

# Aquaculture Spectrum™

The Indian Aquaculture Magazine

## ADAPTIVE & MITIGATIVE STRATEGIES - A CALL FOR CLIMATE ACTION IN AQUACULTURE

- Page 21



### Seed production of Pearlsport, *Etroplus suratensis*, in recirculatory aquaculture system

An innovative  
approach for  
livelihood of aqua-  
farmers

Page 12



### Adaptive & mitigative strategies

A call for climate  
action in aquaculture

Page 21



### Tilapia lake virus (TILV)

A serious concern  
for the global tilapia  
industry

Page 41



### Ornamental Fish – Monthly Feature -Driftwood Catfish

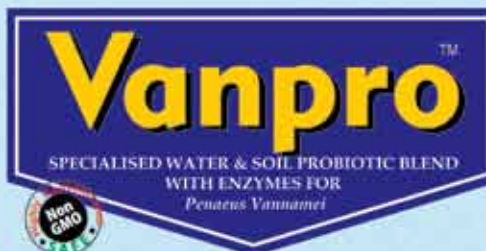
Page 58



# Synergy Solutions for Vannamei (R)Evolution



S



Specially formulated blend of Microbes & Enzymes to counter challenges in high density *Vannamei* culture Enhances water quality and improves pond bottom. Effective in both aerobic and anaerobic conditions.

Manufactured by :

**AMERICAN BIOSYSTEMS**

PO Box 1523, Roanoke, Virginia 24007 USA



## Odobloc®

Natural Solution for Ammonia Pollution  
Concentrated Liquid Yucca

Liquid Solution for Ammonia Pollution. A 50% extract of *Yucca schidigera* Fast acting formula to control obnoxious gases in aqua ponds.

Manufactured by:



**distributors processing inc.**

7656 AVE 168, Porterville, CA, 93257 USA

Imported & Mkt. by :



**Synergy**  
Biotechnologies

The Bio-Synergy Group #1-58, Sriharipur, Hyderabad-500 076  
Customer Care : +91 40 27174095  
Email : info@synergybiotech.net

an ISO 9001-2008 & GMP Certified Company

Antibiotic Free

For Aquaculture use only

Feed Supplement





## GAYATHRI HATCHERIES

KOTHAVODAREVU,  
PANDURANGAPURAM VILLAGE,  
BAPATLA -522101 GUNTUR DT., A.P.  
gaayathri2011@gmail.com



- CAA Approved Hatcheries
- BAP Certified
- Own Maturation Facility
- Certified SPF Broodstock
- Certified SPF Seed
- Antibiotic Free Seed
- Qualified and Experienced Technical Team

## GAAYATHRI BIO MARINE

ADIVI VILLAGE,  
PANDURANGAPURAM  
BAPATLA -522101, GUNTUR DT., A.P.  
gaayathribiomarine@gmail.com



**V. Narendra Varma**

☎ + 91 9849815566,  
+ 91 9849915566





SOLUTION FOR SUSTAINABLE  
AQUA CULTURE.....



**Our all Products are Registered with CAA as Antibiotic-free Product**

**Imported and Marketed by  
FECPI India Pvt. Ltd.**

**Admin. Off. : D-Block, Ground Floor, Sripati Nilayam,  
No.85, Vallalar Street (School Road), Keal Ayanambakkam,  
Chennai - 600 095. Mob : +91 99449 88192, Ph : 044 49523456**

**Visit us at : [www.fecpi.in](http://www.fecpi.in)**



#### Editor:

Mr. Jaideep Kumar, Editor (Former Deputy Project Director, Rajiv Gandhi Centre for Aquaculture, Sirkali)  
Email: aquacultureoutlook@gmail.com,  
Mob No. 9381944442

#### Editorial Board:

Dr. P.E. Cheran, Associate Editor (Partner, Allwin Aquatech Shrimp Hatchery, Marakkanam, Tamil Nadu)  
Email: cheranaquaoutlook@gmail.com  
Ms. Pramila Rajan, Associate Editor, (Ornamental Fish Expert, Aquatic Systems, Mangalore)  
Email: pramirajan@gmail.com  
Dr. Supraba V, Associate Editor, (Former Technical Manager, TASPAC (MPEDA), Visakhapatnam)  
Email: contribute2aquaspec@gmail.com  
Ms. Archana Jaideep, Associate Editor  
Email: achuoutlook@gmail.com  
Mr. V. Edwin Joseph, Production Editor, (Former Chief Technical Officer, Library and Documentation Centre, ICAR - Central Marine Fisheries Research Institute, Kochi)  
Email: edwinjosephaquaoutlook@gmail.com

#### Advisory Board:

Dr. T. C. Santiago, former Principal Scientist CIBA  
Dr. Y.C. Thampi Sam Raj, former Project Director, RGCA  
Dr. V.K. Dey, Senior consultant, Bay Harvest International  
Dr. V.S. Chandrashekar, former Principal Scientist CIBA  
Dr. R. Kirubakaran, Former Group Head, Marine Biotechnology Division, NIOT  
Dr. P. Haribabu, Professor (Rtd), Faculty of Fishery Science, SV Veterinary University  
Dr. Jitendra Kumar Sundaray, Head- Division of Fish Genetics & Biotechnology, ICAR-CIFA  
Mr. D. Ramraj, MD, Padmanabha Labs and Hibreeds Aquatics  
Mr. Madhusudhan Reddy, Director, Saranya Group  
Mr. Ravikumar Yellanki, MD, Vaisakhi Bio-Marine (P) Ltd., Vaisakhi Bio-resources (P) Ltd.,  
Mr. Apuchand Eluri, Entrepreneur & leading Aquaculture consultant  
Dr. P. E. Vijay Anand, Deputy Regional Lead - Asia subcontinent, USSEC  
Mr. C. M. Muralidharan Fisheries project consultant to FAO & other agencies

# CONTENTS

Aquaculture Spectrum is a monthly publication by Aquaculture Outlook. Aquaculture Outlook presently publishes two editions; Aquaculture Spectrum in English and Jala Sedhyam in Telugu.

## 9 Editorial

### 12 Seed production of Pearlscale, *Etroplus suratensis*, in recirculatory aquaculture system

An innovative approach for livelihood of aqua-farmers

## 21 Adaptive & mitigative strategies

A call for climate action in aquaculture

## 33 Integrated aquaculture brings livelihood development and economic prosperity to a tribal farmer in Borigumma Block of Koraput District, Odisha, India: A Success Story

## 41 Tilapia lake virus (TILV)

A serious concern for the global tilapia industry

## 48 Aquatic health tips from Amreneni Ravi Kumar

## 50 L. vannamei Broodstock Imports

## 53 Dr. Cheran's Column - Monthly Feature

Shrimp Aquaculture - Industry Review

## 58 Ornamental Fish - Monthly Feature -Driftwood Catfish

## 63 Aqua Brahma Shrimp Prices - Monthly Analysis

## 64 News

## 77 Upcoming Aquaculture Events

#### Advertiser's Index

Adisseo Asia Pacific .....	52
Aqua Brahma .....	62
Arunachala Agency .....	30
Avanti .....	66
Avanti AHCP .....	72
Bhuvan Biological .....	69
Biomed Techno Ventures .....	06
Biostadt .....	10
Devee Nutri International .....	25
Deepak Nexgen .....	47
Eruvaka Technologies Pvt. Ltd .....	11
FECPI India Pvt Ltd .....	04
Gayathri Hatcheries .....	03
Golden Marine .....	40
Grobest Feeds Corporation India Ltd... ..	26
Growel .....	73
Himalaya .....	07
JJ Group Pondicherry .....	65
Mayank Aqua Products .....	80
Microbasia .....	60
Neospark.....	20
Padmanabha .....	57
Poseidon Biotech .....	56
Poseidon Enterprises .....	78
PVS Group .....	32
Salem Microbes Pvt Ltd .....	08
Shrimp Improvement Systems .....	76
Shenglong Biotech India Pvt Ltd .....	79
Skretting .....	18
Synergy Biotechnologies .....	61
Synergy Biotechnologies .....	02
The Waterbase Limited .....	46
Uni President .....	17
Zeigler .....	31

#### Subscription Information:

Annual Subscription Charges for Aquaculture Spectrum:  
Rs. 1800/- (12 issues). It would be sent by Book Post. Institutional subscriptions Rs.3000 (12 issues) Overseas Subscription charges are USD \$100 per year and issues would be sent by Airmail. Email us at subscriptionaquaspec@gmail.com

#### For contribution of article:

To contribute articles/manuscripts/news clippings, please visit our website and contribute using the provision on the menu bar or email us at contribute2aquaspec@gmail.com

#### Advertising:

For information on advertising in Aquaculture Spectrum and its editions in regional languages, please email us at aquacultureoutlook@gmail.com, and/or edpaquacultureoutlook@gmail.com

#### Contact Details:

Aquaculture Outlook, Flat No. A3, Plot No.1, 3rd Floor, Nahar Mathura, Sri Aadhi Varagha Puri, Thiruvadanthai, Kancheepuram District, Chennai-603112, Tamil Nadu  
Mobile no: 9381944445 / 9381944442.

Edited, Printed and Published by Jaideep Kumar on behalf of M/s. Aquaculture Outlook, printed at Safire Offset Printers, 3/49, Ayyanar Colony, Vembakottai Road, Sivakasi 626 123, Tamil Nadu and published from:

#### Aquaculture Outlook,

Flat No. A3, Plot No.1, 3rd Floor, Nahar Mathura, Sri AadhiVaragha Puri, Thiruvadanthai, Kancheepuram District, Chennai-603112, Tamil Nadu. Registered with the Registrar of Newspapers for India with Reg. No. TNENG/2018/76151; ISSN 2581-7892

#### Cover page:

Photograph of Fish Farming cages sourced from Shutterstock

#### Disclaimer:

The views and opinion expressed in the articles and industry news are that of the authors and do not necessarily reflect the views and opinion of Aquaculture Spectrum. Aquaculture Spectrum assumes no liability or responsibility for any inaccurate, delayed or incomplete information, nor for any actions taken in reliance thereon. The information contained about each individual, event or organization has been provided by such individual, event organizers or organization without verification by us. However, if any discrepancy in the contents is observed, please let us know via email to aquacultureoutlook@gmail.com



biomed



# Pure-Min

100% Soluble & Ionically Balanced Minerals

“Introducing Purest form of Minerals  
specifically designed for Shrimp Nurseries”

## Advanced Shrimp Nursery Care



**Dosage**  
1 kg/ 1 lakh seed, once in a day, based on  
salinity and alkalinity  
or  
as advised by Aquaculture consultant

NO  
SOLVENT  
FEED  
SUPPLEMENT



 [hr@biomed.org.in](mailto:hr@biomed.org.in)

 [www.biomed.org.in](http://www.biomed.org.in)

Follow us On 



*Introducing...*

**Himalaya**  
SINCE 1930



# First time ever

Unique formula with phytoactives

Probiotics | Yeast

**Phytoactives**

**Controls  
harmful bacteria**

**Improves  
water color**

**Reduces  
sludge**



**3-tier Protection  
Formula**



**The Himalaya Drug Company**

Animal Health Division, Makali, Bengaluru 562 162, India

www.himalayawellness.com  
E-mail: marketingahp@himalayawellness.com



Certified by  
Coastal Aquaculture Authority,  
Govt. of India as an  
Antibiotic-free Aquaculture input



Farming with  
Quality Inputs



## LABORATORY SERVICES

Farming with  
Realtime  
Information

## TRACEABILITY PROGRAM

Farming with  
Traceable  
Records



- PERFORMANCE EVALUATION, TECHNOLOGY TRANSFER & INTERNATIONAL COOPERATION

- SOIL ANALYSIS
- WATER QUALITY ANALYSIS
- DISEASE DIAGNOSIS
- MICROBIOLOGY
- CONSULTING & TRAINING



**AQUAONE  
CENTER**

ICT Enabled Aquaculture Support Services

NETWORK OF 6 LABS

Authorised Service provider of  
**NFDB AQUAONE CENTER**

**GUJARAT**

Navsari - 9360137645  
Olpad - 9360137646

**WEST BENGAL**

Kalinagar - 8695861888  
Contai - 9360137644

**ODISHA**

Baliapal - 9360137640  
Chandaneswar - 9360137641



www.aoclabs.in



- FARM RECORD KEEPING
- INTEGRATION OF LABORATORY, SERVICE AND FARM RECORD
- FARM CERTIFICATION ADVISORY
- TRACING OF FARM PRODUCE UPTO CONSUMER



**SALEM MICROBES  
PRIVATE LIMITED**

An ISO 9001 : 2015 Company

Regd. Off : No. 21/10C, Bajanai Madam Street,  
Gugai, Salem - 636 006. Tamilnadu. India.

Customer Care : 91 +427 + 2469928 / 70106 96630

E-Mail : contact@salemmicrobes.com

93448 37525





**W**ith a view to promote exports, the Govt. of India announced reduction of duties on certain inputs required for shrimp aquaculture such as shrimp broodstock, artemia cysts as well as frozen krill, mussels and squid used in hatcheries. Though it was announced that import duty on shrimp feed used in farms has also been reduced, industry sources inform that the reduction has come into effect only for hatchery feeds and not grow-out farm feeds.



Jaideep Kumar

While this move has brought some relief to the hatcheries, there is nothing much to cheer for the farming sector that has been battling disease issues over the last four to five years and has had to deal with escalation in prices of most farm inputs such as feeds, feed additives, fertilizers, minerals and probiotics following the Covid-19 pandemic. Feed prices have increased by over 10 percent during the last 6 months, significantly increasing the cost of production in farms. There has been disappointment for seafood exporters as well, who have to cope with steep freight hikes, shortage of containers and lower incentives under RoDTEP. High duties on fish meal and other ingredients make import of ingredients such as fish meal unviable for feed millers.

The date of the much-awaited Aqua India 2022 being organized by the Society of Aquaculture Professionals, India has been announced. It is now scheduled to be conducted from the 23<sup>rd</sup> to 25<sup>th</sup> June 2022 at Feathers Hotel, Chennai. Stakeholders eagerly await the market outlook provided by global experts during the event as well as the wealth of technical information that it brings in each time.

The February 2022 issue of Aquaculture Spectrum features articles on "Seed production of pearlspot *Etroplus suratensis* in Recirculatory Aquaculture System: An innovative approach for livelihood of aqua-farmers" by Tanveer Hussain et.al., "Integrated aquaculture brings livelihood development and economic prosperity to a tribal farmer in Borigumma block of Koraput District, Odisha, India: A Success Story" by B.C. Mohapatra et.al., "Adaptive & Mitigative Strategies: A Call for Climate Action in Aquaculture" by Menaga Meenakshisundaram & Felix Sugantham and "Tilapia Lake Virus (TiLV): A Serious Concern for the Global Tilapia Industry" by Soibam Ngasotter et.al. Our regular columns on "Shrimp Aquaculture - Industry Review" by Dr. P.E. Cheran, "Aqua Health series" by Dr. Amerneni Ravi Kumar and "Ornamental Fish" (*Driftwood Catfish*) by Dr. V.K. Dey, along with SPF shrimp broodstock imports and news from across the Indian and global aquaculture sector are also featured in this issue.

**Jaideep Kumar**

# Taking on the big titles

## Aquaworld Acclaimed



To the aquaculture  
global community.

★ ★ ★  
**Performance  
validated**  
by approved universities.



Of Aqua Farmer's



Globally

Holding the flag to a country that is the second-largest producer of aquaculture produce, Biostadt Aquaculture wanted to make a difference to farmers locally using globally recognised solutions. The goal was to wake aqua farmers to stress-free culture days & move the industry to a low-risk and high-profit industry. Whilst providing farmers aqua security "Biostadt aquaculture" stamped it's identity internationally.







# Eruvaka

Transforming Aquaculture

## INTELLIGENT SHRIMP FEEDING SYSTEMS



### PondMother

- Intelligent Automatic feeder for shrimp
- Digitally controlled feed regulations & dispensing
- Uniform dispensing for feed in 12m radius
- Mobile application notifications for alarming
- Solar Powered with Battery Backup



### ShrimpTalk

- Underwater Acoustics-based shrimp feeding system
- On demand feeding based on Shrimp Appetite
- Highly effective in feeding shrimp, Results in better FCR and faster growth
- 24 x 7 feeding system reduces feed wastage and improves water quality

Eruvaka Technologies Pvt. Ltd.  
6th, Sri Hari Towers, Besides Mary Stella College,  
NH5 Frontage Rd, KP Nagar, Vijayawada,  
Andhra Pradesh - 520008, India.

Web: [www.eruvaka.com](http://www.eruvaka.com)  
E-Mail: [info@eruvaka.com](mailto:info@eruvaka.com)  
Cell No: +91 9908963863

# SEED PRODUCTION OF PEARLSPOT, *ETROPLUS SURATENSIS*, IN RECIRCUALTORY AQUACULTURE SYSTEM

## AN INNOVATIVE APPROACH FOR LIVELIHOOD OF AQUA-FARMERS

**Tanveer Hussain<sup>1\*</sup>, Pankaj A. Patil<sup>1</sup>, Jose Antony<sup>1</sup>, P. Mahalakshmi<sup>2</sup>, M. Kailasam<sup>2</sup>,  
Krishna Sukumaran<sup>2</sup>, Prem Kumar<sup>3</sup>, K.P. Jithendran<sup>2</sup>**

<sup>1</sup>ICAR-Navsari Gujarat Research Center of CIBA, NAU campus, Navsari, Gujarat-396 450, India.

<sup>2</sup>ICAR-CIBA, 75 Santhome High Road, R.A. Puram, Chennai-600 028, India.

<sup>3</sup>Kakdwip Research Centre of ICAR-CIBA, Kakdwip, South 24 Parganas, West Bengal- 743347

Corresponding author - Email: [tanveer.hussain@icar.gov.in](mailto:tanveer.hussain@icar.gov.in)

**P**earlspot, *Etroplus suratensis* (Bloch, 1790) is commonly known as green chromide and is a popular brackishwater food fish in the western coast of India. Its firm meat texture and characteristic flavour makes it a favourite fish in the state of Kerala, which has recognized pearlspot as its state fish with the sole objective of conserving the natural stocks and enhancing its

*Pearlspot – Etroplus suratensis*



aquaculture production. Pearlspace fetches upto INR 250 to 500 in markets across the country and it sells for even higher prices in the niche markets. Recently, the fish has also started becoming popular among fish hobbyists as an ornamental fish. Being a fish with an omnivorous feeding habit, aquaculture of pearlspace is considered economical and highly adaptable to different culture systems like pond, pen and cages. A major bottle neck that is limiting the expansion of pearlspace farming is the insufficient availability of quality seed for stocking in different growout systems. Although, several studies report the breeding and seed production of pearlspace in earthen ponds, cement tanks and raceways, large scale seed

production technology for the species is a challenging task due to issues such as pair

formation and parental care among others. In order to overcome these issues as well as to carry out mass scale seed production, the Navsari Gujarat Research Center of CIBA (NGRC-CIBA) has developed a **cage based mass spawning system** for pearlspace and an **RAS based Hatchery system (Incubation & larval rearing)** at its research farm in Matwad, Navsari, Gujarat.

