



# Management of water quality through bioremediation

## Biotechnology Benefiting Aquaculture

Ponds are complex dynamic constantly evolving aquatic ecosystems. No two are alike; shrimp numbers and species vary, biosecurity practices do not always exclude the presence of fish, feed varies in composition and nitrogen content, ponds vary in age and size with differing types of sediments on the bottom, ponds range from 100% soil to 100% lined, shrimp are growing (one hopes) all the time throughout the production cycle, etc.



Cost effective utilization of our products depends on a number of factors, obviously one of which is how much product is used. We suggest you try the following approach:

### Titration

While we provide guidelines for use, the truth is that we cannot know how best to use our product in your production system so we suggest if you followed our guidelines and did not see an impact, *that you use as high of a level and as frequent of an application as you feel comfortable with.* In some systems this will be more than you need, but you will under most circumstances see an impact. In subsequent production runs back off of this level until you see a no-benefit level and then move up from there to somewhere midway between this level and the higher levels you used in the beginning. It is important to ensure that the environment you have is one that will allow the bacteria to thrive for the short period of time that they typically do before the forces of ecology push them back into a pre-application niche. This may mean using an additional carbon source such as molasses to ensure this.

Most clients who use PRO4000X are very happy with how our product performs and see a range of benefits including but not limited to:

- ⇒ less accumulated organic matter
- ⇒ changes in algal composition
- ⇒ reduction in ammonia levels
- ⇒ reduction in sulfide levels
- ⇒ a reduction in the overall loads of certain heterotrophic bacteria that thrive in higher organic environments, specifically vibrios

These changes in the environment of the pond impact the shrimp (or fish). Since the environment is cleaner they will be under less stress. This can result in faster growing, larger animals that are less prone to being impacted by disease, specifically some bacterial issues created by vibrios impacting excessively stressed animals and other cost critical impacts.

One question we are always being asked is how best to use the product? We do not ascribe to the theory of cookbook aquaculture. As an expert in many different production systems with a global customer base and experience with culture methods in dozens of countries over 35 years, I know that this is not a viable approach towards the use of tools of this nature.

It is an unfortunate aspect of capitalism that people who sell products will often say whatever they need to make the sale. This is one reason why so many companies call their products probiotics, even though any scientifically literate person who takes the time to read the literature knows that not only is there no such thing for shrimp (or fish) but that the concept in humans is often not valid in many instances.

I am not interested in selling you a product that does not work and would not be selling a product if I did not know that it worked. Unlike many other companies I sell products to make aquaculture a better more sustainable industry and my entire career has been dedicated to this. The money is important but if the products did not work **I WOULD NOT SELL THEM.**

This is not about my bottom line-it is about yours.

We know that the bacteria in our tablets do what we say they do. This has been proven time and time again in many field trials. The key to success is for you to understand that your production environment has a fingerprint that is unique and that you control the best way to use our products. We are confident that if you take this approach you will be able to optimize the use of our products in your unique production environment and see significant benefits.

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