

Role of Probiotics in Aquaculture

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Introduction

- The world “probiotics was coined by Parker (1974), and defined as “Organisms and substances that give to intestinal microbial balance.
- Fuller (1989) revised the definition as “live microbial feed supplement which beneficially affects host animal by improving its intestinal microbial balance”.
- Probiotics are often termed as “friendly”, “beneficial”, “good” or “helpful” bacteria, because they help keep the gut healthy. More recently, the probiotics are defined as “live microorganisms” that when administered in adequate amounts confer a health benefit on the host (FAO / WHO, 2001).



Why we have to use probiotics



- During the last decades, antibiotics used as traditional strategy for fish diseases management and also for the improvement of growth and efficiency of feed conversion. An alternative approach to manage fish and shrimp health, that is fast gaining attention in aquaculture industry is, “probiotics”, a microbial intervention approach for disease prevention and control, high survival and growth by enhancing the feed conversion efficiency

Generally, probiotics refers bacteria belonging to gram positive especially

Lactobacillus sps,	Weissella sps.
Bifidobacterium sps	Carnobacterium sps.,
Streptococcus ,	Enterococcus sps.,
Lactococcus sps.	Microalgae (Tetraselmis) and Yeasts (Debaryomyces)
Streptococcus sps.	Lactobacillus sps.,

Types of Probiotics

They are 3 types of probiotics, as mentioned below:

1. Water Probiotics – Applied to pond water
2. Soil Probiotics – Mixed with sand and applied to pond bottom
3. Feed / gut Probiotics – Given as feed supplement



Water probiotic



Soil probiotic



Gut probiotic

Water Probiotics

These are marked in 2 forms

- I) Dry forms
- II) Liquid forms.

- Liquid forms give positive results in lesser time, when compared to the dry and spore form bacteria, though they are lower in density
- These play major role in improving the water quality of culture pond.
- Dose 1kg or 1 litre per hectare



Soil probiotics

- Bacteria like Rhodococcus, Nitrobacter, Nitrosomonas and Sulphur reducing bacteria clean the bottom of aqua ponds.
- Dose 20-25 litre per hectare

Feed / gut probiotics

Lactic acid bacteria.

- Probiotics act as a microbial nutritional medicine that benefits the host health condition by reducing mucosal and systemic immunity and improving the physiological and nutritional actions. These enhance the fish and shrimp feed efficiency by stimulating digestive enzyme and maintain the balance of intestinal microbes, resulting in improved nutrient absorption, utilization and ultimately the survival, growth of fish and shrimp.
- Dose 3-5gm/kg feed



Role of Probiotics

- The three types of probiotic bacteria can be directly applied to soil, water of the farming pond and also as an additive to feed.
- Various commercial probiotics are available in the market in different combinations and bacterial counts.
- Reports inform that use of probiotic bacteria reduces mortality rate. However, the quantity of cells presents in the probiotic, given with feed plays a major role in the survival of animals.
- The bacterial count of 10^9 g-l is ideal than 10^{12} g-l and it indicates that the increasing of bacterial count does not offer protection to the animals.
- Mixed probiotic bacterial species yields better result by enhancing lysozyme activity, migration of neutrophils, and plasma bactericidal activity, than probiotic with single species.
- Now a days, probiotics like yucca, glucans etc are also included in the probiotic preparation which are non-digestible ingredients and help in stimulating the growth of probiotic bacteria especially in colon region of fish.
- Probiotic bacteria are isolated from the pond, sediment, soil, water and animal. The potential effect of probiotic relies on the source from which the bacteria are isolated and the way of application. So, it cannot be considered that all the commercial probiotics available in the market are potential one and they many vary based on the source and type.

The effect of probiotic is depending on various factors like mainly the type of probiotic, the dosage, method of application, duration of application, frequency of application. The commercial probiotics available in market are either in liquid or powder form. Instead of applying these products directly in the pond water or soil, it may be allowed for further fermentation mixing with jaggery for a period of 4-6 hrs which would improve the viability and functionality of microbes for better performances.



The probiotics are also prepared in encapsulated form through various processes like emulsification, extrusion, spray drying and adhesion to starch etc. This encapsulation aids to prevent the damage of probiotic bacteria from low pH and other digestive enzymes of GIT. If the probiotic bacteria survive well in the intestine, then the performance of bacteria will be effective against the infectious. The viability of probiotic depends on the method of production, storage temperature, survival and stability in the intestinal tract.

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