### **Mass spawning of pearlspace in floating net cage installed in brackishwater pond**

Twenty four nos. (12 pairs) of pearlspace brooders comprising of both male (TL:  $20.5 \pm 0.201$  cm & BW:  $222 \pm 4.33$  g) and female fish (TL:  $18.57 \pm 0.44$  cm & BW:  $179.15 \pm 10.97$  g) were stocked in a floating cage ( $4 \times 4 \times 1.5$  m) at a sex ratio of 1:1. The cage was installed in a brackishwater earthen pond. The brooders were segregated on the basis of the secondary sexual characteristics. Female fish were identified using the protruded pinkish enlarged ovipositor whereas, male fish were recognized with the presence of the whitish pointed genital papilla. The brooders were fed using formulated pellet diet containing 32% crude protein and 5% lipid @ 5% of body weight daily in two equal feeding rations.

12 circular clay bowls (Egg collectors) were placed in the cage at an interval of 1 m distance from each other as a substrate for laying the eggs. These egg collectors were suspended in the cage using nylon twine and tied to the cage collar for easy observation and collection of eggs.

The number of egg collectors required depends on the number of breeding pairs released into the cage.

A total of 27 spawnings were recorded within a span of 3 months, with an average of 2 - 3 spawnings/week. The number of eggs layed in each spawning ranged from 600 to 1,600 numbers, with an average fecundity of 900 nos./ spawning. The eggs were oblong, heavily yolked, light

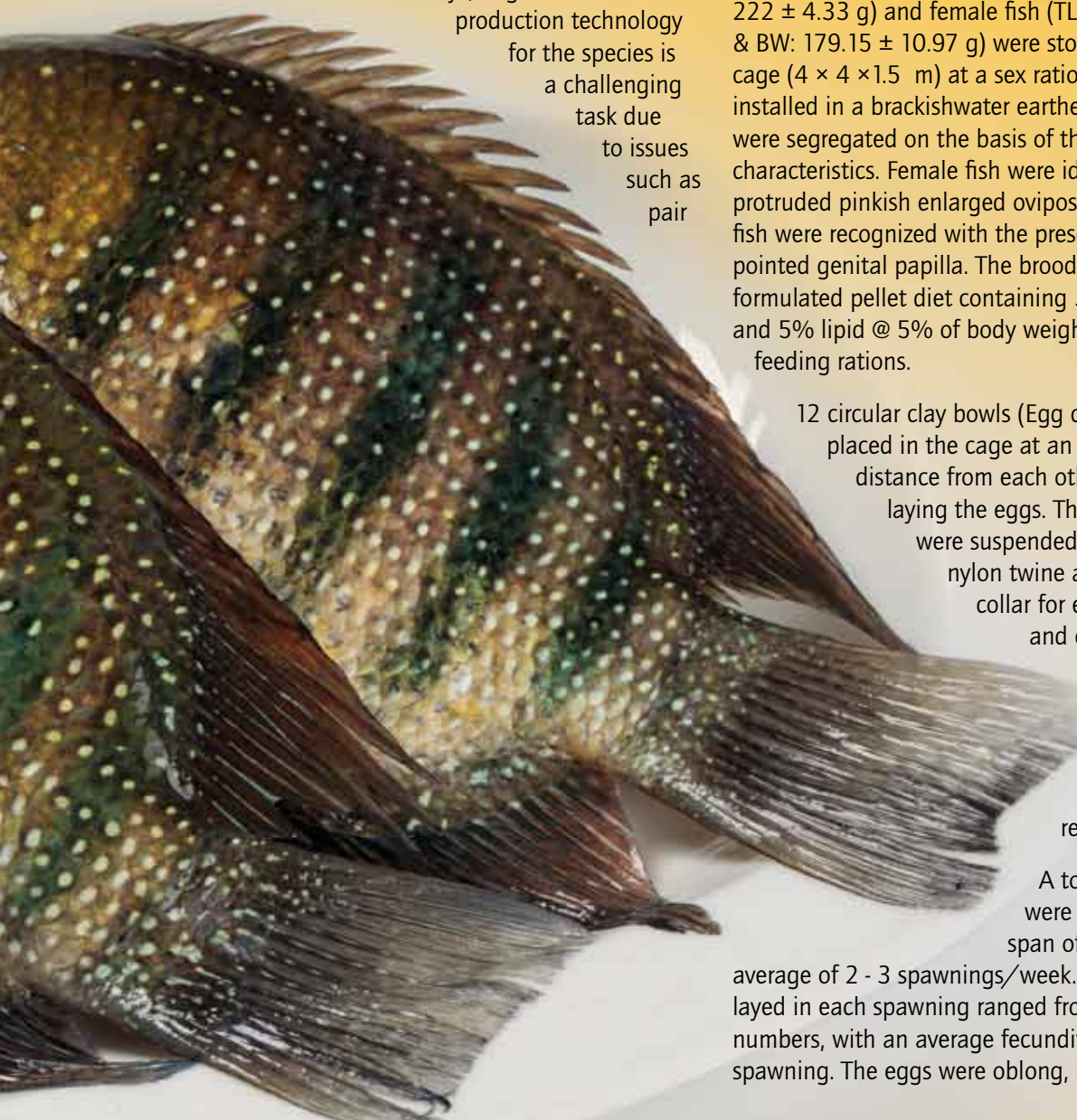






Fig 1. Pair of pearlspot brooders



Fig 3. Fertilized eggs attach to clay bowls

peach in colour and were adhesive in nature and attached to the substrate. Regular inspection of the egg collection bowls were carried out during morning and evening at 07:30 and 18:00 hours respectively, for presence of eggs. The physico-chemical parameters of the pond water during the spawning of pearlspot in the cage ranged as follows, temperature: 29 – 31°C, salinity: 9 – 17 ppt, Dissolved oxygen: 5 – 6 ppm and pH: 8.1 – 8.3.

### Collection of fertilized eggs, acclimatization and treatment

The egg collectors (substrate) along with the attached fertilized eggs were removed from the cage 24 hrs after spawning and washed repeatedly with clean seawater along with the substrate to remove any attached debris. As a prophylactic measure, the eggs were subjected to  $\text{KMnO}_4$  dip treatment at 10 ppm concentration for







Fig 4. Microscopic view of fertilized egg

30 seconds. They were then placed (along with the substrate) inside the incubation tanks for hatching. The substrate removed from the cage was replaced with another one and kept in the same position of the cage to facilitate further spawning and to avoid movement of brooders to another location/substrate.

## Incubation, hatching and larval rearing in RAS based indoor hatchery

The incubation cum larval rearing tanks are attached to a RAS system. A series of plastic tubs (LRTs of 70L cap) with inlet and outlet, were placed above a 2 tonne rectangular FRP tank with the support of a steel frame installed above the tank. A submersible power head (2,500 liter/hr) placed inside the 2 ton FRP tank (reservoir for collection of filtered water) circulated the water between tanks and the filtration devices (sand and biofilter). Vigorous aeration and mild flow rate of 1 L/min was maintained for incubation and hatching of eggs. The eggs hatched after an incubation period of 2 - 3 days depending on water temperature and egg stage. An average hatching rate of 90% was observed. After the completion of hatching, the substrate was removed and the hatchlings were reared in the LRTs for a period of 21 days.



Fig 2. Brackish water floating net cage installed in pond for spawning



Fig 5. Portable tub based RAS system for egg incubation and larval rearing of pearlspot



Fig 6. Beneficiaries with pearlspot fry



Fig 7. 21 day old pearlspot fry

## Larval rearing

The hatchlings of pearlspot measured approximately 5.5 mm in total length and were demersal in nature due to the presence of heavy yolk sac. The newly hatched larvae were maintained in the plastic tubs (LRTs) at a density of 15 nos./litre. The larvae were fed from the 3<sup>rd</sup> day onwards using freshly hatched *Artemia* nauplii at 5 nos./ml. By the 7<sup>th</sup> day post hatch, the stocking density of pearlspot larvae was reduced to 6 nos./litre (around 400 nos. in each tub). From the 10<sup>th</sup> day post hatching, larvae were fed twice a day using formulated larval feed (200 – 500 µ) and 3 times using freshly hatched *Artemia* nauplii. After 21 days post hatching, the larvae attained a size of 9 - 10 mm at a survival rate of 80%.

Around 12,000 early fry were obtained from 27 spawnings at the hatchery unit within three months. Pearlspot seed produced from this model were supplied to the beneficiaries under the scheduled caste sub plan (SCSP) scheme at regular intervals for demonstration of nursery rearing of pearlspot as a source of livelihood generation activity. It is estimated that around 9,000 no's early fry can be produced in a month using

12 - 15 pairs of brooders, at an average of 650 nos. fry per spawning. The peak breeding season suitable for pearlspot seed production is during the months of July to October. The investment required for setting up of 1 cage unit and a portable RAS incubation and larval rearing system for the production of 50,000 fry/annum costs INR 90,000.

## Nursery rearing of pearlspot in hapa based system

Nursery rearing is a very important step in aquaculture for the production of appropriate sized fingerlings. Nursery rearing of pearlspot can be carried out in ponds, tanks and net cages (hapa). However, nursery rearing in hapa is considered superior, as it is economical, easy to monitor and suitable for large scale production of fingerlings in 45 - 60 days of rearing.

Twenty one days old, early fry of pearlspot (0.9 - 1 cm) were stocked in hapas (2×1×1 m dimensions) installed in earthen ponds @ 500 nos./hapa. Early fry were fed 3 times daily using artificial larval diet at 15% of their total biomass. Early fry attained a size of 2.0 - 2.5 cm (fry) in 30 days of nursery rearing. Further, the fry were reared for another 30 - 45 days to attain the fingerling



Fig 8. Distribution of pearlspot seeds to beneficiaries



## AQUACULTURE PROBIOTICS EXPERT

*Nu Ri*  
NET 200 g **BSL**



✓ Probiotics  
for water treatment

### 1. WATER QUALITY CONDITIONING

Best choice of *Bacillus* spp. that rapidly decompose uneaten feed, feces and other organic substances in pond water, keeps water quality optimal



### 2. HIGH ACTIVITY OF SPORES

No cultivation is needed. Easily adapt to the changes of surroundings and grow fast in freshwater or seawater culture farming, even under low oxygen environment

Inhibit the growth of: *Vibrio* spp.



### 3. DECREASE AMMONIA CONTENT

Prevent the accumulation of toxic substances such as  $\text{NH}_3$ ,  $\text{NO}_2$ , etc.

### 4. IMPROVE WATER COLOR

Improve water color regulate the algae and bacteria balance in water, turning your pond from green to clear

### 5. ESTABLISH BALANCED POND BACTERIA SYSTEM

Compete nutrition with vibrio and inhibit them to grow. Provide nutrition for probiotics in the pond, to establish a well-balanced farming system.

### 6. INCREASE AQUACULTURE PRODUCTION

Good quality of water prevents fish/prawn infections, making high profit of production

### \* COMPOSITION:

*Bacillus* spp.  $> 1 \times 10^{11}$  cfu/kg

(*Bacillus subtilis*, *Bacillus amyloliquefaciens*, *Bacillus licheniformis*)

### UNI-PRESIDENT VIETNAM CO., LTD

No. 16-18-20, DT 743 Road, Song Than II Ind Zone,  
Di An Ward, Di An City, Binh Duong Province, Vietnam.

✉ aquafeed@upvn.com.vn

🌐 www.uni-president.com.vn

AQUA  
care



Control

SKRETTING  
a Nutreco company

Presenting **AquaCare Control**, a probiotic product from Skretting's water care portfolio.

**AquaCare Control's** formulation is designed to improve water quality, support growth and feed conversion ratio for fish and shrimp.

To know more contact us:  
+91 73047 95555



SKRETTING INDIA

Unit No. L4 04, SLN Terminus, Survey No. 133, Besides Botanical Gardens  
Gachibowli, Hyderabad - 500032, Telangana | [contact.india@skretting.com](mailto:contact.india@skretting.com)  
[www.skretting.in](http://www.skretting.in) | [Skretting-India](https://www.facebook.com/Skretting-India) | [Skretting India](https://www.linkedin.com/company/Skretting-India)



Connect with us





Fig 10. Pearlspot fingerlings



Fig 9. Nursery rearing of pearlspot in nylon hapas

size (4 - 4.5 cm). An average survival rate of 80% was obtained during the nursery rearing of early fry to fingerling stage. During nursery rearing, cleaning of hapas on regular basis is very much essential to avoid clogging and to facilitate water circulation for better growth and survival of the stocked fry.

A total of 10,000 pearlspot fry and fingerlings were produced at NGRC-CIBA farm with the involvement of SCSP beneficiaries (women Self Help Groups) during this period. Around, 8,000 pearlspot fingerlings (4.5 - 8 cm) were sold to local brackishwater fish farmers at INR 15/fingerling resulting in generation of revenue to the tune of INR 1,20,000 to the SCSP women beneficiaries.

### **Advantages of spawning in floating net cages and seed production of pearlspot in RAS system**

Pair formation is very easy in cage based breeding model of pearlspot, as it promotes natural selection of pairs within a community of brooders.

- Risk free maintenance of brooders in cages whereas other systems need expensive RAS system.

- Enhanced breeding frequency due to complete curtailment of parental care
- Complete control over egg incubation and larval rearing results in better fry production.
- Cages can be easily installed in any unutilized water body and establishment of a small RAS system exclusively for larval rearing requires low capital investment
- Mass scale seed production can be easily achieved from this model.
- Periphyton attached to the cage mesh forms additional nutrient rich feed for the brooders.

### **Conclusion**

The cage based pearlspot community breeding model carried out in this study has produced promising results towards continuous breeding and supply of fertilised eggs and larvae to hatchery units. The production of 10,000 fry within a period of 3 months from a very small experimental setup, is indicative of the immense scope for mass scale seed production of pearlspot in the region. A total of 50,000 fry/annum can be produced using 12-15 pairs of brooders stocking in floating net cages and subsequent seed production in RAS system. This technology can be propagated to other coastal states of India for mass scale seed production of pearlspot for the benefit of aquafarmers and self-help groups as a livelihood generation activity.





# Neospark

Performance Through Excellence

For Enhanced Metabolic Activity  
and Immunity in Shrimp and Fish

# MGS

**M**etabolic **G**rowth **S**timulator  
for use in  
**Aquaculture**

- Stimulate Metabolism
- Strengthen Immunity
- Recover after Diseases
- Increase Growth rate



"Do not contain antibiotics"  
"Do not contain hormones"

The goods delivered have  
the GMP+ status as specified  
in the GMP+ FSA module

\*Registered with CAA as Antibiotic-Free Product  
vide Registration No. CAA/JAN20/FA/03582

Quality



Service



Technology



Innovation

- Manufacturing Facilities for Aquaculture, Poultry and Large Animal Products as per GMP+, FAMIqs, EIC and ISO 9001:2015.
- Specially Qualified personnel for different product groups.
- Ability to provide customized solutions for different sectors.
- Globally extending over 25 countries.



mail@neospark.co.in

# Neospark

www.neospark.com

A GMP+ FSA, FAMIqs, ISO 9001:2015 and EIC Certified Company



# ADAPTIVE & MITIGATIVE STRATEGIES

## A CALL FOR CLIMATE ACTION IN AQUACULTURE

**Menaga Meenakshisundaram & Felix Sugantham**

Tamil Nadu Dr. J. J. Fisheries University

Corresponding author: [felixfisheries@gmail.com](mailto:felixfisheries@gmail.com)

### Abstract

Effective adaptation is required across all scales and sectors of fisheries and aquaculture in order to strengthen and maintain productive and resilient aquatic ecosystems. Dependence on capture fisheries for feed is a problem for aquaculture production owing to increasing uncertainty in the Eastern Boundary Upwelling Systems (EBUS) adds to pressure on capture fisheries and thus on already stressed ecosystems. Acidification impacts global shellfish and mussel production (shell construction, reproduction and life cycle). There is a definite need for more scientific data on implications of acidification for aquaculture production. Flooding and inundation are likely to affect aquaculture facilities in coastal areas. Aquaculture production of tilapia, carp and milkfish

in certain regions will probably benefit from expected climate change. A substantial global decline of global molluscan production from 2020 – 2060 onwards is predicted. Efforts to adapt to and mitigate climate change should be planned and implemented with full consideration of this complexity and how any new interventions will affect not only the immediate targets of the actions but the system as a whole. Failure to do this will increase the risks of inefficiency, failure of the actions, and of maladaptation.

