International Journal of Current Science Research
www.drbgrpublications.in

Volume: 2; Issue: 4; April-2016; pp 524-529. ISSN: 2454-5422

A study on the combined effect of probiotics on water quality of fresh water fish pond

K. Parvathi[1*] and P.Sivakumar[2]

[1]PI-UGC MRP, Assistant Professor in Zoology, Erode Arts and Science College (Autonomous), Erode, India.

[2]Professor in Pharmaceutical Chemistry, The Erode College of Pharmacy, Erode, India.

*Corresponding author email: parsieac95@gmail.com

Abstract

The aim of the present investigation was to find out the combined effect of probiotics *Lactobacillus acidophilus* and *Bacillus subtilus* on physico chemical parameters of fresh water fish pond. The water parameters such as temperature, pH and ammonia in both the control and experimental pond water were analyzed at the end of 30 and 60 days of culture period. The present results revealed that slight changes were observed in temperature and pH but ammonia level was decreased significantly in experimental pond than the control pond.

Key words: probiotics, temperature, pH and ammonia.

Introduction

Nowadays aquaculture has grown tremendously, becoming an economically important industry. It is the fastest, food producing sector in the world. Fish are one of the most important vertebrate and main major sources of animal protein. Fish contain almost all the essential amino acids than man requires. Supplementary feed plays a major role in producing good quality fish. Sometimes this food may create unfavourable conditions by producing harmful gases as a result of decomposition. Various probiotics are being used to overcome the production of harmful gases (Sharma and Bhukkar, 2000). Poor water quality and disease out breaks are the main constrains to aquaculture production there by affecting both economic development and socio economic status of local people. Recently attempt being made to improve water quality in fish culture is the

application of probiotics and enzymes to the ponds. It involves manipulation of microorganisms in pond to enhance mineralization of organic matter to get rid of desirable waste compounds. Probiotics is a live microbial feed supplement which beneficially affects the host animal by improving its intestinal microbial balance" (Fuller, 1988). Bacteria are found in every small corner of the environment. Probiotics such as Lactic acid bacteria and Bacillus spp. are bio-friendly agent that can be introduced into culture environment to control and compete with pathogenic bacteria as well as to promote the growth of the cultured animals. Kennedy *et al*., (1988) used probiotic bacteria in the culture of marine fish larva and observed the application of probiotic bacteria to larval fish tanks, increased survival and size uniformity and growth rate. In aquaculture, water quality plays an important role in maintaining good health of fish and hence, the present work aims to find out the effect of probiotics on water quality of fresh water fish pond.

Materials and methods

The experimental animals selected for the present investigation was fresh water teleost fish *Cyprinus carpio* (L). Fish was purchased from Sirago fish farm, Nerinjipet and Government fish farm, Krishnagiri and were acclimatized in nursery ponds for a month. The fish were fed well with supplementary diet. The ingredients used for the preparation of fish feed consist of dry fish meal, rice bran, ground nut oilcake and soya beans.

Experimental design

The two earthen fish ponds located at farm Perualli, Kaaveripattinum, Krishnagiri (Dt), Tamil Nadu, India were chosen for the present investigation**.** The earthen ponds were designed as Pond 'A' and Pond 'B'. Pond A was kept as control and pond B was kept as an experimental (fed supplementary diet with isolated probiotics). After acclimatization, 200 fingerlings of *Cyprinus carpio* were introduced slowly into each pond water (A and B). The fish in the pond A was fed only with supplementary diet alone and the fish in the pond B were fed with supplementary diet along with probiotic mixture (*Lactobacillus* and *Bacillus subtilis* in the ratio of 1:1). The feed was given twice a day (Morning 6-7 am and evening 4-5pm) regularly at the rate of 5% body weight of fish. The study was carried out for the period of 60 days. Physico-chemical parameters of water were studied at 30 days intervals by collecting water samples in between 8 am to 9 am.

The Physico-chemical parameters of pond water such as temperature, pH and ammonia were analyzed by the methods of APHA (1995). Statistical analysis was carried out for the obtained data and results presented in figures.

Results and Discussions

In the present study, slight changes were observed in temperature and pH in both control (pond A) and experimental pond (pond B). The ammonia level was significantly decreased in experimental pond than the control pond.

Fig.1.Effect of probiotics on temperature level in fresh water fish pond.

