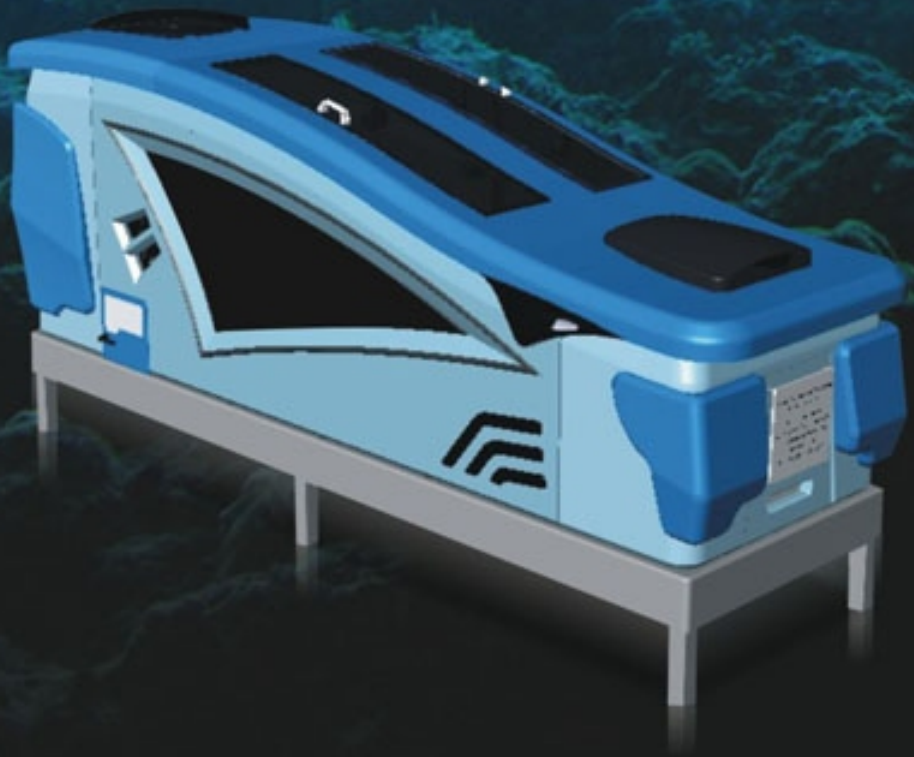
ORIENTAL
AQUAMARINE BIOTECH

Oriental Aquamarine Biotech India Private Limited



www.nitrifying-bioreactor.com

Oriental Aquamarine Biotech (India) P Ltd offers a patented **NITRIFYING BIOREACTOR TECHNOLOGY FOR THE ESTABLISHMENT OF RECIRCULATING AQUACULTURE SYSTEMS. Scientists at the National Centre for Aquatic Animal Health, Cochin University of Science and Technology, Kochi developed the technology with funding from the Department of Biotechnology, Government of India, New Delhi after 16 years of intensive research and field validation.**

Closed Recirculating Aquaculture Systems fitted with the Nitrifying Bioreactors actively control water quality and helps maintain reef quality oligotrophic water conditions for optimum growth and development of various aquatic species

The Nitrifying Bioreactors are activated with a consortium of nitrifiers by immobilizing them on an inert substratum designed as a cartridge. They grow as a biofilm and as water passes over them nitrification is effected.

Versatile Applications	**Various Aquatic Species:**
Marine Water	Prawn, Shrimp, Lobster,
Brackish Water	Finfishes, Molluscs,
Fresh Water	Ornamental Fish, Reptiles

The main constituents of the Recirculating Aquaculture System are

- **Nitrifying Bioreactors**
- **Probiotics :**
  - Detrodigest™ - detritus degrading bioaugmentor
  - Enterotrophotic™ - Antagonistic probiotic preparation to manage Vibrio in the system.

EX-SITU PACKED BED BIOREACTOR (PBBR)

Packed Bed Bioreactor (PBBR)

The Packed Bed Bioreactor has a patented design and comprises the following elements:

- Mild steel structure with marine based protective coating
- Outer fiber& Acrylic material body with seashore protective coating
- Reactors made of food grade material placed in series, with inlet and outlet tanks
- Beads filled Cartridge made with acrylic materials
- Good Air supply system for 54 aeration cells with flow regulators
- Total purification process with use of 0.5 hp 230V single phase motor
- Wheel Mounted Machine for easy transportation & handling

Applications

- Establishment of Recirculating Aquaculture Systems for maturation and brood stock maintenance.
- Establishment of Recirculating Aquaculture Systems for larval production.
- Nitrification of the incoming water from sea.
- Spent water treatment and reuse

IN-SITU STRINGED BED SUSPENDED BIOREACTOR (SBSBR)