### Introduction

Fish (including shellfish) provide essential nutrition for around 3 billion people and at least 50% of animal protein and minerals to 400 million people from the poorest countries. Over 500 million people

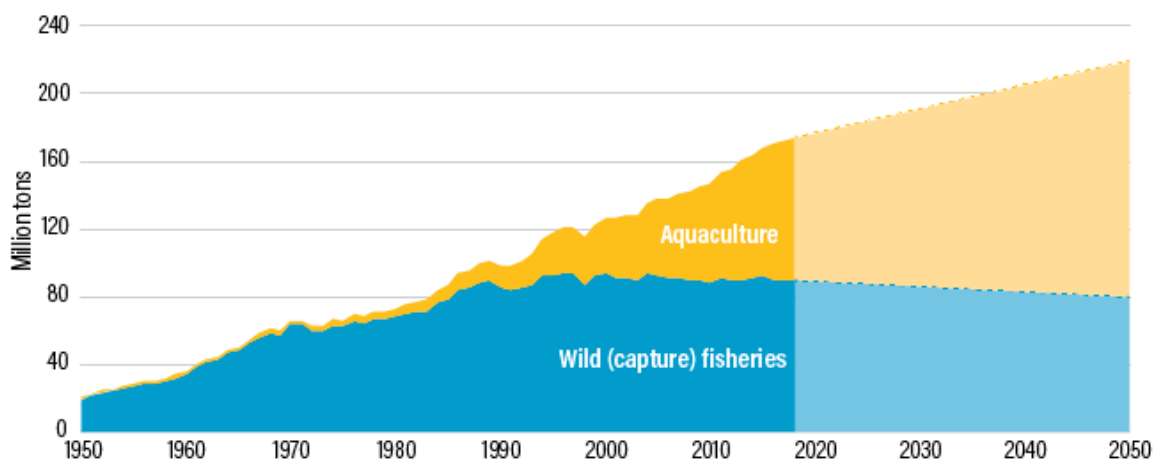
*Industrial Fisheries have a much higher total CO<sub>2</sub> emissions than small scale fisheries*

Element	Environmental Challenge	Reference
<b>Aquaculture</b>	Global aquaculture production will need to reach 140 million tons in 2050	Waite et al (2014)
<b>Capture Fisheries</b>	Global capture fisheries will likely be stable at 93 million tons by 2030	World Bank (2013)
<b>Land requirement</b>	Aquaculture will occupy 44 million ha of land in 2050	Waite et al (2014)
<b>Water demand</b>	Aquaculture will use 469 km <sup>3</sup> of freshwater in 2050	Mungkung et al (2014)
<b>Freshwater eutrophication</b>	Aquaculture related freshwater eutrophication will reach 0.89 million tons P eq. in 2050	Waite et al (2014)
<b>Marine eutrophication</b>	Aquaculture related marine eutrophication will reach 3.2 million tons N eq. in 2050	Mungkung et al (2014)
<b>Nutrient release</b>	Nutrient release from mariculture will increase upto sixfold by 2050	Bouwman et al (2013)
<b>Biotic depletion</b>	Demand for wild fish produce fishmeal and fish oil for aquafeeds will need 47 million tons in 2050	Waite et al (2014)
<b>Greenhouse gas (GHG) emissions</b>	Aquaculture related GHG emissions will reach 776 million tons CO <sub>2</sub> eq in 2050	Mungkung et al (2014)

Table-1 Predicted potential changes of fisheries and aquaculture production

in developing countries depend directly or indirectly on fisheries and aquaculture for their livelihoods. Aquaculture is the world's fastest growing food production system, growing at 7% annually. Fish products are among the most widely traded foods, with more than 37% [by volume] of world production being traded internationally. The warming of the climate has significant implications for the hydrological cycle. Changing precipitation, temperature and climatic patterns and the melting of snow and ice affect the

quantity, quality and seasonality of water resources, leading to inevitable changes in aquatic ecosystems. Climate change is already causing permafrost warming and thawing in high-latitude regions, and in high-elevation regions, it is driving glacier shrinkage, with consequences for downstream water resources. In the marine systems, the melting of the Arctic Sea ice has the potential to disrupt or slow down the global ocean conveyor belt. The potential changes of Fisheries and Aquaculture production is given in the Table.1



Aquaculture production will need to reach 140 million tons in 2050 (Source: World Resources Institute)



In 2012, the estimated global emission of carbon dioxide by fishing vessels, both marine and inland, was 172.3 mega tonnes, which was about 0.5 percent of total global emissions that year. The aquaculture industry, including the emissions involved in capturing fish for feed, was estimated by FAO in 2018 to have led to the emission of 385 mega tonnes of carbon dioxide in 2010.

## Carbon Footprints of Fisheries and Aquaculture Activities

### Fisheries operations

- Industrial fisheries have much greater total CO<sub>2</sub> emissions than small scale fisheries
- Fuel use is the sectors' major source of emission, estimated at around 3 tonnes of CO<sub>2</sub> for each tonne of fuel used.
- Management measures that encourage 'a race to fish' create incentives to increase engine power.

- Overfished stocks at lower densities and smaller individual sizes require vessels to exert more effort, thereby increasing fuel use per tonne of landings.

### Aquaculture production

- Most small-scale aquaculture production requires only small amounts of fertilizer, often organic and in some cases low energy supplementary feeds and therefore has a relatively small overall carbon footprint compared to most other animal husbandry practices.
- The organic feeding materials used in aquaculture ecosystems to accelerate primary production especially in tropical fishponds, can have significant effects on microbial processes, which in turn affect carbon biogeochemical processes that emit methane (CH<sub>3</sub>).



*Algae can be used as a sustainable option to produce fuel, oil and protein*



*Climate smart aquaculture involves greater reliance on energy from renewable sources*

- Some species and systems which are of high-quality food value such as shrimp, salmon and marine carnivores have high feed energy or system energy demands, and consequently have very high carbon footprints.

### Post-harvest practices

- As in all food production sectors, post-harvest activities entail packaging and transporting; these create post consumption waste, all linked with CO<sub>2</sub> emissions.
- Intercontinental airfreight may emit 8.5 kg CO<sub>2</sub> per kg of fish shipped, about 3.5 times the levels from sea freight, and more than 90 times those from the transport of fish consumed within 400 km of its source.

## Adaptive Measures in Aquaculture

There are also opportunities to reduce GHG emissions in aquaculture, which include improved technologies to increase efficiency in the use of inputs; greater reliance on energy from renewable sources and improving feed conversion rates; and switching from feed based on fish to feed made from crop-based ingredients that have lower carbon footprint. The integration of pond aquaculture with agriculture is also a potential option for reducing fuel consumption and emissions.

## Potential measures to reduce GHG emissions

### Production of feed materials

- Selecting feed ingredients with lower associated emissions (e.g., locally sourced oilseeds, which are much lower than fishmeal and fish oil sourced from capture fisheries)

### Feed mill energy use

- Improving management efficiency of feed mills
- Substituting high emission intensity fuels with low emission intensity alternatives

### Feed conversion rates

- Optimizing nutritional content of feed and its availability
- Improving feed management and storage conditions
- Increasing dissolved oxygen levels to increase feeding efficiency

### Fish health

- Improving water quality management
- Maintaining appropriate fish stocking densities
- Implementing effective biosecurity measures
- Using healthcare products judiciously

### On-farm N<sub>2</sub>O emissions

- Adhering to fertilization guidelines in pond aquaculture
- Improving feed management to reduce uneaten feed

## Adaptive and Mitigative Strategies

A list of climate change risks associated with the regions and its adaptation strategies are hereby listed as follows:

Risks	Climatic Drivers	Regions Exposed	Adaptation
Marine Biodiversity loss with high rate of climate change	Ocean acidification Warming Trend	Global Trend High in Low Latitude System	HA: Limited to the reduction of other stressors  NA: Hypoxia adapted lifeforms will benefit from expanding oxygen minimum zones Removal of invasive species to support recovery of the traditional flora and fauna needed for resilient ecosystems





# LARVIVA®

## COMPLETE HATCHERY AND NURSERY FEEDS FOR SHRIMP

All LARVIVA feeds contain Bactocell®, the only probiotic for shrimp approved by the European Commission, with documented effect on *Vibrio* prevention.

The LARVIVA feed range includes premium microencapsulated larval feeds for early feeding and co-feeding, extruded granulates for shrimp postlarvae, and extruded mini pellets for intensive hatchery and nursery systems.



### Devee Nutri International

Plot No. 81/10, Block D, 2nd Floor, Street No.1, Patrika Nagar,  
Madhapur, Hyderabad - 500081, Telangana, INDIA.

Tel No. : +91 -40-29554381 / 29554391

Email : deveenutriinc@gmail.com

[www.larvia.com](http://www.larvia.com)



# Only Grobest delivers Grobest quality and Grobest results



*The Grobest Difference.  
We provide the most advanced,  
effective and sustainable aquatic  
feed and nutrition solutions.*

*GroStronger GroFaster GroSustainably*

**GROBEST FEEDS CORPORATION (INDIA) PVT. LTD.**

25/1A&1B, Perambur Redhills High Road, Kathirvedu, Vinayagapuram, Chennai -600 099. TN, India

Phone: +91 44 25651813 / 75500 41414

• Email: [gb\\_india@grobest.com](mailto:gb_india@grobest.com)

• Web: <https://in.grobest.com>



Spatial redistribution of fish and invertebrate species in coastal areas and open ocean	Hypoxic zones Extreme temperature	Global trend	HA: Translocation of commercial fishing activities Expansion of sustainable aquaculture production techniques  NA: Evolutionary adaptation to changing environment is limited
High mortalities and loss of habitats for larger fauna	Hypoxic Zones	Subtropical gyres Semi enclosed seas	HA: Translocation of fishing fleets. Reduction of nutrients and pollution running off agriculture can help to stop the formation of HZ
Reduced growth and survival of shellfish	Ocean Acidification Warming Trend	Global trend with cold water being more reactive to CO <sub>2</sub> pH low in coastal areas	NA: Mussels in Baltic Sea appear to adapt to acidification as it increases energy expenditure to cope with chemical changes Red King crab reacted to elevated CO <sub>2</sub> emissions by increasing hatch durations, decreased egg yolk, increased larval size & decreased larval survival  HA: includes the exploitation of more resilient species and the reduction of human related stressors
Reduced biodiversity fisheries, abundance and coastal	Ocean acidification Warming trend	Coastal boundaries Eastern Boundary upwelling Ecosystems	NA: Migration, they would like to move at the speed of 10-20 km per year  HA: Reduction of other stressors E.g., Coral bleaching-can only be slowed down and not stopped assuming continuous CO <sub>2</sub> emissions
Coastal inundation and habitat loss	OA Changes in precipitation Sea level rise	Coastal Boundaries	HA: Reduce unsustainable aquaculture, pollution, fishing, tourism and Increase mangrove, seagrass, coral reef protection and re- saturation

Decrease of total fisheries catch potential & reduction of bodyweight of individual animals	Warming trend	Low Latitude regions	HA: Growth of aquaculture sector Marine spatial planning
Redistribution of catch potential of large pelagic highly migratory species (e.g., tuna)	Warming trend	Tropical Pacific	Adjustment of international fishing agreements and instruments
Increasing variability of small pelagic species	Ocean Acidification	Oceanic regions	Development of new management tools might have limited success to sustain yields Aquaculture is dependent on small pelagic species for feed. Increase the feed efficiency Farming of herbivorous finfishes Reduction of fish meal and fish oil usage
Decrease in catch and species diversity in coral reefs Increasing vulnerability of aquaculture systems	Ocean Acidification Warming trend	Tropical coral reefs Asia pacific Americas Africa	Colonization of corals would facilitate the culture of high value species like lobster Increasing feed efficiency Technological advancements Switching to high tolerant fish species which can thrive in acidification Integrated water use planning Insurance schemes for the small and medium scale farmers
Occurrence of mycotoxins in post-harvest sector	Temperature Salinity Precipitation	High and low latitude regions	Concrete implications are unclear with regard to mycotoxins, but could be addressed through controls of storage facilities
Negative effects on traditional food processing practices	Temperature Salinity Precipitation	Coastal boundaries	Minimal usage of resources and effective storage technologies to be implemented with less energy demand

(NA: Nature Adaptation; HA: Human Adaptation)





*Acidification of oceans can impact molluscan production*

## Knowledge Gaps in Fisheries and Aquaculture sectors related to Climate Change

The impacts to freshwater, brackish and marine aquaculture systems need to be separated as these systems will face different drivers of change and will thus require specific adaptation strategies suitable for different species and regions. More research is needed on how to sufficiently substitute aquaculture and mariculture feed derived from capture fisheries. The implications of increasing droughts and changing precipitation patterns on aquaculture production need to be further contextualized. More research is needed to understand individual shellfish and fish species ability to cope with chemical and physical changes in different farming systems. More concrete information is needed on the implications of climate change on the post-harvest sector.

## Adaptation options within fisheries and aquaculture

More information is needed to improve the understanding of social, economic and governance impacts and vulnerabilities specific to fisheries and aquaculture systems (coupled social ecological systems)

under climate change. A wider range of adaptation options need to be investigated within different contexts and their efficacy, vis a vis, acidification and climate change documented. Information is, in particular, required on prioritizing and financing proposed adaptation options within fisheries and aquaculture. More detailed information is needed on alternative livelihood strategies in regions predicted to experience a decline of capture fisheries or that become increasingly unsuitable for farming aquatic species. Accurate and specific information is needed on how the processing of aquatic products can be adapted to improve the resilience of livelihoods dependent on such products. Marine protected areas (MPAs) certainly contain a huge potential for maintaining and improving the resilience of aquatic systems. Further concrete information is needed on how to integrate the needs of communities directly and indirectly dependent on the aquatic resources when designing and implementing MPAs.

## What can we do now?

- Implement comprehensive and integrated ecosystem approaches to managing coasts and oceans, fisheries, aquaculture, disaster risk reduction and climate change adaptation.

- Move to environmentally-friendly and fuel-efficient fishing and aquaculture practices.
- Eliminate subsidies that promote overfishing and excess fishing capacity.
- Provide climate change education in schools and create greater awareness among all stakeholders.
- Undertake vulnerability and risk assessments at the 'local' level.
- Integrate and 'climate-proof' aquaculture with other sectors.
- Build 'local' ocean-climate models.
- Strengthen our knowledge of aquatic ecosystem dynamics and biogeochemical cycles such as ocean carbon and nitrogen cycles.
- Encourage sustainable environmentally-friendly biofuel production from algae (seaweed).

- Explore carbon sequestration by aquatic ecosystems.
- Fill critical gaps in knowledge to assess the vulnerability of aquatic ecosystems, fisheries and aquaculture to climate change.
- Strengthen human and institutional capacity to identify the risks of climate change to coastal communities and fishing industries, and implement adaptation and mitigation measures.
- Raise awareness that healthy and productive ecosystems, which arise from well managed fisheries and aquaculture, and careful use of catchments and coastal zones, are a cross-sectoral responsibility.

**Note:** The above article was written for the deliberation (Keynote address) in the Conference on 'Sustainable Ecosystems, Aquaculture, Fisheries and Fisherfolk' organised by the Dept of Aquatic Biology & Fisheries, University of Kerala, Thiruvananthapuram (28 - 29 January, 2022).



## ARUNACHALA AGENCY ARUNACHALA AQUATIICS

Royalcaviar, Biospheres, Vitellus, Artemia,  
MEM, Royaloyster, Royal Pepper Protein,  
Royalseafoods, MPEX Black, Bactosafe.



Stockist  
**BERNAQUA**

**P.P.PRABAKARAN**

Head - Marketing  
Ph: 044 48502080, Mob: +91 9445284090, 9440284090  
Email: arunachalaaqua@gmail.com

No. 374, 30th street, 6th sector, K.K.Nagar,  
Chennai- 600078, Tamil Nadu, India







nutrition through innovation

# Productivity

All **new** performance driven larval diet increases productivity adding superior value!



A nutrient-optimized larval diet for superior performance.

- Highly digestible and attractable ingredients to promote fast growth.
- Formulated and manufactured to maximize protein efficiency and water quality.
- Contains **Vpak** (Vitality Pak) to enhance animal health and disease resistance.
- Biosecure and certified free of shrimp pathogens.
- Does not contain terrestrial animal proteins.
- Nitrogen-preserved with tamper-resistant packaging for product security and stability.



Researched & tested at  
**Zeigler Aquaculture Research Center**

**DISTRIBUTOR:** Priyanka Enterprises  
+91-99-4964-0666 • [priyankanlr2000@yahoo.co.in](mailto:priyankanlr2000@yahoo.co.in)

**Zeigler Bros., Inc.**  
400 Gardners Station Road  
Gardners, PA 17324 USA

[www.zeiglerfeed.com](http://www.zeiglerfeed.com)  
[info@zeiglerfeed.com](mailto:info@zeiglerfeed.com)

717-677-6181  
717-677-6826 fax

**GLOBALG.A.P.**  
The Global Partnership for Safe and Sustainable Agriculture



Third Party Manufacturing from PVS

## Business Offer



For Traders, Marketers & Entrepreneurs in  
Aqua Health Care Industry

3 Decades of Excellence, Expertise & Experience

Largest Manufacturer  
in Aqua Healthcare

Modern &  
Automatic

DSIR approved  
R & D facilities

2.1 Lakh sq. ft  
production area

Well Established  
QC & QA Dept.



**PVS GROUP INDIA**

Corporate Office: Kohinoor Apartments, Kalanagar,  
Benz Circle, VIJAYAWADA-520 010, Andhra Pradesh, INDIA.  
E-mail: [support@pvsgroup.info](mailto:support@pvsgroup.info), Contact +91 866-2497449, 2476577

## Products

### PARASITICIDES:

Deltamethrin 1.25%, 1.75%, 2.80% & 12.5%  
Amitraz : 12.5% & 25%  
Cypermethrin 10%

### ANTIBIOTICS:

Enrofloxacin 50% & 80%  
Doxycycline 50 % & 80%  
Oxytetracycline 80%  
Neomycin 50% & 20%  
Ciprofloxacin 50%  
Trimethoprim 16 %  
Sulphamethoxazole 80%

- Probiotics & Combinations
- Minerals & Combinations
- Multi Vitamins
- Protein gel
- Immunity Booster
- DO improvers
- Ammonia Reducers
- Growth Promoters
- Feed binders & Gel
- Liver tonics

### WORMICIDES & FLUICKICIDES:

Albendazole 50% & 80%  
Fenbendazole 50% & 80%  
Praziquantel 80%  
Ivermectin 10%

- Plankton Developers
- Disinfectants (Iodine, BKC, Triple salt etc.)
- Zeolites
- EDTA & Combinations

## Other Services

- Label Designing
- Packaging Designing
- Company Logo Designing
- Product Catalogue Designing
- Product leaflets & posters
- Technical inputs
- Bulk Pack Supply
- Customized Brand Preparations

**Separate Production facilities as per cGMP standard  
For Probiotics, Feed supplements, Disinfectants & Antibiotics**





# Integrated aquaculture brings livelihood development and economic prosperity to a tribal farmer in Borigumma Block of Koraput District, Odisha, India: A Success Story

**B.C. Mohapatra\*<sup>1</sup>, J. Debbarma<sup>1</sup>, Prabhati K. Sahoo<sup>1</sup>, G.M. Siddaiah<sup>1</sup>, D. Majhi<sup>1</sup>, K.D. Mahapatra<sup>1</sup>, L. Panda<sup>1</sup> and P. Adhikari<sup>2</sup>**

<sup>1</sup> ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar - 751002, Odisha, India

<sup>2</sup> PRAGATI, Koraput, Odisha, India. \*Corresponding Author: [bcmohapatra65@gmail.com](mailto:bcmohapatra65@gmail.com)

**A**quaculture in most Asian countries is practiced in extensive, semi-intensive and intensive forms and is very crucial for employment and nutritional security of the rural and farming community. May it be a developed country or a developing country, food security is of utmost importance. The incorporation of aquaculture with agriculture, horticulture and animal husbandry has always shown fruitful results. The prominence of aquaculture will spread far and wide in the years to come. The aquaculture sector has taught management skills to farmers and an approach to sustainability. Poverty, hunger and malnutrition can be overcome by implementation of techniques related to aquaculture. Along with these benefits, aquaculture also enhances sustainable resource management. This study enumerates clearly, the path of a farmer

to enhanced livelihood and economic development through integrated aquaculture.

