



BIO-Lair

Aquaculture - Aquafarming

AQUACULTURE



More Bacteria High Surface

- ✓ **100 times more surface than other substrates**
- ✓ **Over 2,000,000 m²/m³ of surface area, or over 10,000 m²/Kg of media**



Disc Stack



Net with BIO-Lair

HARVEST MORE in Cleaner Water

- Lower Ammonia, Organic Waste
 - Less Mortality & Faster Growth
 - Less Food Wasted
 - Probiotic & Bacillus Bacteria Control Pathogens
 - Blue-Green Algae Control
 - More Fish or Shrimp to Sell

How Does This Occur?

Bacteria are the natural way to clean water. BIO-Lair provides more surface area to create more bacteria. Enzymatic Bacillus Bacteria can quickly break down ammonia and organic waste. Probiotic Bacteria help resist disease. Bacillus bacteria reduce disease pathogens.

BIO-Lair is a porous ceramic with very high surface area (100 times other products). It can support large bacteria colonies needed to clean water. Bacteria and oxygen are very important in aquaculture to maintain healthy water. Bacteria controls ammonia, pathogens, algae and organic waste. Clean water leads to happy, healthy fish or shrimp that grow faster.

BIO-Lair works with any bacteria, but is especially effective with Bacillus, Pseudomonas, and Probiotic bacteria blends used in Aquaculture. Deadly ammonia and disease pathogens are lowered to safe levels. Enzymes break down complex organics (fats, oils, cellulose and proteins) for easier oxidation. Probiotic bacteria strengthen the digestive tract of seafood to ward off disease. Toxins from blue green algae are reduced, which improves taste.

Clean water allows fish or shrimp to grow faster. Special medicated feeds are not needed. Cost of adding BIO-Lair and bacteria is quickly returned by having more product to sell.

BIO products have been used in both fresh water and seawater for over 15 years. Water quality improves and less mortality occurs in hatcheries, tanks and ponds or other water bodies used to raise seafood. Less residue occurs on tank and pond bottoms.

Benefits of BIO-Lair & Aquaculture Bacteria

- Less media needed: 1 Kg of BIO-Lair provides 8,000 m³ surface for bacteria growth
- Ammonia removed faster: some 3.5 Kg-NH³/m³ can be removed daily
- Lower nitrates exist: bacteria strains convert to nitrogen gas
- Enzymes accelerate organic waste breakdown for more rapid oxidation
- Less feed is wasted when fish and shrimp are eating more
- Investment returned quickly (1-2 cycles)
- Improvement occurs in all applications
 - Higher yields in hatcheries – probiotic bacteria strengthens larvae or fingerlings
 - Better control of pH and faster reduction of nitrogen and organic compounds
 - Faster growth of seafood occurs in cleaner water
 - More weight harvested for same growth period

AQUACULTURE

Shrimp



Shrimp Pond with Bio-Lair

Tanks



Pathogens

Bacillus Strains in Aquaculture Bacteria

Produce metabolites that inhibit growth of pathogenic bacterial or oomycete pathogens typically found in Aquaculture

Results Using BIO-Lair and Aquaculture Bacteria

Shrimp Hatcheries

Testing is on-going at Hatcheries in Ecuador. Yields are increased to over 95% with populations ranging from 5,000,000 to 8,000,000 larvae.

One hatchery ran side-side comparison of 2 identical 50,000 L tanks that were used to raise shrimp larvae over a 20 day growing period

- Only Tank 1 contained BIO-Lair
- Standard Bacteria used by the hatchery was used in both Tanks

Results: Use of BIO-Lair gave a higher yield and 20% more larvae weight

- ✓ Tank 1 maintained a pH of 7.8 with no ammonia spikes.
- ✓ In Tank 2, pH increased to 10.8 and many ammonia spikes occurred.
- ✓ Yields were 99% in Tank 1 and larvae weighed 20% more
- ✓ Tank 2 had only a 79% yield

Shrimp Ponds

Bacteria used in some 19 shrimp ponds in Ecuador provided positive results

- Harvest increased 25-35%: 818 Kg to 1091 Kg. of shrimp/ Ha
- Survival increased ~15%
- Water turnover was reduced and water cleaner
- Pond bottom soil was much cleaner with a sandy brown color after harvest
- Snails interfering with shrimp growth were eliminated by removal of organic pools

Bio-Lair in suspended nets and bacteria was used in 2 shrimp ponds in China stocked with over 3 million larvae/Ha, much higher than the 350,000 larvae/Ha used in Ecuador. Ammonia/nitrites was controlled, algae did not form and average yield was 12% higher compared with 3 Control ponds. Feed was 5% less and no sludge was on pond liner.

Tilapia Tank (38,000 Liters)

6 month study conducted in a state-of-art aquaculture facility in Alabama (U.S.)

BIO-Lair hung above aeration along side of the recirculating tank. Bacteria added weekly.

Results are:

- Death of fish reduced from 13% to 2%
- Ammonia spikes significantly reduced
- Food waste dropped 24%
- Aeration efficiency improved due to quicker breakdown of organic waste
- Fish looked better when sold to live fish markets

Bacillus Bacteria

Bacillus bacteria available in ABP strains used with Bio-Lair was found to inhibit the growth of 9 aquaculture pathogens under laboratory conditions in a study at Auburn University done using bacteria from Organic Pond. Other studies show positive results for *Bacillus*-based products used in aquaculture. For example, *Bacillus* strain IP5832 spores fed to turbot larvae resulted in a decrease in *Vibrionaceae* population with significant improvement in weight gain and survival of the larvae. It also improved food adsorption by enhancing protease levels, decreased the number of pathogenic bacteria in the system and improved turbot larval growth. The survival of channel catfish was also found to improve in a farm trial using a mixed culture containing *Bacillus* bacteria.