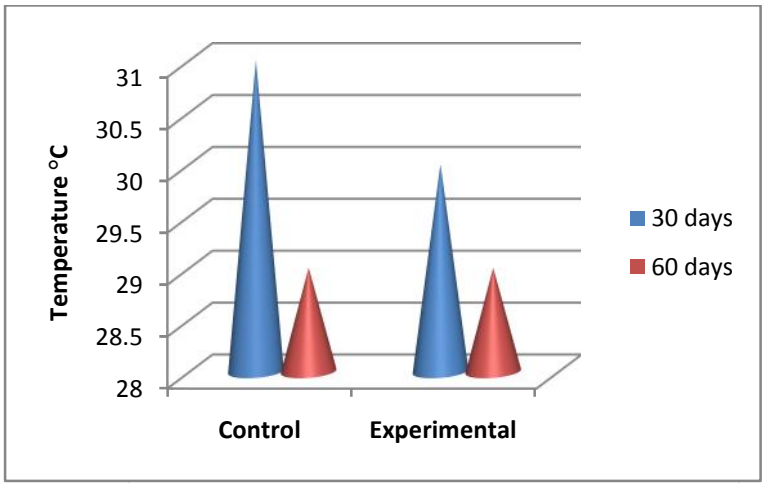


Fig.2.Effect of probiotics on pH level in fresh water fish pond.

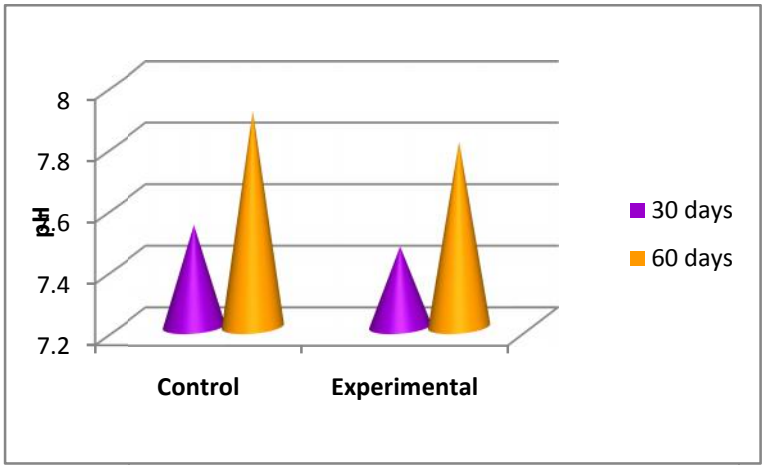
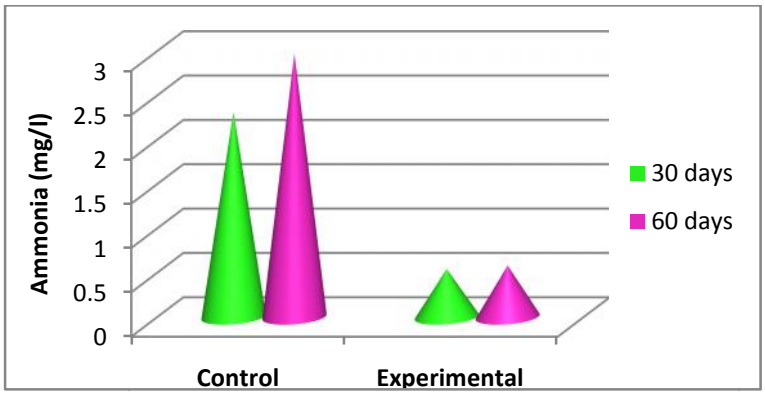


Fig.3.Effect of probiotics on ammonia level in fresh water fish pond.



Aquatic environment is a complex system of inter-linking processes. Maintenances of the balance of critical parameter are fundamental requirements for successful aquaculture. The prophylactic use of beneficial bacteria can improve health performances of cultured aquatic animals. Water temperature is fundamentally an important factor due to its efficiency on chemical and biological reactions in the aquatic system. Saxena (2003) recommended 28 °C – 31°C and 29°C -31°C for optimum growth. In the present study, the temperature was vary from 29°C to 31°C in control and experimental pond water (Figure.1). It shows that temperature was maintained more or less same throughout experimental periods by probiotic bacteria.

pH is one of the important factor for decomposition of organic matter which plays an important role for the growth of aquatic organisms. In the present study, pH was 7.53 and 7.9 in control ponds at the end of 30 and 60 days respectively, whereas the range of pH in experimental pond was 7.46 and 7.8 respectively (Figure.2). Sadek and Moreau (1996) suggested a pH range of 6.5 – 8.5 favorable for the fish culture. The optimum range of pH is 6.8 - 8.7 should be maintained for growth and production of aquatic organism (Ramanathan *et al*., 2005). Further, the present study was supported with the result of Mohanty (2009).