## Importance of aquaculture

The pros of implementing aquaculture are listed below:

- a) Food security:** With the application of aquaculture, the scarcity of food can be eradicated. Farmers can depend on their yield from farmland as well as the yield produced from water resources.
- b) Rural development:** Areas which are mostly in the outskirts and devoid of the newest technologies can easily adopt aquaculture, which helps the farmers to grow economically. If the farmers grow, the country also grows with them.

*Integrated Fish farming – An ideal option  
for small scale rural farmers*





*A view of Ganeshwar Nayak's pond in Dengaguda Village of Koraput District in Odisha*

**c) Boost of income:** A gradual and regular increase of income can be achieved by practicing aquaculture. The size of land available is never a barrier because aquaculture is possible in land of any extent.

**d) Improving nutrition:** Fish is a very important source of animal protein. It can be used as a very good alternative to meat from higher terrestrial organisms. It therefore can be an easy way out to eradicate malnutrition in several areas.

**e) Poverty mitigation:** With proper knowledge of aquaculture, people in rural areas can get themselves involved in various programs of the government and get an ample profit out of it.

### **Study area and farmer details**

Koraput District of Odisha State in India comprises of 2,042 villages, spread across 8,635 sq.km and has population of 13,79,647 (2011 Census). Around 14.25% of the population in this district belong to the Scheduled Caste and 50.56% to the Scheduled Tribe. This study narrates the success achieved in Integrated Aquaculture by a tribal farmer named Mr. Ganeshwar Nayak from Dengaguda Village of Borigumma Block, Koraput District in Odisha. Ganeshwar passed 10<sup>th</sup> standard from an Odia medium school and lives with his wife and two children, his father, mother and younger brother. His annual income from different





sources was around INR 30,000/- in 2019. He is a farmer by profession having 3.0 acres of agricultural land and a 1.0-acre pond (100 m x 40 m) constructed through Pradhan Mantri Matsya Sampada Yojana (PMMSY) in 2019.

### **Constraints faced by the farmer**

Farming is the most important vocation for the rural population in our country. However, the earnings from the small pieces of land owned by most farmers are sometimes not capable of feeding the whole family. Practicing agriculture alone couldn't suffice the farmer's needs. Therefore, to maintain a continuous flow of money and for prosperity, aquaculture is a preferable

profession and if aquaculture is integrated with agri-horticulture, it provides better production and higher income to the farmer.

### **Involvement and technical support**

Initially, Ganeshwar Nayak had very little information regarding aquaculture and the various financial benefits that one could derive from fish farming. The Tribal Sub-Plan Scheme (TSP) of the government, implemented by the Central Institute of Freshwater Aquaculture (ICAR-CIFA), Bhubaneswar, has opened new ways for the farmer. He was invited to awareness camps, training programmes and provided methodological support from the scientists. With the technical aid from the experts, enrolled himself into the government scheme. With the help of this motivation and both on farm and off farm technical support, Mr. Nayak could excel in integrated aquaculture activity.

### **Culture practice**

Previously, Nayak had absolutely no information on the 'how', 'what' and 'when' of aquaculture. His association with the scientists of ICAR-CIFA helped him gather valuable knowledge on pond water management practices in aquaculture, information on the number of fingerlings/yearlings that he should stock in his pond, fish feeding schedule as well as feed management. He had started his venture with less information, but with the help of experts, he gained valuable experience which helped him develop and improve his skills further. He could now plan the selling of his agricultural yield as per the market value. The information he got from ICAR-CIFA facilitated him to analyze the best he could do with fish farming. With proper guidance and fundamental knowledge, he scaled himself up. From doing fish farming on a small scale, Nayak can now handle it on a much wider scale.

In his 1.0-acre (100 m x 40 m) pond, Nayak stocked 2000 advanced IMC fingerlings. As a part of his integrated farming venture, he was also provided with pelleted fish feed, fertilizers, lime and horticultural crop saplings (Banana G9 variety 100 nos., papaya 50 nos. and moringa 25 nos.) in 2019. At the end of the first year of culture (2020), he harvested 950 kg of fish.

During the second year (starting at 2020), Nayak stocked 2500 nos. of advanced IMC fingerlings in





*Duck Shed on the pond bund*



*Ducks swimming in the fish pond*



his pond; along with it, he kept 250 ducks and the pond bunds were planted with banana, papaya and drumstick plants. At the end of the year (2021), he could harvest 1200 kg of IMC at a survival rate of 60%. It is calculated to be 3000 kg/ha/year carp production. The size of fishes during harvest was catla: 1000 - 1500 g (300 - 370 mm); mrigal: 600 - 1100 g (240 - 320 mm) and rohu: 750 - 1200 g (270 - 300 mm). The value at which the fishes were sold at his pond site and at local market was INR 170/kg.

The main factor under consideration is the survival of fish. The fish will survive only if the growth cycle is well taken care of. For proper growth, right type of food is very crucial. For the feeding of fish, Nayak was advised to use the pelleted feed @ 2.0% of body weight. Occasionally he used de-oiled rice bran (DOB) and groundnut oil cake (GOC) @ 1:1. The GOC was sometimes replaced to some extent by the mustard oil cake (MOC). Along with this he was also guided to maintain proper hygiene and water quality parameters of the pond.

Besides aquaculture he also had planted G9 variety of banana, papaya and drumsticks around the boundary

of his pond. He had around 100 banana plants, 50 papaya plants and 25 drumstick plants. He also has 3.0 acres of land where he grows paddy. From these 3.0 acres of agricultural land gets yield @ 18 - 20 quintal of paddy per acre. He could get Rs. 500/- from banana sale from a plant, 30 kg papaya per plant (sold @ Rs. 20/- per kg), 32 kg drumstick per plant (sold @ Rs 50/- per kg) and Rs 300/- from the sale of one duck.

### Integrated fish culture and economic benefits

Ganeshwar Nayak earns his livelihood through his paddy land (3.0 acres) and fish pond (1.0 acre). Before the adoption of integrated farming, he had zero knowledge on aquaculture, but following ICAR-CIFA's intervention, he acquired knowledge and experience on scientific fish culture techniques. Upon seeing the resources available with him, he was advised and encouraged to undertake integrated fish farming approach. As initial support, ICAR-CIFA provided fish seed (IMC advanced fingerlings), pelleted fish feed, saplings of G-9 variety banana, papaya and moringa. He further incorporated duck (Moti variety) rearing

*Ganeshwar Nayak with the author, Dr. B.C. Mohapatra, Principal Scientist ICAR-CIFA*





Partial harvest being done in the fish pond of Ganeshwar Nayak

Year	Operational Cost (Rs. Lakhs)		Total Operational Cost (Rs. Lakhs)	Income from Sales (Rs. Lakhs)		Total Income (Rs. Lakhs)	Net Profit (Rs. Lakhs)	B:C
	Fish Culture	Duck+Horticulture Crops + Duckery		Fish Culture	Duck+ Horticulture Crops + Duck Meat & Eggs (in Lakhs)			
1 <sup>st</sup> year	0.50	0.30	0.80	1.20	0.42	1.62	0.82	2.03
2 <sup>nd</sup> year	1.00	0.20	1.20	1.70	0.90	2.60	1.40	2.17

into his integrated fish farming to maximize his returns. Duck droppings were used as fertilizer to enhance nutrient availability to boost plankton production. Meat and eggs obtained from the ducks reared, served both for sale as well as personal household consumption. Apart from selling the fish to market, his family also consumes a portion of the farmed fish, taking care of his family's nutritional security. Additionally, he was able to generate a net profit of 0.82 lakhs in the first year by selling fish, duck eggs and horticulture produce. In the second year, he could reap the maximum benefit from his integrated fish farming as he was able to produce 1.2 tons of fish in his pond by following the scientific advice provided by ICAR-CIFA scientists. Participation in periodic training, workshops and field

demonstration organized by ICAR-CIFA, generated further interest and upscaled his scientific knowledge on fish culture. Overall, he managed to get a net profit of 1.40 lakhs in the second year from the integrated fish farming component.

Further, observing his keen interest in fish farming, ICAR-CIFA now plans to install a portable FRP hatchery of 1.0 million seed production per cycle capacity in his fish farm. Like Nayak, several tribal farmers need to be groomed and provided support to improve their socio-economic status. Govt. scheme like the TSP should be implemented in various parts of the country, where ST population prevail and are in need of socio-economic upliftment.



## Livelihood development

The success story of Ganeshwar Nayak has been made possible by ICAR-CIFA in collaboration with PRAGATI, Koraput. Nayak had never imagined that incorporating aquaculture into his agricultural practices would open up so many avenues for enhancing his livelihood. Only land is not enough for a successful farmer. Proper guidance helps a farmer to flourish in all spheres. Through Pradhan Mantri Matsya Sampada Yojana (PMMSY) Nayak could dig a 1.0-acre pond. He was then well guided by the scientific community on the best way to utilize his pond. He is now easily able to manage aquaculture and agriculture/ horticulture simultaneously. Along with employment, aquaculture helped the farmer to improve his social and economic status and also given him the confidence to achieve various things on his own.

## Covid-19 pandemic crisis mitigation

During the Covid-19 pandemic, when the rest of the economic activities ceased, the farmer focused more towards the aquaculture activity and this could safeguard his livelihood and his family needs.

## Acknowledgements

The authors sincerely acknowledge the financial support from the Tribal Sub-Plan Programme of Government of India operating at ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar, Odisha and the Director, ICAR-CIFA for providing facilities for the study. The authors also thank PRAGATI, Koraput for their local support.

## To subscribe Aquaculture Spectrum & Jala Sedhyam

please visit [www.aquaculturespectrum.com](http://www.aquaculturespectrum.com) or fill out our subscription form attached with the magazine and send it to us at;

### AQUACULTURE OUTLOOK,

Flat No. A3, Plot No.1, 3rd Floor, Nahar Mathura, Sri AadhiVaragha Puri,  
Thiruvadanthai, Kancheepuram District, Chennai-603112, Tamil Nadu

Please ensure that you intimate us on the payment made by SMS/WhatsApp to

**+91 93819 44445.**

To advertise, please mail us at  
[aquacultureoutlook@gmail.com](mailto:aquacultureoutlook@gmail.com)





The **BEST** You Can Get



\*L.Vannamei

**"Satisfaction is a Rating  
Loyalty is a Brand"**



**The Responsible  
Seafood Choice**

**"A Thankful Receiver  
Bears a Plentiful Harvest"**

**Corporate Office**

**GOLDEN MARINE HARVEST**  
Valathamman Koil Street  
Chettikuppam  
Marakkanam  
District : Villupuram  
Tamil Nadu, India

**GOLDEN WHITE PRAWNS**  
Valathamman Koil Street  
Chettikuppam  
Marakkanam  
District : Villupuram  
Tamil Nadu, India

**GOLDEN MARINE HARVEST**  
Thoduva Village, Kooliyar  
Thirumullaivasal  
District : Sirkazhi  
Tamil Nadu, India.

**GUJARAT GOLDEN MARINE**  
Survey N0- 312  
Velan - 362720  
District - Gir-Somnath  
Gujarat, India

Email : [info@goldenmarine.in](mailto:info@goldenmarine.in)

Website : [www.goldenmarine.in](http://www.goldenmarine.in)

Contact : +91 99944 35858



Golden-Marine-Harvest GMH



# TILAPIA LAKE VIRUS (TiLV)

## A SERIOUS CONCERN FOR THE GLOBAL TILAPIA INDUSTRY

**Soibam Ngasotter<sup>1</sup>\*, Soibam Khogen Singh<sup>1</sup>, Pradyut Biswas<sup>1</sup>, and Bhuneshwar<sup>2</sup>**

<sup>1</sup>College of Fisheries, Central Agricultural University (Imphal), Lembucherra-799210

<sup>2</sup>ICAR-Central Institute of Fisheries Education, Mumbai-400061

\*Corresponding author: [ngasotter@gmail.com](mailto:ngasotter@gmail.com) (Soibam Ngasotter)

### Introduction

Tilapia is currently the second most important group of farmed fish in aquaculture after carps. Global production is estimated at 6.4 million metric tons in 2015, with an estimated market value of US \$ 9.8 billion and increases annually (FAO 2017). Because of their high protein content, hardy nature, large

size, rapid growth, prolific breeding, tolerance to high stocking density, and palatability, several tilapia species, particularly *Oreochromis* sp., are being focused as a major aquaculture fish species. Tilapia lake virus (TiLV) or Tilapia tilapinevirus is an emerging infectious agent that affects both wild and farmed tilapia populations and threatens the global tilapia industry.

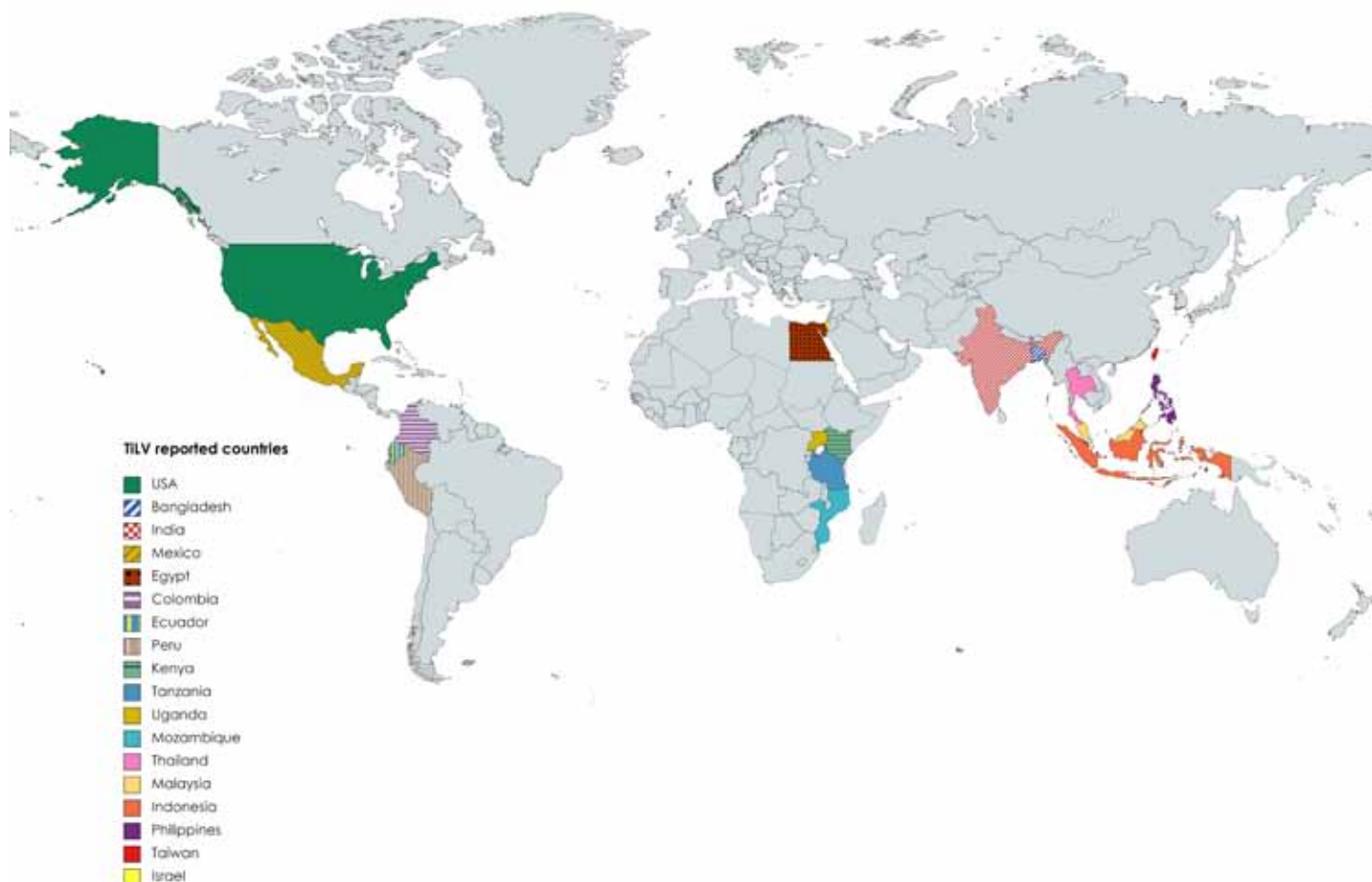


Fig. 1: World map indicating the geographical regions with reported TiLV cases (Credit: mapchart.net)

Credited with mapchart.net



Fig. 2: Nile tilapia (*Oreochromis niloticus*) susceptible to TiLV (Photo credit: Soibam Ngasotter)

The virus was first reported in 2014 when the Sea of Galilee (Kinneret Lake) in Israel experienced a major noticeable decline in tilapia catch quantities. So far, it has been reported in various regions across Asia, Africa, South America, and North America (Fig 1). The disease related to TiLV infection is currently known under three different names; Tilapia Lake virus disease (TiLVD), syncytial hepatitis of tilapia (SHT), and one-month mortality syndrome. It typically affects the fingerling and juvenile stages of tilapia and can cause mass mortalities up to 90 percent.

### Characteristics of TiLV

TiLV is a novel enveloped, negative-sense, single-stranded RNA virus with ten segments encoding ten proteins with a diameter between 55 to 100 nm. It belongs to Group V of the Baltimore classification system of viruses. The viral particles of TiLV are sensitive to organic solvents (ether and chloroform) because of their lipid membrane. The duration of survival of TiLV outside the host has not been determined; however, studies have demonstrated horizontal, waterborne



spread under experimental conditions. TiLV replicates and transcribes at the sites of pathology, in other words, the liver in samples with liver lesions and the central nervous system in samples with central nervous system lesions, as indicated by results from *in situ* hybridization (ISH).

### Susceptible host species (Tilapia)

Tilapines susceptible to TiLV includes wild tilapia (*Sarotherodon galilaeus*, *Oreochromis aureus*, and *Tristramellasisimonis intermedia*), farmed tilapia (*Oreochromis niloticus*) (Figure 2), and hybrid-tilapia (*O. niloticus* × *O. aureus*; *O. niloticus* × *O. mossambicus*). Other tilapia species in the genus *Oreochromis*, such as red tilapia and wild black tilapia, have also been reported to be affected. Studies have shown that other fish species co-cultivated with tilapia at the time of disease outbreak remained unaffected, thus, suggesting that only tilapines were susceptible to this pathogen. Other species may be vulnerable but is yet to be determined.

