Improving Aquaculture Practices with Probiotics

PROBIOTICS FOR AQUACULTURE INDUSTRY

The blue swimmer crab, *Portunus pelagicus* (Portunidae), is widely distributed throughout the coastal and estuarine areas of the tropical Western Pacific and Eastern Indian oceans. Driven by increasing demand, the interest in *P. pelagicus* as a candidate species for aquaculture has increased. Conversely, the hatchery production of crab larvae is more often challenging owing to low or no survival rates during the early stages. The intensive rearing condition for marine fish larvae provides an appropriate environment for opportunistic bacteria that may cause microbial problems and high larval mortality. Routes of lethal pathogens entry into hatchery includes seawater, faecal matter, and exoskeleton of spawner and feeds. Mass mortalities in crab occurs frequently in zoea larvae, which are infected when the bacteria proliferates inside the larvae.

Due to the high mortality and contagious nature of diseases, large amounts of antibiotics are often used for cures, and frequent use of antibiotics has led a growing concern due to the emergence and spread of antibiotic resistant bacteria that are becoming increasingly difficult to control and eradicate. Thus, there is an increasing need for alternative approaches and the application of probiotics may be considered. Probiotics are organisms and substances, which contribute to intestinal microbial balance. Although the application of probiotics in aquaculture seems to be rapidly growing due to their environment-friendly role, the proposed probiotics bacteria in crab aquaculture has not been worked out extensively.

The present study has selected and evaluated three *Lactobacillus* species from blue swimming crab gut, which show strong antimicrobial activity against pathogenic *Vibrio parahaemolyticus*, *Vibrio harveyi* and *Vibrio piscicida*.

- **Lactobacillus** have improved larval survival significantly from 0% – 1% to 10% – 11%
- One of the main pathogens found in blue swimming crab is *Vibrio parahaemolyticus* that causes shrimp early mortality syndrome (EMS) disease. Thus, Lactobacillus probiotics not only enhance larvae survival of blue swimming crab but also can be considered to counter the EMS disease
- Crab gut *Lactobacillus* not only improves growth and survival, but also improves water quality and enhances digestive enzyme activity
- *Lactobacillus* is gaining importance as an aquaculture probiotic due to its environmentally and health friendly roles

COMPETITIVE ADVANTAGES

- **Market Potential**
  - The growth of aquaculture as an industry has accelerated over the past decade and has resulted in environmental damages and low productivity of various crops. The need for increased disease-resistant growth of aquatic organisms and feed efficiency has brought about the use of probiotics in aquaculture practices. Later, probiotics were used to improve water quality and control of bacterial infections. Today, there is a documented evidence that probiotics can improve the digestibility of nutrients, increase tolerance to stress and encourage reproduction. As such, the present invention has a high market potential in aquaculture to improve the survival of blue swimming crabs and increase productivity. Target markets include hatcheries in the Indo Pacific regions where blue swimming crabs are widely distributed, and most of Asia and Latin America where shrimp is also important.

WHAT'S NEXT?

The inventors would like to speak to companies interested in licensing this technology.

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