In fish ponds, mineralization of fertilizers, feed wastes and excreta often increases the ammonia concentration, which is harmful to fish. Hence, water quality parameter to be maintained at optimal level in fish ponds for the better production. The nitrogen cycle involves the oxidation of ammonia to nitrite by bacteria of the genus *Nitrosomonas* and the subsequent oxidation of the nitrite to nitrate by *Nitrobacter*. Inputs of ammonia cannot be eliminated from the water body. Concentration of total ammonia level was decreased significantly in experimental pond water

(0.54 and 0.58 mg/l) than the control pond water (2.31 and 2.97 mg/l) (Figure.3). Similar finding was reported by Mohaideen *et al*., (2010). Ammonia level should be less than 1 ppm in the farm (Sounderapandian *et al*., 2010). Ammonia toxicity usually expresses the reduced growth rate instead of mortality (Ratan Kumar Saha, 2010). Heterotrophic bacteria are known to utilize nitrogen rich substances and release ammonia or ammonium salts (Jana and Barat, 1983).The low level of ammonia in probiotic treated pond may be due to the conversion of ammonia to nitrite and then to nitrate relatively results in low level of ammonia (Padmavathi *et al.,* 2012; Sunitha and Padmavathi, 2013).

From the present study, it is concluded that probiotics played a major role in maintaining optimum water quality parameters especially temperature, pH and ammonia throughout the culture period and hence, by using probiotics, it is possible to improve water quality and prevent the bacterial diseases in fish ponds.

Acknowledgement

The author Dr. K. Parvathi would like to thank the University Grants Commission (UGC) for providing financial assistance to carry out this research work.

Reference

Abdul Kader Mohaideen M; Selva Mohan M; Peer Mohamed S and Zahir Hossain MI 2010 Effect of probiotic bacteria on the growth rate of fresh water fish *Catla catla*. Inter. J. Biol. Tech. 1(2): 113-117

APHA 1995 American water works association and water pollution control federation. Standard methods for the examination of water and wastewater. 19th edn., American Public Health Association, Washington DC, USA

Fuller R 1989 Probiotics in man and animals. J. Appl. Bacteriol. 66: 365-378

Jana BB and Barat S 1983 Development of Heterotrophic and Ammonifying Bacterial Populations As Affected By The Fish *Clarias batrachus* under different experimental conditions. Acta. Hydrochim. Hydrobiol. 11: 569-576

Kennedy B; Venugopal MN; Karunasagar I and Karunasagar I 2006 Bacterial flora associated with the giant freshwater prawn *Macrobrachium rosenbergii*, in the hatchery system. Aquaculture. 261: 1156-1167

Mohanty RK 2009 Impact of phased harvesting on population structure, feed intake pattern and growth performance of *Macrobrachium rosenbergii* DeMan (giant freshwater prawn) in polyculture with carps in concurrent rice–fish Culture, Aquaculture Int.; 1-15

Padmavathi P; Sunitha K and Veeraiah K 2012 Efficacy of probiotics in improving water quality and bacterial flora in fish ponds. African J. Microbiol. Res. 6(49): 7471-7478

Ratan Kumar Saha 2010 Soil and water quality management for sustainable aquaculture. Naren Publi.

Sadek S and Moreau J 2003 Prawn (*Macrobrachium rosenbergii*) culture in earthen ponds in the Nile delta, Egypt: culture parameters and cost benefits. Israeli J. Aquacult. 48(4): 201-218

Saxena V. Scientific guidelines for farmers engaged in freshwater prawn farming in India. Aquaculture Asia VII :17-18

Soundarapandian P and Ananthan G 2008 Effect of unilateral eyestalk ablation on the biochemical composition of commercially important juveniles of *Macrobrachium malcolmsonii*. Int. J. Zool. Res. 4(2): 106-112

Sunitha K and Padmavathi P 2013 Influence of probiotics on water quality and fish yield in fish ponds. Int. J. Pure. Appl. Sci. Technol. 19(2): 48-60