### Susceptible life stages

The fingerling and juvenile stages of tilapia are reported to be the most susceptible stages with high mortality rates. Approximately 90% of mortality in red tilapia fingerlings within one month of stocking has been reported. Medium to large-sized adult stages of

tilapia are also reported to be affected, but with lower mortality rates of just over 9 percent.

### Mode of transmission

Studies have reported TiLV can be transmitted through direct horizontal transmission by cohabitation or transfer of live aquatic animals. Until now, there is no evidence of vertical transmission. The biophysical properties of TiLV are not well characterized. Hence, the risk of indirect transmission of TiLV associated with animal products is difficult to determine. Still, research suggests that the eye, brain, and liver are likely to contain the highest concentrations of TiLV and, therefore, solid and liquid waste were likely to be contaminated.

### Clinical signs and symptoms

The clinical signs and symptoms associated with TiLV infection vary with the geographical location of the disease outbreak. Gross clinical signs include ocular alterations, including opacity of the lens and in advanced cases, ruptured lens, lethargy, skin erosion, discoloration (darkening), haemorrhages in the leptomeninges, and congestion of the spleen (Figure 3). Other signs and symptoms include exophthalmia, abdominal distension, scale protrusion, pale gills, ulcers, loss of appetite, abnormal behaviour, such as reduced schooling behaviour and swimming at the

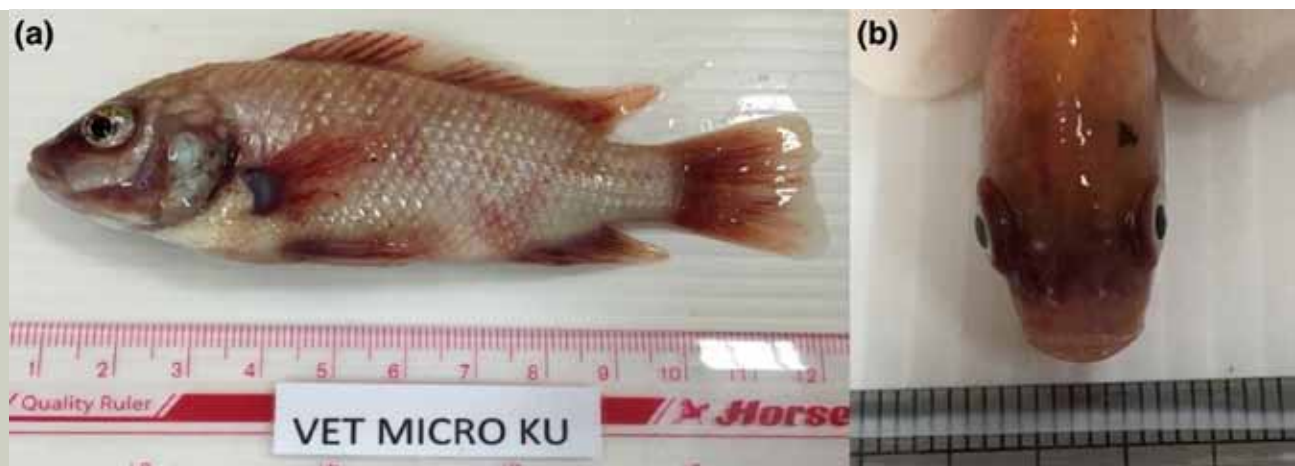


Fig. 3: Clinical signs and symptoms associated with TiLV infection (a) TiLV infected red hybrid tilapia showing skin haemorrhages and erosion, and scale protrusion, (b) TiLV infected red hybrid tilapia showing haemorrhages surrounding the eyes and nostrils. Reprinted from Surachetponget al. (2020), Copyright © 2020 John Wiley & Sons Ltd, with permission from John Wiley & Sons Ltd.

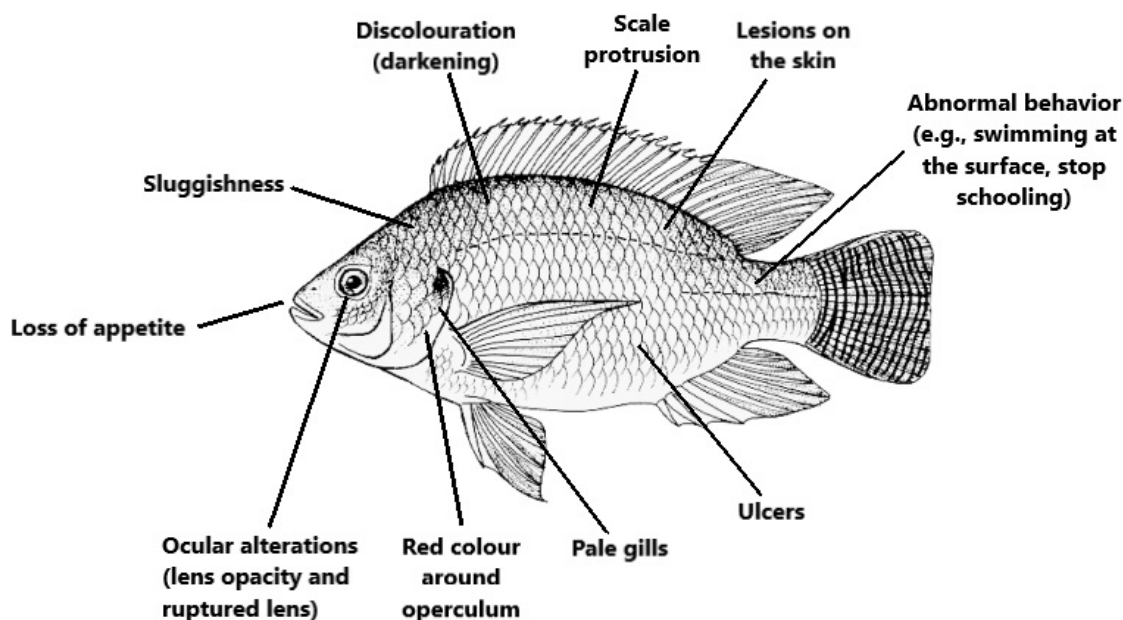


Fig. 4: Gross clinical signs and symptoms associated with TiLV infection

surface (Figure4). Additionally, brain congestion and paleness of the liver have been observed. The main organs primarily affected are eyes, brain, and liver. Although affected eyes can easily be observed as the lesions are macroscopic, lesions in the brain and liver are microscopic and thus requires histological examination for observation and confirmation.

## Diagnostic methods

The preliminary diagnostic methods to examine affected tilapines include observing gross clinical signs and symptoms, as stated above. High levels of mortality associated with ocular alterations (opacity of the lens or more severe pathology) should be considered suspicious of TiLV infection. Other signs, such as skin erosions, haemorrhages in the leptomeninges, and moderate congestion of the spleen and kidney may be observed post-mortem; however, these signs are only useful as a presumptive diagnosis, and a histological examination or molecular methods were required for further confirmation. Cell culture could be used as a

presumptive test method where TiLV could be cultured in various cell lines and then observed for cytopathic effects (CPE). Studies have shown multiple cell lines to be suitable for TiLV cell culture. Tilapia lake virus could be cultured in the E-11 cell line or primary tilapia brain cells, inducing a cytopathic effect (CPE) 3 - 10 days after inoculation. It was also reported that the E-11 cell line at 25°C provided optimal conditions for TiLV replication.

Several molecular methods based on Polymerase chain reaction (PCR), such as reverse transcriptase (RT) PCR have been developed, and PCR primers, specifically targeting TiLV genes, have been designed. A more sensitive, nested RT-PCR has also been developed, which is 10,000 times more sensitive than the single RT-PCR. Subsequently, a semi-nested RT-PCR method with improved analytical sensitivity (detection limit of 7.5 viral copies per reaction) has been developed and can detect TiLV from clinically healthy fish. Recently, a SYBR green-based reverse transcription-quantitative PCR (RT-qPCR) method with a reported sensitivity of two copies/ $\mu$ L has been developed. All the currently



---

available PCR methods have not been fully validated and, thus, should be combined with the sequencing of representative PCR products for agent confirmation.

## Control and prevention methods

TiLV can be prevented by following good sanitary and biosecurity practices. The movement of live tilapines from farms where the virus is known to occur would limit the spread of the disease. Standard measures, such as cleaning and disinfection should be followed to minimize spread via equipment, vehicles, or staff. At present, there is no effective protocol or medication to cure TiLV diseases in aquaculture, and, therefore, the importance of biosecurity measures needs to be promoted by competent authorities. It has been suggested that biosecurity measures combined with the breeding of fish for improved resistance or the development of a vaccine may offer long-term prospects for managing the disease. Other prevention methods include good management practices (GMP), such as rapid removal of moribund and dead fish together with the safe disposal of removed fish.

## Impact of TiLV on a global scale

The emergence and spread of TiLV have a global impact as tilapia is currently the second most important group of farmed fish worldwide after carps. In 2015, the People's Republic of China (1.78 MMT), Indonesia (1.12 MMT), and Egypt (0.88 MMT) were the top three tilapia producers. Other major producers are Bangladesh, Vietnam, and the Philippines. This industry is a major proprietor in China, Egypt, Thailand, Indonesia, Philippines, Laos, Colombia, Costa Rica, Honduras, and Ecuador, with the United States (US) as the lead importer. Tilapia are also ecologically important in some regions as they are beneficial in mosquito and algae control, and habitat maintenance for shrimp farming. They are also a crucial wild capture species. Thus, the global emergence of TiLV has caused significant commercial, economic, and ecological losses in the tilapia industry. For instance, in Egypt, the summer mortality syndrome in 2015 resulted in a production loss of 98,000 metric tonnes, valued at roughly USD 100 million. In Israel, the annual wild capture figures for the major edible fish, *Sarotherodon galilaeus* (mango tilapia) in the lake (Sea of Galilee) declined from 316 metric tons in 2005 to 8 metric tons

in 2009, before increasing to 160 metric tons in 2013 and 140 metric tonnes in 2014.

## Status of TiLV in India

The first reports of a TiLV disease outbreak in farmed Nile tilapia in India were from West Bengal and Kerala. The diseased fish showed lethargy, inappetence, and skin erosions, with a mortality rate of above 85%. In both states, TiLV outbreaks were observed during the month of July. Given that India's rainy season starts from June, it's reasonable to conclude that TiLV outbreaks in India are linked to seasonality. Another recent TiLV outbreak was reported from cage-farmed Nile tilapia in Maharashtra. The infected Nile tilapia were approximately 20 to 80 days old and showed clinical signs such as cutaneous haemorrhage, loss of scale, and fin and tail rot. Additionally, the infected fish was found to be co-infected with *Aeromonas* spp., particularly *A. veronii*. The collective effects of viral and bacterial infections may cause fast disease development and significant mortality rates. Therefore, during a viral infection, it's crucial to check for other opportunistic organisms.

## Conclusion

TiLV is a newly emerging, single-stranded RNA virus that affects both wild and farmed tilapia spp. with very high mortality rates of up to 90 percent and, thus, pose a severe threat to the global tilapia industry. Ever since it was first reported in 2014 in Israel, it has been reported from several other countries in Asia, Africa, and America. It mainly affects the fingerling and juvenile stages of tilapia, although adult stages are also reported to be affected. The main clinical signs and symptoms of TiLV infected tilapines are ocular alterations (lens opacity, ruptured lens, and bulging eyes), scale protrusions, lesions on the skin, ulcers, loss of appetite, sluggishness, pale gills, discoloration, and abnormal behaviours, such as swimming at the surface or reduced schooling behaviour. Currently, no protocol and medications are available to prevent or treat TiLV disease. Therefore, stress on tilapia farms should be minimized by following good sanitary and biosecurity practices. More research should be carried out to produce genetically improved tilapia with more resistance to TiLV and develop a vaccine that could offer long-term prospects for managing the disease.



# WATERBASE

# FEEDING GROWTH SINCE 1993

**Maximise your profits  
with Waterbase Feed**



## BayWhite Enriched

Balanced Shrimp Nutrition for Good Returns

- **Balanced Nutrition** - Highly palatable with marine specialty ingredients
- **HP Boost** - Boosts hepatopancreas function with functional ingredients
- **Healthy Gut** - Maintains healthy microflora in gut and limits Vibro Sp in gut

## VanaMax

Max Immunity, Max Nutrition & Max Growth for Max Profits

- **Advanced Nutrition** - Maximises shrimp growth with highly digestible & soluble marine proteins for efficient protein conversion
- **Amino Balance** - Right combination of protein sources with balanced amino acids for maximum nutrient absorption
- **OptiTrace** - Pack of vital trace minerals that enhance maximum nutrient absorption and provides natural immunity to the shrimps
- **HP Boost** - Boosts hepatopancreas function with functional ingredients
- **Healthy Gut** - Maintains healthy microflora in gut and limits Vibro Sp in gut





# ifEED®



DEEPAK NEXGEN FOODS AND FEEDS PVT. LTD.





Amerneni Ravi Kumar

# INFECTIOUS MYONECROSIS VIRUS (IMNV)

## AQUATIC HEALTH TIPS FROM AMERNENI RAVI KUMAR

**I**nfection with infectious myonecrosis virus (IMNV) means an infection with the pathogenic agent that is similar to members of the Family Totiviridae. This disease was first reported in *P. vannamei* in Americas in 2004 and then in Indonesia during 2007. In India, it was first reported in the year 2016. IMNV has impacted the sustainable growth of shrimp aquaculture in a few countries across the globe and caused severe economic losses to the farmers.

### Disease pattern

In early juvenile, juvenile, or adult *P. vannamei* in regions where infection with IMNV is enzootic, outbreaks of infection with IMNV is associated with sudden high mortalities that usually follows stressful events such as capture by cast-netting, feeding, sudden changes in water salinity or temperature, etc. Severely affected shrimp become moribund and mortalities can be high. Feed conversion ratios (FCR) of affected populations can increase from a normal value of ~1.5 upto 4.0 or higher.

*White tails seen in shrimp affected by infectious myonecrosis virus*







## Clinical signs

Affected shrimp present visibly white tails. Such shrimp may have been feeding just before the onset of stress and may have a full gut. They become moribund and quick and high mortalities can be recorded that continue for several days. Clinical signs may have a sudden onset following stresses (e.g., capture by cast-netting, feeding, and sudden changes in temperature or salinity).

## Behavioural changes

Only shrimp with acute-phase of disease present behavioural changes. Typically, severely affected shrimp become lethargic during or soon after stressful events such as capture by cast-netting, feeding, sudden changes in water temperature, sudden reductions in water salinity, etc.

## Gross pathology

Shrimp in the acute phase of disease present focal to extensive white necrotic areas in striated (skeletal) muscles, especially in the distal abdominal segments and tail fan, which can become necrotic and reddened in some individual shrimp. Exposing the paired lymphoid organs (LO) by simple dissection will show that they are hypertrophied (3 – 4 times their normal size).

## Diagnosis

- RT-PCR
- Lateral flow test strip

## Prevention

- By the selection of IMNV free seed
- Good biosecurity

## IMPORT OF SPF *L. VANNAMEI* TO INDIA DURING DECEMBER 2021 TO FEBRUARY 2022

S. NO	NAME OF THE HATCHERY	SUPPLIER	DATE OF RECEIPT	QUANTITY RECEIVED
<b>DECEMBER 2021</b>				
1	Shrimp Improvement Systems (India) Pvt. Ltd	SIS; Florida	01.12.21	300
2	Samudra Hatcheries Pvt. Ltd	SIS; Florida	01.12.21	672
3	Vaisakhi Bio-Resources Pvt. Ltd - Plant II	American Penaeid; Florida	01.12.21	1200
4	Raj Hatcheries Madras Pvt. Ltd	Sea Products; Texas	01.12.21	600
5	Sapthagiri Hatcheries	Kona Bay; Hawaii	02.12.21	1200
6	Vaisakhi Bio-Marine Pvt. Ltd - Unit IV	Kona Bay; Hawaii	02.12.21	1200
7	Sarada Marine Products	Kona Bay; Hawaii	02.12.21	1200
8	Star Aqua Hatchery	SIS; Florida	04.12.21	440
9	Amaze Shrimp Hatcheries	SIS; Florida	04.12.21	400
10	Krishna Godavari Aquatech Pvt. Ltd	SIS; Florida	04.12.21	600
11	KPR Hatchery	SIS; Florida	05.12.21	1000
12	Sri Chaithanya Hatchery	SIS; Florida	05.12.21	400
13	Sarada Hatcheries - Unit I	SIS; Florida	05.12.21	400
14	Sun Glow Marine	American Penaeid; Florida	07.12.21	400
15	BKMN Aqua	SIS; Florida	08.12.21	580
16	Sea Park Hatcheries Private Limited	SIS; Florida	08.12.21	600
17	Vaisakhi Bio-Marine Pvt. Ltd - Unit III	Benchmark Genetics; Florida	08.12.21	1200
18	Avanti Feeds - Unit I	SIS; Florida	11.12.21	1200
19	Hybrid Ebi Hatcheries Pvt. Ltd	Benchmark Genetics; Florida	11.12.21	1200
20	AR Shrimp Hatchery	SIS; Florida	12.12.21	600
21	Neeva Aero Solutions	SIS; Florida	12.12.21	800
22	Shirdi Sai Hatcheries	Kona Bay; Hawaii	13.12.21	600
23	Aquatic Farms Ltd	Kona Bay; Hawaii	13.12.21	600
24	Ananda Foods	Kona Bay; Hawaii	13.12.21	400
25	Sree Victory Shrimp Products Pvt. Ltd	Kona Bay; Hawaii	13.12.21	1200
26	Blue Star Marines	SIS; Florida	14.12.21	600
27	Sree Gayathri Hatchery	SIS; Florida	14.12.21	600
28	Vaishale Prawn Hatchery	SIS; Florida	15.12.21	600
29	NGR Aquatech Pvt. Ltd	SIS; Florida	15.12.21	600
30	BMR Marine products Pvt. Ltd - Vizag	Sea Products; Texas	16.12.21	1200
31	Golden Prawns Pvt. Ltd	Syaqua Americas Inc; Florida	16.12.21	600
32	CP Aquaculture (India) Pvt. Ltd - Mukkam	Kona Bay; Hawaii	17.12.21	600
33	CP Aquaculture (India) Pvt. Ltd - Prakasam	Kona Bay; Hawaii	17.12.21	600
34	Sai Aqua Hatcheries	Kona Bay; Hawaii	17.12.21	600
35	Makineedi Hatcheries	Kona Bay; Hawaii	17.12.21	1200
36	East Coast Hatcheries	SIS; Florida	18.12.21	580
37	Seven Staar Hatchery	SIS; Florida	18.12.21	800
38	Seven Staar Aqua Tech	SIS; Florida	18.12.21	800
39	Winner Marine Hatchery - Unit II	SIS; Florida	19.12.21	600
40	SS Hatcheries	American Penaeid; Florida	19.12.21	600
41	Sun Hatcheries	SIS; Florida	19.12.21	450
42	Alpha Hatchery - Unit II	SIS; Florida	19.12.21	400
43	CP Aquaculture (India) Pvt. Ltd - Bhogapuram	Kona Bay; Hawaii	20.12.21	600
44	KKR Aquatics	Kona Bay; Hawaii	20.12.21	600
45	Shree Kanak Matsya Hatcheries	Kona Bay; Hawaii	20.12.21	600
46	Sandhya Aqua Exports Pvt. Ltd	Sea Products; Texas	21.12.21	600
47	Empire Marine Harvest	SIS; Florida	22.12.21	580
48	Best India Marine Harvests	Syaqua Americas Inc; Florida	22.12.21	600
49	Devi Seafoods Ltd	Kona Bay; Hawaii	24.12.21	600
50	Jay Jay Aqua Tech	Kona Bay; Hawaii	24.12.21	600
51	Siri Hatchery	Kona Bay; Hawaii	24.12.21	600
52	East Coast Hatcheries	Kona Bay; Hawaii	24.12.21	400
53	Anjaneya Hatchery-PrakasamDist	Kona Bay; Hawaii	24.12.21	600
54	Golden White Prawns	Syaqua Americas Inc; Florida	24.12.21	1200
55	Aqua Star Shrimp Hatchery	SIS; Florida	25.12.21	400
56	Mahadeva Fish Tech Private Limited	SIS; Florida	25.12.21	800
57	Sheng Long Bio-Tech (India) Pvt. Ltd	SIS; Florida	29.12.21	960
58	Sai Aqua Hatcheries	Kona Bay; Hawaii	31.02.21	600
59	Sree Hanuman Hatcheries	Kona Bay; Hawaii	31.12.21	600
60	Best India Marine Harvests	Kona Bay; Hawaii	31.12.21	400
61	Prince Aqua Pvt. Ltd	Kona Bay; Hawaii	31.12.21	1200
62	Venture Shrimp Hatchery	SIS; Florida	31.12.21	450
<b>JANUARY 2022</b>				
63	Sree Vyshnavi Hatcheries	American Penaeid; Florida	08.01.22	600
64	Sankalpa Prawn Farms & Hatcheries	American Penaeid; Florida	08.01.22	600
65	Gayathri Hatcheries	SIS; Florida	08.01.22	1200
66	BSR Shrimp Hatchery	SIS; Hawaii	08.01.22	420
67	Neeva Aero Solutions	SIS; Hawaii	08.01.22	630
68	Samudra Hatcheries Pvt. Ltd	SIS; Florida	09.01.22	300
69	Sree Dattatreya Hatcheries	SIS; Florida	09.01.22	600
70	Sri Dhanalakshmi Hatcheries	Kona Bay; Hawaii	10.01.22	1200
71	Sri Manjunadha Hatcheries	Kona Bay; Hawaii	10.01.22	600
72	Apex Frozen Foods Ltd	Kona Bay; Hawaii	10.01.22	1200
73	The Waterbase Ltd	SIS; Florida	14.01.22	400
74	Sri Mahalakshmi Hatcheries - Vizag	SIS; Florida	15.01.22	600
75	BMR Industries Pvt. Ltd	SIS; Florida	15.01.22	1200
76	Sri Manjunadha Hatcheries	SIS; Florida	16.01.22	600



