ACTA SCIENTIFIC MICROBIOLOGY (ISSN: 2581-3226)

Volume 2 Issue 4 April 2019

Short Communication

Use of Probiotics to Open a New Horizon in Aquaculture

Pritam Mukherjee[1]* and Abhijit Mitra[2]

[1]*Department of Biotechnology, Techno India University, West Bengal, Kolkata, India*

[2]*Department of Marine Science, University of Calcutta, Kolkata, India*

***Corresponding Author:** Pritam Mukherjee, Department of Biotechnology, Techno India University, West Bengal, Kolkata, India.

Received: February 11, 2019; **Published:** March 05, 2019

Fish protein is an integral part of human diet and is currently gaining importance to feed the growing population of the planet Earth. Aquaculture is a vital pathway to meet the demand of fish protein for this rapidly rising population. The main challenge in aquaculture is the spread of microbial diseases. To get rid of this situation aquaculturist relies heavily on vaccines and antibiotics. Heavy use of antibiotics has posed an adverse impact on the aquaculture sector. These encompass suppression of immunity, bioaccumulation within the body tissues [1-3] and ecological threats to coastal habitats. It has also been reported that continuous use of antibiotics in mangrove areas has also decreased the survival rate of species like *Sonneratia apetala*. A study conducted by Mitra *et al.* [4] exhibits that survival of the mangrove species is low in those areas where antibiotics like oxytetracycline is heavily used to boost up the production of shrimp in central Indian Sundarbans (stations 6 - 10). On the other hand, the survival rate of *S. apetala* is higher in western Indian Sundarbans (stations 1 - 5) where there is almost no aquaculture activity (Figure 1).

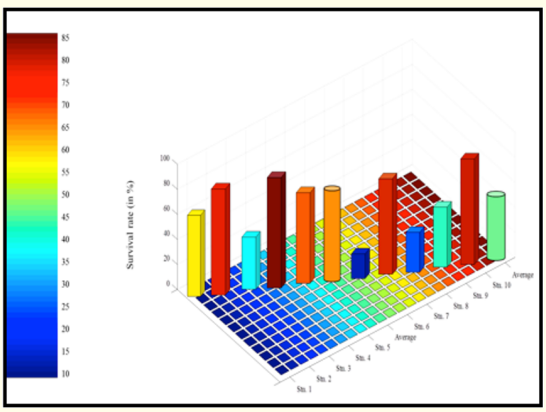

Figure 1: Survival percentage of *Sonneratia apetala* in Indian Sundarbans. Note that the rate is much lower in stations 6 -10 (where aquaculture is dominant) compared to stations 1 -5.

Considering the adverse impacts posed by chemicals on aquaculture sector, the use of an alternative approach became important, which is the application of probiotics. Probiotics is considered as an alternative health management strategy for the cultured fish species. The research is presently getting high acceptability due to the demand for environment friendly aquaculture [5]. Thus, the vertical of using probiotics is basically an eco-friendly alternative to the therapeutic use of antimicrobials [6].

Probiotics improves the intestinal microbial balance of the cultured fish species (host organism) and is served as a live microbial feed supplement [7]. It can also be defined as a beneficial agent packed with microorganisms, which when consumed by the fish species in optimum quantity results in the improvement of intestinal microbial balance of the cultured fish species. Another proposed definition of probiotics used widely in aquaculture is "live microbial cultures added to feed or environment (water) to increase viability (survival) of the host" [8].

Probiotics exerts a regulatory influence on the growth of intestinal microbiota, retards the growth of harmful bacteria and provides/accelerates the natural defense mechanism of the cultured fish species [9]. This results in the improvement of resistance power of the cultured species against the disease-causing organisms. The ability of some probiotics to adhere to the intestinal mucous layer of the host organism may block the intestinal infection route that is common to many pathogenic microbes [8], for example, the action of *E. coli* on the gut epithelium may be prevented by *Lactobacilli*, which competes successfully for this specific site. *Lactobacillus* is one of the best strains used in the domain of probiotics, which is added to the feed with the aim to boost up the immunity of the cultured fish species [10]. It is to be noted that the *Bacillus* strains can thrive luxuriantly without any mortality even if they are exposed to the manufacturing process of fish pellet.

With the improvement of science and technology attempts to discover more potential strains are on the way, preferably the strains that will be able to attach to gut epithelial cells, heat-resistant strains etc. It is expected that research in this field may overcome the challenges posed by diseases in the sphere of aquaculture and place this livelihood on strong economic platform.

Bibliography

1. Tukmechi A., *et al*. "Changes in intestinal microflora and humoral immune response following probiotic administration rainbow trout oncorhyncus mykiss". *Journal of Animal and Veterinary Advances* 6.10 (2007): 1183-1189.

2. Nayak SK., *et al*. "Effect of dietary probiotic and vitamin C on the immune response of India major carp Labeo rohita (Ham)". *Fish Shellfish Immunology* 23 (2007): 892-896.

3. El-Haroun ER., *et al*. "Effect of dietary probiotic Biogen supplementation as a growth promoter on growth performance and feed utilization of Nile tilapia Oreochromis niloticus (L.)". *Aquaculture Research* 37 (2006): 1473-1480.

4. Mitra A., *et al*. "Survival rate of mangroves: A proxy to assess ecosystem health". *Indian Journal of Geo Marine Sciences* 46.10 (2017): 2046-2053.

5. Abdelhamid AM., *et al*. "Evaluation of a new Egyptian probiotic by African catfish fingerlings". '*Journal of Environmental Science and Technology* 2.3 (2009): 133-145.

6. Merrifield DL., *et al*. "The current status and future focus of probiotic and prebiotic applications for salmonids". *Aquaculture* 302 (2010): 1-18.

7. Fuller R. "Probiotics in man and animals- A review". *Journal of Applied Bacteriology* 66 (1989): 365-378.

8. Ringo E., *et al*. "Lactic acid bacteria vs. pathogens in the gastrointestine of fish: a review". *Aquaculture Research* 41 (2010): 451-467.

9. Giorgio G., *et al*. "Importance of Lactobacilli in food and feed biotechnology". *Research in Microbiology* 161 (2010): 480-487.

10. Bucio Galindo A., *et al*. "Kinetics of Lactobacillus plantarum 44a in the faeces of tilapia (Oreochromis niloticus) after its intake in feed". *Journal of Applied Microbiology* 107 (2009): 1967-1975.

Volume 2 Issue 4 April 2019