Chen, H.C. 1985. Water quality criteria for farming the grass shrimp, *Penaeus monodon*. Proceedings of the 1st International Conference on Culture of Penaid Prawns/Shrimps, December 4-7, 1984, Southeast Asian Fisheries Development Center, Iloilo City, Philippines, pp: 165-169.
2. Gilles Le Molluae, 2001. Enviromenatl factors affect immune response and resistance in Crustacesns. The advocate, pp: 99.
3. Karunasagar, I., Pai, R., Malathi, G.R. and Karunasagar, I. 1994. Mass mortality of *Penaeus monodon* larvae due to antibiotic-resistant *Vibrio harveyi* infection. Aquaculture, 128: 203-209.

4. Moriarty, D.J.W. 1997. The role of microorganisms in aquaculture ponds. *Aquaculture*, 151: 333-349.
5. Ramanathan, N., Padmavathy, P., Francis, T., Athithian, S. and Selvaranjitham, N. 2005. Manual on polyculture of tiger shrimp and carps in freshwater. Tamil Nadu Veterinary and Animal Sciences University, Fisheries College and Research Institute, Thothukudi, pp: 1-161.
6. Reddy, R., 2000. Culture of the tiger shrimp *Penaeus monodon* (Fabricius) in low saline waters. M.Sc. Thesis. Annamalai University, Chidambaram, Tamil Nadu, India.
7. Soundarapandian P. and Gunalan, B. 2008. Recent technology for the survival and production of giant tiger shrimp *Penaeus monodon* along south east coast of India. *International Journal of Zoology and Research*, 4(1): 21-27.
8. Soundarapandian, P., Ramanan V. and Dinakaran G.K. 2010. Effect of probiotics on the rowth and survival of *Penaeus monodon* (Fabricius) *Current Research Journal of Social Sciences*, 2(2): 51-57.
9. Strickland, J.D.H. and Parsons T.R 1972. A practical handbook of seawater analysis. *Bull. Fish. Res. Bd., Canada*, 167, p.311.



***Corresponding Author:**

Dr. S. Murali Mohan*

Reader in Zoology, Sri Sai Baba National Degree College
(Autonomous), Anantapur, Andhra Pradesh