77	Rama Shrimp Hatchery	Syaqua Americas Inc; Florida	16.01.22	1100	102	Sandhya Aqua Exports Pvt. Ltd	SIS; Florida	04.02.22	600
78	BKMN Aqua	SIS; Florida	16.01.22	1200	103	Adithya Bio Resources	SIS; Florida	05.02.22	600
79	DSR Hatcheries	Kona Bay; Hawaii	18.01.22	600	104	Golden Marine Harvests	SIS; Florida	06.02.22	800
80	Vaisakhi Bio-Marine Pvt. Ltd - Unit III	SIS; Florida	18.01.22	1200	105	CP Aquaculture (India) Pvt. Ltd - Mukkam	Kona Bay; Hawaii	07.02.22	600
81	CP Aquaculture (INDIA) Private Limited - Gudur	Kona Bay; Hawaii	18.01.22	600	106	Sri Mahalakshmi Hatcheries - Nellore	Kona Bay; Hawaii	07.02.22	600
82	CP Aquaculture (India) Private Limited - Prakasam	Kona Bay; Hawaii	18.01.22	600	107	CP Aquaculture (India) Pvt. Ltd - Bhogapuram	Kona Bay; Hawaii	07.02.22	1200
83	CPF (India) Private Limited	Kona Bay; Hawaii	18.01.22	600	108	CP Aquaculture (India) Pvt. Ltd - Nellore	Kona Bay; Hawaii	07.02.22	600
84	Snehitha Hatcheries	Kona Bay; Hawaii	18.01.22	600	109	Golden Marine Harvests - Unit II	Benchmark Genetics; Florida	10.02.22	800
85	Royal Hatcheries	SIS; Florida	19.01.22	600	110	Tropical Shrimp Hatchery	Kona Bay; Hawaii	11.02.22	400
86	Anjaneya Marine Hatcheries	SIS; Florida	19.01.22	600	111	NSR Aqua farms Pvt. Ltd	Kona Bay; Hawaii	11.02.22	1200
87	Varun Shrimp Hatchery Private Limited	SIS; Florida	19.01.22	600	112	BMR Marine Products Pvt. Ltd - Unit II	Sea Products; Texas	11.02.22	1200
88	Alpha Hatchery	American Penaeid; Florida	20.01.22	400	113	Saivasista Hatcheries	Kona Bay; Hawaii	11.02.22	1000
89	Sun Glow Marine	SIS; Florida	21.01.22	400	114	Sai Marine Exports Pvt. Ltd	SIS; Florida	12.02.22	1200
90	CPF (India) Pvt. Ltd	PT Bibit Unggul; Indonesia	22.01.22	638	115	Sapthagiri Hatcheries	Kona Bay; Hawaii	14.02.22	1200
91	Sai Aqua Hatcheries	Benchmark Genetics; Florida	23.01.22	608	116	Venkata Sai Hatcheries	Kona Bay; Hawaii	14.02.22	1200
92	Sri Shirdi Sai Hatchery	Syaqua Americas Inc; Florida	23.01.22	600	117	Gayathri Hatcheries	SIS; Hawaii	15.02.22	1272
93	Vandayar Hatchery	Kona Bay; Hawaii	25.01.22	600	118	Sheng Long Bio-Tech (India) Pvt. Ltd	SIS; Florida	18.02.22	960
94	BMR Exports - Kancheepuram	Kona Bay; Hawaii	25.01.22	1200	119	Amaze Shrimp Hatcheries	SIS; Florida	19.02.22	400
95	SVR Hatcheries	Kona Bay; Hawaii	25.01.22	1200	120	Crystal Aqua Marine Hatcheries Pvt. Ltd	Kona Bay; Hawaii	21.02.22	600
96	Srinidhi Biotechnologies	SIS; Florida	27.01.22	1200	121	Crystal Aqua Marine Hatcheries Pvt. Ltd	Kona Bay; Hawaii	21.02.22	200
97	Lotus Sea Farms	SIS; Florida	27.01.22	420	122	BMR Shrimp Hatcheries	Kona Bay; Hawaii	21.02.22	1200
98	Ravi Hatcheries	SIS; Florida	30.01.22	600	123	Srinivasa Hatcheries	Kona Bay; Hawaii	21.02.22	900
<b>FEBRUARY 2022</b>					124	Tejaswi Sea Food Hatcheries	SIS; Florida	23.02.22	600
99	Meenakshi Hatcheries Pvt. Ltd	SIS; Hawaii	01.02.22	1000	125	KPR Hatchery	SIS; Florida	23.02.00	600
100	Vaisakhi Bio-Resources Pvt. Ltd	SIS; Hawaii	01.02.22	1000	126	Sarada Hatcheries - Unit I	SIS; Florida	23.02.22	600
101	Saran Saai Hatcheries	SIS; Florida	03.02.22	580	127	Sri Venkateswara Shrimp Hatcheries Pvt. Ltd	SIS; Florida	25.02.22	1200

Source: CAA Website, AQF-RGCA, MPEDA

## IMPORT DETAILS OF SPF *P. MONODON* CONSIGNMENTS QUARANTINED AT AQF (DECEMBER 2021 TO FEBRUARY 2022)

S. NO	NAME OF THE HATCHERY	SUPPLIER	DATE OF RECEIPT	QUANTITY RECEIVED
<b>DECEMBER 2021</b>				
1	Unibio (India) Hatcheries Pvt. Ltd	Aquaculture De La Mahajambal; Madagascar	15.12.21	978
<b>JANUARY 2022</b>				
2	Vaishnavi Aqua Tech	Moana Technologies LLC; Hawaii	08.01.21	1000
3	Vaishnavi Aqua Tech	Moana Technologies LLC; Hawaii	28.01.22	1296
<b>FEBRUARY 2022</b>				
NIL				

Source: CAA Website, AQF-RGCA, MPEDA



# Their health is your wealth.

## POWER UP AQUACULTURE HEALTH

Adisseo's aqua team works together with researchers and producers around the globe to develop an innovative range of health promoters and optimize their application under today's challenging production conditions. Based on natural ingredients, these specialty additives reduce the impact of diseases and parasites on the productivity of fish and shrimp. Powered by scientifically proven anti-bacterial and anti-parasitic activities, immune-modulators, hepato-protectors as well as novel modes of action such as Quorum Sensing Inhibition. Today, our aqua-specific product lines SANACORE®, APEX®, AQUASTIM® and BACTI-NIL®, are applied in premium brands of functional feeds for fish and shrimp.

Feed is much more than just nutrition.







**P. E. CHERAN**

103, SHREE APARTMENTS,  
6th CROSS,  
2nd MAIN ROAD,  
DAKSHANAMURTHY NAGAR,  
KADIRKAMAM,  
PONDICHERRY - 605 009  
pecheran28@gmail.com

# Shrimp Aquaculture

## - Industry Review

**T**he year 2022 is off to a very sedate start with seed stocking reported to being very slow. Foggy conditions during early part of the day and high temperatures later have resulted in high diurnal temperature variations leading to disease outbreaks in all farming areas, especially in Andhra Pradesh. Reduction in farm gate prices have also contributed to farmers being cautious and taking their time to go for seed stocking.

### Farm Front

In West Bengal, only around 5% of the farms have stocked their ponds while the rest are likely to stock during March-April. Majority of the farms are still under preparation and the farmers are waiting for the

salinity to increase. As of now salinities are around 10 - 15 ppt in the coastal areas and only around 5 - 7 ppt in the upper reaches, which is likely to increase gradually. Around 5 - 10% of the farms in West Bengal are expected to stock SPF monodon if they are able to obtain seed. Overall, farmers are not very enthusiastic about the crop this season as the cost of all inputs, land lease, labour cost have increased which would have a major impact on the cost of production. Availability of labour has also become a major issue for shrimp farms. Overall, only around 300 million seeds have been stocked this season, which is only around 30 - 40% of the quantity stocked during the corresponding period last year. Most experts feel that only about 50% of

*Shrimp farming has made a  
very sedate start in 2022*

---

the total farming area could be stocked this season due to shortage of funds. Farmers are also wary of the present situation in Europe (war between Ukraine and Russia) and feel that it could have an impact on market demand and prices in the months to come. The situation is more or less similar in Odisha as well and farmers are exploring the possibilities of obtaining funding and support for the forthcoming crop. Pumping is going on and the stocking will slowly commence.

With distress harvests on the rise, farm gate prices of *vannamei* in **Andhra Pradesh** decreased for all counts by Rs. 60 - Rs. 70/Kg. This also had an impact on seed stocking which was very slow during the month. Neither feed manufacturers nor health care product manufacturers are extending credits to dealers, who in turn are unable to provide stocks on credit to farmers owing to the resources crunch. Several farmers especially in south Andhra Pradesh have commenced pumping and waiting to stock SPF *monodon* seeds as *monodon* farmers were quite successful in the first crop of 2021. Several farmers in Guntur district were able to stock SPF *monodon* seeds during January and February this year. However, foggy weather and low temperatures have caused WSSV outbreaks in some of the farms. Inadequate water preparation has resulted in several ponds developing filamentous algae, adding to the problems.

While farmers in the northern parts of Ongole are waiting to stock *monodon*, several *vannamei* farms in Ethamukkala and Tanguturu have been affected by WSSV. Around 50 - 60 million seeds stocked during January and February in Utukuru area has

been affected by disease. Presently, most farmers are uninterested in stocking *vannamei*, but if they are unable to procure SPF *monodon* seed, they are likely to stock *vannamei* itself during March end to April. Experienced farmers who adopt GMPs are opting for lower stocking densities and procuring inputs on cash are able to achieve success and keep the cost of production in check. In and around Nellore, only 15 - 20 % farms have been stocked and the remaining are preparing their ponds to stock in March when farming situation is more favourable.

According to **Madhu Talluri**, Technical Director of SGS Aqua Solutions, Kakinada, seed stocking was extremely slow during February mainly due to widespread White Spot disease outbreaks especially in the West Godavari district of Andhra Pradesh. Premature harvests of ponds that were stocked during Nov-Dec 2021 (the peak stocking period in recent months) are being carried out now. Costs of all farm inputs such as probiotics and minerals have also escalated in recent times which increases the cost of production.

In the southern districts of Andhra Pradesh, and parts of **Tamil Nadu**, intermittent unseasonal rains were observed during the month. Most of the farmers stocking *vannamei* seeds are a confused lot as seeds from different lines of broodstock from various suppliers are being supplied under different nomenclature such as "Growth line", "Hardy line", "Speed", "Superior", "General" etc. Farmers would now be assessing the performance of these lines in the field as such an option is available only recently.

*Filamentous algae is seen in several monodon ponds that were prepared in a hurry to stock seeds during availability*







*Demand for Black Tiger shrimp seed is very high and stocking has commenced*

Farmers of **Gujarat** are waiting for SPF monodon seeds and have not started pumping water into their ponds yet. They hope that seed supply would be good in March. However, if that does not happen, they are likely to stock vannamei during April. Over all very less stocking by this year, when compared to last year's stocking. **SajiChacko**, CEO of Onaway Group, Gujarat, expressed a similar opinion and indicated that farmers are just about getting their ponds ready for stocking in March and a majority of the farmers are favouring the stocking of black tiger but are unable to due to limited seed supply.

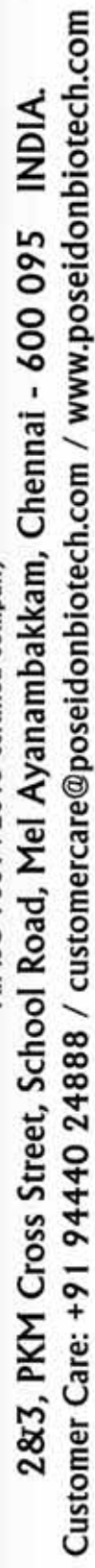
### **Hatchery Front**

Hatchery operators had a very disappointing February 2022 as the market demand for vannamei seed was the lowest when compared to the corresponding

month over the last several years. According to **Madhusudhan Reddy**, Director, Saranya group, Andhra Pradesh, while the production was good in the beginning of the month, the market demand turned out to be weak. Towards the end of the month however, several production issues were also seen in hatcheries both in the Andhra as well as the Tamil Nadu coast. Big hatchery groups were however able to market a large portion of the seeds produced, offering attractive bonuses as well as by extending credit.

Demand for Black tiger seed, however was extremely high especially in Gujarat and the Guntur district of Andhra Pradesh. Reports indicate that production issues have hampered production in one of the hatchery groups and several farmers are waiting for seed production to resume.







Now...Disease Diagnosis made simple, faster and accurate with

# POCKIT DUO

POCKIT™ Micro Duo is a hand-held PCR device for Farm / Hatchery use. Its sensitivity and specificity is equivalent to real-time PCR.



**Approval and  
Certifications**



**WORLD ORGANISATION FOR ANIMAL HEALTH**  
*Protecting animals. preserving our future*

**Drugs Controller General of India (DCGI)**  
**ISO 13485 and GMP**

**Manufactured by**

**GeneReach Biotechnology Corp.**

No. 1 Keyuan 2nd Road, Central Taiwan Science Park,  
Taichung City 407, Taiwan | [www.genereach.com](http://www.genereach.com)

**Distributed in India by**

**Padmanabha Labs Pvt. Ltd.,**

Plot No.18B, Kohinoor Complex, ECR, Vettuvankeni,  
Chennai 600 115, India

Email: [padmanabhalabs@gmail.com](mailto:padmanabhalabs@gmail.com)

# THE DEMURE DRIFTWOOD CATFISH

**F**ound mostly in South America, Driftwood catfish belong to the genus *Tympanopleura*. The name is derived from Greek, where Tympanon means drum; and pleura, meaning side or rib (pluron). For many years nominal species of *Tympanopleura* and *Ageneiosus* were treated together in a single family, the Ageneiosidae. **Read on for more.....**

*Tympanopleura* is distinguished from *Ageneiosus* by having an enlarged gas bladder not strongly encapsulated in bone; a prominent 'pseudo-tympanum' consisting of an area on the side of the body devoid of epaxial musculature where the gas bladder contacts the internal coelomic wall; short, blunt head without greatly elongated jaws; and smaller adult body size.

Six species, *T. nigricollis*, *T. cryptica*, *T. atronatus*, *T. brevis*, *T. rondoni*, and *T. longipinna* are now recognized, of which two are described as new. The latter four are relatively widespread in the middle and upper Amazon River basin. Species of *Tympanopleura* are distinguished from each other based on unique meristic, morphometric, and pigmentation differences.

The driftwood catfish  
*Tympanopleura cryptica*







***Tympanopleura atronasus***, is distinct from others in having the greatest number of pleural ribs. It differs from others by the following combination of characters: a large, dark patch of dense melanophores concentrated on the flank above the anal fin, longitudinal black to purplish stripe in each caudal-fin lobe, a broad, black crescent on the chin. It is distinguished from *T. cryptica* in having fewer gill rakers; *T. brevis* in having fewer anal-fin rays, fewer pectoral-fin rays, fewer gill rakers on the first arch and shorter distance between pectoral- and dorsal-fin origins; *T. longipinna* in having more preanal vertebrae and greater prepelvic length with a shorter anal-fin; *T. rondoni* in having more total vertebrae with shorter, non-recurved posterior diverticula on gas bladder and larger eye diameter and absence of prominent, irregular spots distributed extensively on the head and body.