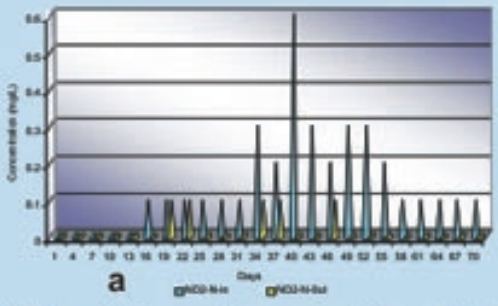
The reactor has four components such as

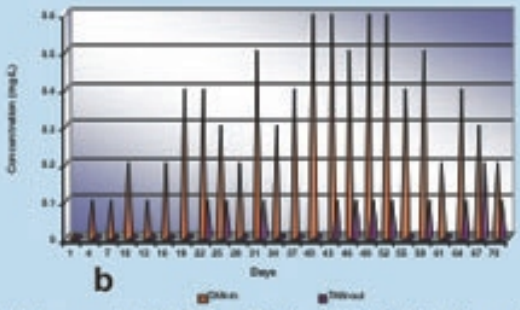
- Outer fiberglass shell with conical bottom.
- Detachable perforated shell lid at the Top.
- Inner cartridge comprising Perspex framework and plastic beads on a string.
- Catridge connected with aeration locking strip & silicon tube.
- Cartidge is specially designed in such a way that larvae, plankton, and food particles when enters, pass out through the airlift pump without mutilation and damage.
- Specially designed conical shaped bottom for collecting sludge.

APPLICATIONS

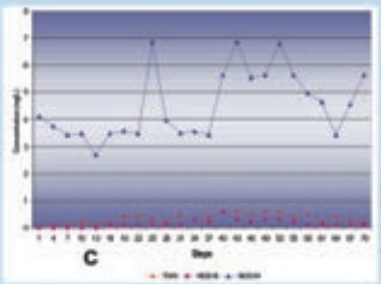
- Insitu nitrification in larval production system
- Quarantine of brood stock
- Live animal transportation

PERFORMANCE:

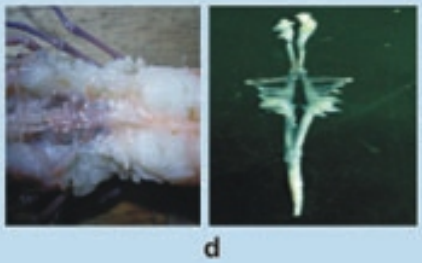




(a), (b) Nitrification efficiency of the reactor integrated into a maturation system. Total Ammonia Nitrogen (TAN) and NO_2-N in the effluent were always below 0.1 ppm irrespective of their influent strength.



Progress of nitrification in an integrated *Penaeus monodon* maturation system



Developing ovary in the animals reared in a maturation recirculating system

Courtesy : NCAAH, CUSAT

The summary of the findings from the field trials undertaken by NCAAH, CUSAT is given below:

- A shrimp (Penaeus monodon) maturation system is operational without any water exchange.
- 0.1 PPM. Residual NH4+-N in the rearing tank
- ZERO ammonia nitrogen in outgoing water
- ZERO Nitrite
- Nitrate < 7 ppm
- Bioreactor achieves complete conversion of ammonia to nitrogen.
- When the substrate concentration in the incoming water goes up, the rate of consumption also increases to maintain the required steady state ammonia nitrogen in the system.
- Total Vibrio count within 30 - 50 cfu/ml.
- Water Delivery Rate: 60 tonnes / day.

BENEFITS

1. Reduced stress on aquatic animals
   a. Increase in fish survival rate
   b. Increase in rate of growth and the size of fish
   c. Better resistance to diseases as vital nutrients and necessary bacteria are maintained

2. Aquaculture farms need not be located close to oceans and water bodies leading to
   a. Reduction in production costs
   b. Reduction in running costs

3. Improvement in surrounding environment
   a. Reduced Waste generation
   b. Reduction in spread of diseases

4. Improved quality of fish produced
   a. Fish produced using this natural technique are organic
   b. Higher Production efficiency

5. Farmed fish closely resemble naturally grown fish as the process closely replicates reef quality conditions for farming

6. No requirement of Antibiotics and Chemotherapeutics.

PATENT

The technology has been patented in **India** and in other countries like
Thailand
Japan
Philippines
South Korea and
Indonesia etc
with a well established aquaculture industry as well as under the Patent Cooperation Treaty (PCT)

This technology has been commercialized with financial assistance from Department of Biotechnology, Government of India under the Small Business Innovation Research Initiative (SBIRI) Program.

AWARDS :

Lockheed Martin India Innovation Growth Program 2007 Medallist

TEDIndia 2009 Fellow

Technium
From big ideas to big business

Technium International Challenge, UK Award 2008.

New Ventures INDIA

New Ventures India Portfolio company

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Detailed report on field trials is available in the website
www.nitrifying-bioreactor.com
and publications mentioned therein.