***Tympanopleura cryptica***, found in the upper portion of the Amazon River basin in Peru and the middle portion of that basin in Brazil, was described scientifically only in 2015; before that the species was probably always confused with other species, hence the species name *cryptica*, which means "hidden,

concealed". The males of *T. cryptica* get a strongly extended back-fin during the reproductive time like all dolphin-catfish, that serves during the mating to press the female against the side of the male. The inner fertilization takes place on that occasion with a mating-organ, that is formed from the first five rays of the anal fin. Interestingly they have a very large nose pores, which at first made to think that the animals had bumped somewhere. They are strictly nocturnal and move during the day only when food is given. They are predatory, that can eat surprisingly large fish, so care must be taken while choosing the tankmates. However, they will also accept all usual frozen food.

### Pointers

- Spawning occurs between mid-to-late October and end of March
- Breeding of these species in the aquarium is not reported so far



**V K DEY**  
**23/2566, VELLETHARA**  
**PALLURUTHY,**  
**COCHIN - 682006**  
**vkdey06@gmail.com**

Dr. V K Dey, has over three decades of experience in diverse sectors of Seafood Industry in Asia-Pacific region. He joined MPEDA in 1979 and has been working in various capacities till 2000. He worked with INFOFISH from 2000 - 2008 as Coordinator, Consultancy Services and is currently attached with Bay Harvest International as their Senior Consultant. While working with INFOFISH, he was involved in several studies related to seafood processing, product development and marketing in the Asia Pacific region and beyond, including preparation of project report for setting up of Aqua-technology Park for Ornamental fish. He has to his credit several articles on Ornamental fish including a compilation of articles published as a book, "Living Jewels" by MPEDA.



**microbasia**

Plot No. 4/328, Sivapatham Street, Mel Ayanambakkam, Chennai - 600 095, INDIA. Customer Care: +91-9445211141 / [customercare@microbasia.com](mailto:customercare@microbasia.com)



# SANOMAX-AQ<sup>TM</sup>

A UNIQUE, POTENT AND ECOFRIENDLY SANITIZER

- ✓ FOOD GRADE SINGLE SALT PRODUCT
- ✓ POTENT AND FAST ACTING
- ✓ REDUCES BACTERIAL LOADS, SLIME AND MOULDS
- ✓ CAN BE USED IN ALL SEGMENTS OF AQUACULTURE INDUSTRY VIZ: HATCHERY, FARM & PROCESSING PLANT
- ✓ CAN BE USED DURING CULTURE
- ✓ UNIQUE MODE OF ACTION HENCE DOES NOT DEVELOP RESISTANCE
- ✓ EFFECTIVE UNDER VARIED ENVIRONMENTAL CONDITIONS



PROMISING THE END OF COMPROMISE  
IN SANITATION

Mfg By:



Imported & Mktd. By:



EXPERIENCE THE  
INDOMITABLE STRENGTH OF



BE SURE - BE SECURE



Enhancing Productivity



Ensuring Sustainability

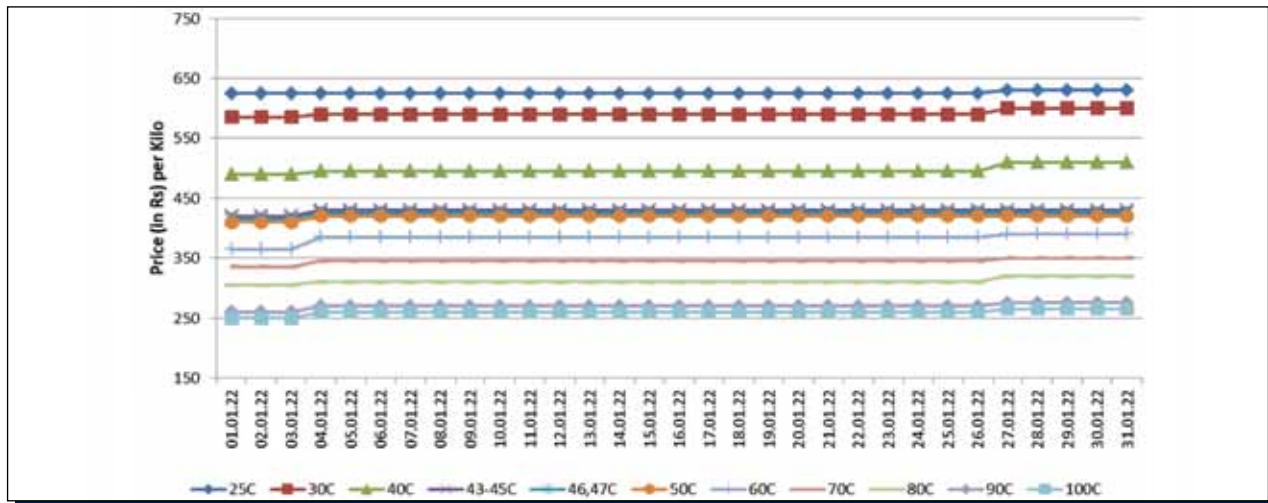
**INDIA'S #1 AQUACULTURE APP**  
**TRUSTED BY MORE THAN 75000 FARMERS**





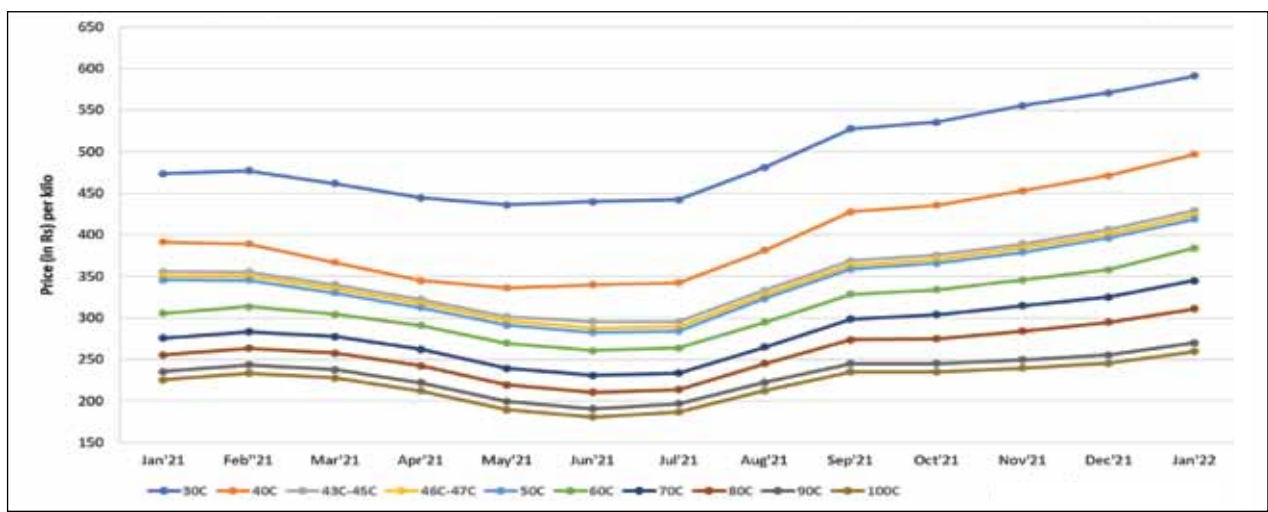
# AQUA BRAHMA SHRIMP PRICES

Daily trend in *P. vannamei* prices (January 2022) in Andhra Pradesh



● Where C denotes count/ kilo

Fluctuation in price (monthly mean values) of *P. vannamei* for a period of 1 year (January 2021 to January 2022)



● Where C denotes count/ kilo

● *L. vannamei* prices continued to rise for the seventh straight month during January 2022. Prices of 40C-60C registered the maximum increase of Rs. 25/- per kg over December 2021 prices, whereas the increase was by Rs. 20/- per Kg for 30C and 70C, by Rs. 15/- per Kg for 100C-80C respectively. This is the highest prices recorded in recent years for all counts.

● In comparison with the prices of January 2021, the monthly mean prices of 100C and 90C during January 2022 were higher by Rs. 35/- per Kg. However, the prices for the rest of the counts were considerably higher; by Rs. 55/- per Kg for 80C; by Rs. 75/- per Kg for 50C - 70C; by Rs. 105/- per Kg for 40C; and by Rs. 115/- per Kg for 30C.

● Like last month, good demand for shrimp in markets worldwide, combined with shortage of raw material locally continued to be the reason for high prices. With weather playing spoilsport, disease outbreaks are causing distress harvesting, mainly of smaller counts (100 - 60C). The same reason continues to cause poor demand for seed and slow stocking in Andhra Pradesh. Stocking is yet to commence in the rest of the country.

## MPEDA COMMISSIONS PHASE-IV OF THE AQUATIC QUARANTINE FACILITY



**T**he fourth phase of the Aquatic Quarantine Facility (AQF) built and operated by Rajiv Gandhi Centre for Aquaculture (RGCA), MPEDA and funded by the NFDB was commissioned by the Secretary, Department of Fisheries, Government of India, Shri Jatindra Nath Swain, IAS on 10<sup>th</sup> January 2022 at the TNFDC complex, Neelankarai in Chennai. The occasion was also graced by Additional Chief Secretary to Govt. of Tamil Nadu, Animal Husbandry, Dairying, Fisheries and Fishermen Welfare Department, Shri T.S. Jawahar IAS; Chief Executive, National Fisheries Development Board, Dr. C. Suvarna IFS and Chairman-MPEDA, President-RGCA, Shri. K.S. Srinivas, IAS. This phase will help the AQ facility to quarantine an additional 1.24 lakh brooders per annum. The total capacity of the facility is now around 5.36 Lakh brooders per annum.

## CIBA LAUNCHES PRODUCTS FOR CONTROL OF NITRITE IN SHRIMP PONDS AND EXTERNAL PARASITE IN FISH FARMS

**D**r. K.P. Jithendran, Director, ICAR – Central Institute of Brackishwater Aquaculture, in the presence of farmer representatives, industry professionals and scientists, commercially launched their technology products for mitigation of nitrite metabolite in shrimp ponds and control of external parasite in fish to M/s. Alpha Biologicals during the Agri Business meet held on 14<sup>th</sup> February 2022, Nellore, Andhra Pradesh. NOVACIDE-ALF, an Anti-Lice Formulation is an efficient oral preparation for control of crustacean parasites like

*Argulus* spp., *Caligus* spp., *Lernanthropsis* spp., and *Lernaea* spp., suitable for different fish species in varied culture systems such as aquarium, pond, cage, concrete tanks, FRP tanks as well as open water bodies such as lakes. It is effective in a wide range of salinities from 0 - 30 ppt. NOVATAN-AMS is an Autotrophic Microbial effective in mitigating nitrite from aquaculture systems and contains nitrite oxidizing bacteria that are efficient in oxidizing toxic metabolite nitrite to non-toxic nitrate.







- *High Quality SPF vannamei seeds*
- *CAA approved Shrimp Hatcheries*
- *Highly Biosecure Operations*

## **JAY JAY Group of Hatcheries**

Pondicherry

### **Our Hatcheries:**

- Calypso Aquatec – Marakkanam, 9443219819
- Jay Jay Aquatech – Anumanthai, 9894229202
- Jay Jay Gold – Panayur, 9443202245
- Blue Bay Culture – Azhakankuppa, 8903518624
- Jay Jay Marine – Nellore, 9701249884
- Pacific Shrimp Hatchery – Chetty Nagar, 9443285558

### **Our other Activities:**

- Hatchery Consultancy Services
- Hatchery and Farm inputs trading
- Shrimp Farming



*Dr. Jose Kutty P.A*



*Dr. Joshi K. Shankar*

## **Jay Jay Group of Companies**

Regd. Office: No. 13, Aziz Nagar, Reddiarpalayam, Pondicherry

Mob: 9894046172, 9894351122

Email: jayjayaquatech@gmail.com, Website: [www.jayjayaqua.in](http://www.jayjayaqua.in)

**PRAWN FEED**



**VANNAMEI FEED**



**BLACK TIGER SHRIMP FEED**



**BLACK TIGER SHRIMP FEED**



# Avanti

Feeds Limited

In the business of quality Prawn feed and Prawn Exports  
An ISO 9001:2015 Certified Company

## *Aiding sustainability & reliability to Aquaculture*



Shrimp Hatchery



Feed Plant - Gujarat



Prawn Feed & Fish Feed



Prawn Processing & Exports

### INNOVATIVE - SCIENTIFICALLY FORMULATED - PROVEN

- GREATER APPETITE • HEALTHY & FASTER GROWTH
- LOW FCR WITH HIGHER RETURNS • FRIENDLY WATER QUALITY

AVANT AQUA HEALTH CARE PRODUCTS

**AVANTI A.H.C.P. RANGE**

**AVANT PRO W**  
Soil & Water Probiotic

**AVANT BACT**  
Gut Probiotic

**AVANT IMMUPAK**  
Immune Modulator

**AVANT NURSERY PRO**  
Nursery & Larval Probiotic

**AVANT AMMONIA ABSORB**  
Gas Absorbent

**AVANT PRO PS**  
Sludge Digester

**AVANT SALDO MIXTOS**  
Marine Minerals

**AVANT MINER MATE**  
Chelated Trace Mineral Supplement

**AVANT D-FLOW**  
Water Quality Improver

**AVANT CATCHER**  
Sediment catcher

**AVANT HERGOZIN**  
Hepatopancreas Booster and Growth Promoter

**AVANT GEO TUFF**  
Pond bottom conditioner

**AVANT AQUADIS**  
Disinfectant

Corporate Office: **Avanti Feeds Limited**

G-2, Concord Apartments 6-3-658, Somajiguda, Hyderabad - 5000 082, India.  
Ph: 040-2331 0260 / 61 Fax: 040 - 2331 1604. Web: [www.avantifeeds.com](http://www.avantifeeds.com)

Regd. Office: **Avanti Feeds Limited.**

FLAT NO.103, GROUND FLOOR, R SQUARE, PANDURANGAPURAM, VISAKHAPATNAM - 530003, ANDHRA PRADESH, INDIA. PHONE NO.0891-2555011. E-MAIL ID : [avantiho@avantifeeds.com](mailto:avantiho@avantifeeds.com)



### UNION BUDGET 2022 CUTS IMPORT DUTY ON INPUTS TO BOOST SHRIMP CULTURE BUT CONFUSION PREVAILS

**F**inance Minister Nirmala Sitharaman, while presenting budget for the coming year on 1<sup>st</sup> February 2022, announced import duty cuts on certain inputs for shrimp aquaculture to promote its exports. Though the announcement looked good for the industry in general it seems that the concessions are only for a limited period, February 2 to May 1, 2022 creating confusion for the industry. According to sources in Marine Products Export Development Authority (MPEDA), the move is expected to bring down the production cost of aquaculture farmers who have been hit by rampant diseases in the farms, lower prices

for shrimps and Covid-19 related logistics problems. The 10% import duty on broodstock of Vannamei and Tiger shrimps and on artemia and import duty of 15% on frozen krill, squid and mussels used as feed in shrimp hatcheries, as well as the import duty of 5% on prawn feed used in the farms have been waived.

The budget has not addressed the issues of seafood industry like freight hike increases, shortage of containers and lower incentives under remission of duties and taxes on exported products (RoDTEP).

Source: <https://www.moneycontrol.com>

### MINISTRY OF FISHERIES LAUNCHES FISHERIES STARTUP GRAND CHALLENGE

**T**he Department of Fisheries, Government of India in association with Startup India, Ministry of Commerce and Industry inaugurated the "Fisheries Startup Grand Challenge" on 13<sup>th</sup> January 2022. The objective of this was to provide a platform to start-ups within the country to showcase their innovative solutions within the Fisheries and Aquaculture sector. Parshottam Rupala, Minister of Fisheries, Animal Husbandry and Dairying and Dr. L. Murugan, Minister of State, for Fisheries, Animal Husbandry and Dairying graced the event. The unrealized potential of the fisheries sector needed to be tapped by providing varied opportunities for bringing in scalable business solutions and maximizing the benefits for the fishermen and fish farmers. Technological breakthroughs are required for enhancing production, productivity and efficiency of the fisheries' value chain to realize the true potential of the fisheries sector.

While launching the Grand Challenge, the Hon'ble Minister, MoFAH&D stressed upon the enormous potential of the fisheries and aquaculture sector and its significance to the national economy. He urged the brilliant and enlightened young minds of India to use the Grand Challenge as a platform to showcase their solutions for resolving sectoral challenges. He also highlighted that the solutions should be devised for resolving issues across the fisheries value chain for increasing aquaculture productivity from the current national average of 3 tons to 5 tons per hectare, doubling exports earnings and reducing post-harvest losses from 25% to 10%.

"Fisheries Startup Challenge" will be live for 45 days for submission of applications on the Start-up India portal - [www.startupindia.gov.in](http://www.startupindia.gov.in).

Source: PIB

### DR. LEELA EDWIN TAKES CHARGE AS THE DIRECTOR OF ICAR-CIFT

**D**r. Leela Edwin, head of the fishing technology division of the Central Institute of Fishing Technology (CIFT), took charge as the acting director of CIFT on 4<sup>th</sup> February 2022. She succeeds Dr. Ravishankar C N, who assumed the new position of director and vice-chancellor at Central Institute of Fisheries Education (CIFE), Mumbai. Dr. Edwin has more than 200 scientific publications to her credit and has received advanced training in fishing gear designing from the Fisheries and Marine Institute (MI) of Memorial University, Newfoundland, Canada. She is an approved research guide of the faculty of Marine Sciences, CUSAT, and the Kerala university of Fisheries and Ocean Sciences.



Source: TOI

## CMFRI TURNS 75

**T**he Central Marine Fisheries Research Institute (CMFRI) established in 1947 turned 75 years on 3<sup>rd</sup> February 2022 and celebrates its platinum jubilee with a yearlong anniversary campaign. During the occasion, logo for the year-long celebration was unveiled, a theme song was released. The institute has played a pivotal role in stewarding India's marine fishery resources since its inception and has grown significantly in size and stature emerging as a leading tropical marine fisheries research hub in the world.

The chief guest, Dr. J. K. Jena, Deputy Director General of the ICAR Fisheries on the foundation day celebration urged the CMFRI scientists to prioritize their focus of research in accordance with the urgent need of the society and the nation. CMFRI Director, Dr. A. Gopalakrishnan, said that the institute broadened its objectives by diversifying towards potentially rewarding arenas such as mariculture, genetic and biotechnological applications and also added that keeping tab of the changes in the sector, research on climate change and bioprospecting will also be strengthened. For the future, CMFRI will focus on precision mariculture with the aid of smart tools and automation with Artificial Intelligence (AI). Apart from this, a number of emerging areas of importance include marine environment management, marine biodiversity research, marine spatial planning, species identification and description, marine pollution research, fish disease diagnosis and control, resource monitoring and assessment, socioeconomics and so on.







# Bhuvan Biologicals

Comprehensive solutions for Aquaculture

CAA  
REGISTERED  
PRODUCTS

**Bhuvan's  
pH-CARE**  
pH - REDUCER



**TRU ZINC**  
REMOVES MICROCYST



**Bhuvan's D-WHITE**  
GUT PROBIOTIC



**M/s. Bhuvan Biologicals**  
#3 - 92/6, Sri Dhairya Lakshmi Godowns,  
Main Road, Chavalipadu  
Kaikaluru - 521333  
Krishna Dist., Andhra Pradesh  
Phone # +91-8978146168, +91: 8125511199  
Email : bhuvanbiologicals@gmail.com  
www.bhuvanbiologicals.com



## AKER BIOMARINE GETS "BEST GLOBAL KRILL PRODUCTS SUPPLIER 2021" AWARD

**A**ker BioMarine, a biotech innovator responsible for building a global and sustainable industry for harvesting krill was rewarded for its dedication and hard work by being bestowed with the prestigious accolade of **"Best Global Krill Products Supplier 2021"** in the APAC Business Awards.

Dedicated to improving human and planetary health, Aker BioMarine develops krill-based ingredients for nutraceutical (Superba®, NKO® and K•REAL®), aquaculture (QRILL™ Aqua), and animal feed applications (QRILL™ Pet). The company also recently launched INVI™, a highly concentrated protein isolate, and the pharmaceutical application, LYSOVETA™, a targeted transporter of EPA and DHA from krill.

Aker BioMarine, a 15-year-old company, is part of the Aker Group, established in 1841. For more than 180 years, Aker has explored and innovated. The company has always been dedicated to nature's resources and along the way, it has pioneered industries with new ideas, methods and products. Aker built the first steamship in Norway, and the first hydropower turbine that gave Norway electricity. The company has become the leader in creating a sustainable future for the energy industry on land and below water, developing technical and digital solutions for every challenge.

Having been successfully present in the Indian Aquaculture segment since 2017, Aker BioMarine has seen very good growth in demand for Krill in shrimp aquaculture in India. Currently, it caters to more than 10 large and medium size customers on a regular basis, and these customers typically include a small percentage of krill to produce grower diets for enhancing shrimp growth and some of them also include krill in functional feed for better stress tolerance.

Indian Aqua feed millers are happy to reduce dependence on the fish meal due to sustainability concerns as well as issues related to the inconsistent quality, supply and price. With krill meal, that is not the case as it is a highly sustainable and traceable material with consistent quality and stable supplies and pricing.



Since day one, the team at Aker BioMarine believed in a world where everyone would have access to quality nutrition and good health without compromising the future of the planet. "We are 100% vertically integrated and our fully transparent value chain starts with sustainable krill harvesting in pristine Antarctic waters," explains Director and General Manager, Atul Barmann. "Our logistics hub team in Montevideo and our sales teams in India – and all over the globe – help ensure our ingredients make their way to customers around the world. We are explorers and pioneers, creators and builders, scientists and philanthropists, fishermen and sustainability enthusiasts."

For its customers, Aker BioMarine has sought to be more than just a supplier. Instead, it has positioned itself as a partner, who brings valuable insights, introduces new market opportunities, and guides its customers for growth and product expansion. By working in sync to co-create unique value, it is pushing the industry forward. "We find success by developing individual team members and building winning teams," Atul continues. "Within those teams, we make a major effort to designate clear areas of responsibility, empowering everyone down the line to ignite their entrepreneurial spirit and carve out their own paths to success. We also find value in leveraging the infrastructure we created in India to generate higher krill awareness in the market. It is imperative for us to utilize our global science and knowledge around krill to help find local solutions to our customers." For the last couple of years in the APAC region, Aker BioMarine has witnessed solid growth in the demand of its krill



products. Atul believes this growth is driven by loyal customers and increased demand from India, as well as the firm's strong focus on quality, sustainability and research, all of which have helped drive the demand. With the growing concern of global supply chain issues, vertical integration is an important part of the conversation. As a fully vertically integrated krill supplier, Aker BioMarine has full control of its supply chain, with complete oversight of its operations from catch to delivery. This has given the company a competitive edge during these challenging times.

Atul concludes, "We are committed to innovation, which has been with the company from day one. It also drives our future for tomorrow. We are more than a supplier to our customers. We challenge the status quo and think outside of the box. We take pride in not only understanding our customer's needs but working with them to find success. Customer centricity is at our core and our goal is to help our customers in India stand out in the marketplace by sharing our global product expertise and market insights."

Contact: Atul Barmann

Web Address: [www.akerbiomarine.com](http://www.akerbiomarine.com)

### CIBA COLLABORATES FOR A STARTUP PROGRAMME ON MUD CRAB SEED PRODUCTION

The Central Institute of Brackishwater Aquaculture and a farm diversification corporate business enterprise, M/s. Aggromalin Farmtech Service Pvt. Ltd., Chennai signed an MoU for a startup program in mud crab seed production and scaling up of mud crab farming with a supply chain on 7<sup>th</sup> February 2022. The MoU was signed by Dr. K.P. Jithendran, Director, CIBA and Mr. Prasanna Manoharan, CEO, Aggromalin Farmtech. Dr. Jithendran expressed that there is an urgent need for the transfer of mud crab nursery seed production technology to farmers to enhance production of Mud crab through aquaculture in India. Dr. C.P. Balasubramanian, Principal Scientist



explained the practical issues in popularizing mud crab aquaculture and stressed the need for the production of stockable crab seed.

### DEPARTMENT OF FISHERIES RAISES CONCERN ON THE USE OF ANTIBIOTICS IN AQUACULTURE

The Secretary, Ministry of Fisheries, Animal Husbandry and Dairying, Department of Fisheries, New Delhi in a letter addressed to the Chief Secretary of all States and UT's of India on 14 February 2022, raised his concern on the menace of continued use of antibiotics in the aquaculture despite issue of advisories against it from time to time and the need to take effective steps to counter it on urgent basis. The Secretary in his request has asked the Chief Secretaries to direct the concerned department to create awareness among the stake holders of aquaculture sector to completely stop use of the twenty antibiotics/pharmacologically active substances including chloroamphenicol and nitrofurans banned for use in

shrimp aquaculture as listed by Coastal Aquaculture Authority and to take step against the violators. In addition he has requested to personally review the matter and instruct the State Drug Controllers to take necessary action to strictly monitor and regulate the distribution of antibiotics for veterinary use and to ensure that they are sold on the prescription of registered veterinary practitioner, that sale of antibiotics in bulk quantities by the distributors and retailers for veterinary use to the feed manufacturers and aquaculture farmers is properly regulated and monitored and that the chemists and druggists association under their jurisdiction are appropriately sensitized.

# AQUATIC HEALTH CARE PRODUCTS



**Avanti**  
Feeds Limited

S  
R  
I  
N  
I  
V  
A  
S  
A  
C  
Y  
S  
T  
I  
N  
E  
P  
V  
T  
L  
T  
D

A  
S  
A  
N  
J  
E  
E  
V  
A  
G  
R  
O  
V  
E  
T  
P  
V  
T  
L  
T  
D



**AVANT PRO W**

Soil & Water Probiotic



**AVANT BACT**

Gut Probiotic



**AVANT NURSERY PRO**  
Nursery & Larval Probiotic



**AVANT IMMUPAK**

Immune Modulator



**AVANT AMMONIA ABSORB**

Gas Absorbent



**AVANT D-FLOW**

Water Quality Improver



**AVANT SALDO MIXTOS**

Marine Minerals



**AVANT MINER MATE**

Chelated Trace Mineral Supplement



**AVANT CATCHER**

Sediment catcher

**AHCP**



**AVANT HERCOSIN**

Hepatopancreas Booster and Growth Promoter



**AVANT PRO PS**

Sludge Digester



**AVANT GEO TUFF**

Pond bottom conditioner



**AVANT AQUADIS**

Disinfectant

*Aiding Sustainability and Reliability to Aquaculture*



# SCIENTIFICALLY FORMULATED AND COMPLETELY BALANCED NUTRITION FOR SHRIMP AND FISH



Grow with  
**Growel**



MANUFACTURED & MARKETING BY:

**GROWEL FEEDS PVT. LTD.**

R.S. No. 57 & 58, Chevuru Village, Sriharipuram Panchayat, Mudinepalli Mandal, Krishna  
District – 521329, Andhra Pradesh, India.

Landline: +91-8677-283435/761/781/791, Cell: +91-9912193322,

Email: [customercare@growelfeeds.com](mailto:customercare@growelfeeds.com) | [www.growelgroup.com](http://www.growelgroup.com)



## RIGHT TO PROTEIN WELCOMES SHALIMAR GROUP AS ITS LATEST SUPPORTER FOR 'SOY FED', INDIA'S FIRST-EVER FEED LABEL

*After Sneha Group in 2021, Shalimar Group supports the 'Soy Fed' label with its adoption in packaging material to help consumers identify high-quality protein foods.*

Following the launch of India's first feed label, 'Soy Fed,' by Right To Protein, a nationwide public health initiative last year, Shalimar Group, a pioneer in the poultry industry, has joined the league of adopters after Sneha Group. The voluntary label will feature on the company's Total Foods range of Tandoori Nuggets and will be gradually integrated into all their poultry products.

The 'Soy Fed' label was introduced during the National Nutrition Month 2021 with a two-fold objective rooted in empowering consumers to make informed choices and differentiate packaged poultry, meat, and fish fed with soy and to help the industry distinguish soy as a quality protein source for animal feed. Livestock, poultry, or fish that is fed with high-quality soy as its primary protein source is of a better quality as the superior amino acid profile and amino acid digestibility of soybean meal has a tremendous impact on their growth and development, thus benefiting the end consumer.

**Mr. Sameer Agarwal, Managing Director, Shalimar Corp** Ltd said, "As a pioneer enterprise engaging in a wide-ranging business of poultry feed milling and animal nutrition, providing our customers with the highest quality food choices has always been our top priority. We truly believe that the 'Soy Fed' label is going to be a key industry differentiator in aiding awareness about the nutritional benefits of Soy as an animal feed and how that positively impacts the consumer's health. With growing concerns and consciousness about well being, people today are relying on trusted brands like us for transparency and we feel this move will further reassure them of our commitment to their evolving needs."

"Protein undeniably is an important requirement not just for human consumption, but also for livestock and aquaculture. Soy feed plays a significant role in the growth and development of animals and helps



to define the quality of protein that is consumed by humans. With partners such as Shalimar Group and Sneha Group coming on board to adopt the voluntary feed label, we are progressing on our journey to raise awareness about the role of soy as a sustainable source of nutrition. This indeed is yet another step towards ushering in a positive change in the industry," stated **Jaison John, Lead - India, US Soybean Export Council (USSEC) and Right To Protein supporter.**

The 'Soy Fed' label is now in the process of reaching out to multiple brands in India for its voluntary inclusion on their packaged protein products – meat, poultry, and fish – and helping citizens learn that we are what our food is fed!

In addition, ahead of Protein Day 2022, Right to Protein, in its ongoing efforts to drive food and especially protein sufficiency in the country through awareness, advocacy, and action, has announced 'Food Futurism' as the theme for this year. This educational initiative will bring together nutrition experts, food scientists, biologists, and others to help Indians better understand the basic science behind healthy nutrition and its role in food security and protein sufficiency.



## About right to protein

Right To Protein is India's first awareness initiative to educate citizens about the importance of adequate protein consumption for better nutrition, health and wellbeing. #RightToProtein initiative aspires to build knowledge of different types of protein sources amongst Indians, especially plant protein, to meet larger nutritional goals. Right To Protein aims to develop an ecosystem of professionals to drive protein awareness and debunk myths and misconceptions about protein as a critical macro-nutrient for human health and of many protein foods sources. The ecosystem will aim to improve the production and consumption quality and consistency of both, plant and animal proteins. Right To Protein

is supported by several like-minded Indian and global individuals, academicians, professionals and institutions. The initiative is open for those who would like to join and/or contribute in any capacity, including providing knowledge, technical support or as promotion partners. For more information, visit [www.righttoprotein.com](http://www.righttoprotein.com)

Please reach out to:

**Devvrat More**

E: [devvrat.more@fleishman.com](mailto:devvrat.more@fleishman.com)

M: +91-9869062202

**Atrayee Choudhary**

E: [atrayee.choudhary@fleishman.com](mailto:atrayee.choudhary@fleishman.com)

M: +91-7506921463

## BLANKET OF DEAD FISH WASHES ASHORE ON CHILE BEACH

**T**housands of dead sardines and anchovies washed ashore on a Chilean beach off the coast of the Coliumo peninsula during February this year. According to the locals, the fish died due to low oxygen levels in deeper waters and have migrated closer to the shore in quest of oxygen. The environmental officials have taken the sample of water for analyzing to determine the cause of the incident.

Chile and Peru manage these stocks separately and both governments are interested in long-term conservation. Peru has two seasons per year in which to set fishing regulations based on effective monitoring using seasonal surveys that estimate abundance.

Additional oceanographic data is gathered as well. The seasonal fishing limit is allocated by the Peruvian fishery management agency (PRODUCE), but there is no defined harvest control rule in place. Chile, controls anchovy fishing populations using indirect stock evaluations that are cross-referenced with surveys. The Chilean fishing administration has well-defined reference points, and the quotas allocated aim to drive fisheries toward maximum sustainable yield (MSY), where a precise harvest management rule may be defined. Both countries keep an eye on the management of fisheries.

*Source: WION*





# SHRIMP IMPROVEMENT SYSTEMS

## Genetics for different Seasons

SIS designed a product viz.,  
Growth line and Hardy line for  
different seasonal conditions  
based on Indian environmental  
factors. Hardy line is suitable for  
summer season whereas  
Growth line is suitable for every  
season

We proudly announce that  
Shrimp Improvement Systems  
Hardy Line met our customer  
expectations by sustaining  
harsh summer conditions, fast  
growth, better survival with  
higher profits.



### SIS SUPERIOR Fastest Growth Line

Superior Growth, Fastest ever,  
Proven profitability.



### SIS Hardy Line

High adaption with the  
disadvantage conditions and  
diseases.



### SIS Growth Line

A combination of fast growth  
and high resistance to perform  
well for most common farm  
conditions.

### Contact

[siva@shrimpimprovement.com.sg](mailto:siva@shrimpimprovement.com.sg); +91 9618661155; [rushi@shrimpimprovement.com.sg](mailto:rushi@shrimpimprovement.com.sg); +91 9959382283

### Office Address

Shrimp Improvement Systems, 48-18-2, 2<sup>nd</sup> floor, Charan Square,  
Nagarjuna Nagar, Vijayawada- 520008.



# UPCOMING AQUACULTURE EVENTS



## 2<sup>nd</sup> EDITION OF WORLD AQUACULTURE AND FISHERIES CONFERENCE

Date: 18 - 19 May 2022

Location: Tokyo, Japan



## WORLD AQUACULTURE 2021

Date: 24 - 27 May 2022

Location: Mérida, Mexico



## AQUACULTURE CANADA AND WAS NORTH AMERICA 2021

Date: 15 - 18 Aug 2022

Location: St. John's Convention Centre, St. John's, Newfoundland, Canada



## AQUACULTURE EUROPE 2022

Date: 27 - 30 Sep 2022

Location: Rimini, Italy



## MUCOSAL HEALTH IN AQUACULTURE 2022

Date: 03 - 06 Oct 2022

Location: Madrid, Spain



## WORLD AQUACULTURE 2020

Date: 29 Nov - 02 Dec 2022

Location: Singapore

## To subscribe Aquaculture Spectrum & Jala Sedhyam

please visit [www.aquaculturespectrum.com](http://www.aquaculturespectrum.com) or fill out our subscription form attached with the magazine and send it to us at;

**AQUACULTURE OUTLOOK**, Flat No. A3, Plot No.1, 3rd Floor, Nahar Mathura,  
Sri AadhiVaragha Puri, Thiruvadanthai, Kancheepuram District, Chennai-603112, Tamil Nadu.

You can also pay through other given options by scanning the QR code below.  
Please ensure that you intimate us on the payment made by SMS/WhatsApp to

**+91 93819 44445.**

To advertise, please mail us at [aquacultureoutlook@gmail.com](mailto:aquacultureoutlook@gmail.com)



**AQUACULTURE OUTLOOK**<sup>TM</sup>

Publishers of Aquaculture Spectrum & Jala Sedhyam



Subscription Plan			
Version	1 Year (12 issues)	2 Years (12 issues)	3 Year (36 issues)
English	₹1800	₹3500	₹5000
Telugu	₹1800	₹3500	₹5000
Both	₹3500	₹6800	₹9700
Subscription Plan for Overseas Users			
Version	1 Year (12 issues)		
English	\$100		



accepted here

**AQUACULTURE OUTLOOK**  
+91 93819 44445



9381944445@okbizaxis



# AUQUA

## iFeeder



One and the Only Intelligent Autofeeder

- 🦞 Specially designed for vannamei farming
- 🦞 High accuracy
- 🦞 Lowest FCR
- 🦞 45 W power only
- 🦞 Battery backup
- 🦞 Simple operation and minimum maintenance



## POSEIDON ENTERPRISES

B 17, Navajivan Colony, Bilimora, Gujarat - 396 321 INDIA.  
Customer Care: +91 99798 73091 (Mr.Patil) / +91 98251 36102 (Mr.Saji Chacko)  
E-mail: ifeeder@poseidonaquatech.com





***Quality SHENG LONG, We Use LIFE LONG***

**Sheng Long, your professional and trusted Aquaculture partner.**  
**We provide the winning combination of High-quality**  
**Aquafeeds and Post larvae (SPF) along with technical assistance in all aspects for your success.**

Plot No.A-11 / 1 Part A, SIPCOT Industrial Park, Thervoy Kandigai, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu - 601 202.  
 Ph: 044 6790 1001, Fax: 044 6790 1017.  
 No.61, Vilambur Village, Panaiyur, Cheyyur Taluk, Kancheepuram Dist, Tamilnadu, India. Ph: 44 2752 6400

**info@shenglongindia.com**

**www.shenglongindia.com**



# VIVA®

a sustainable and profitable  
Innovative solution to shrimp farming.

## VIVA BGnill™

Only  
₹ 840 / Kg

( Included all Taxes )



Blue Green Algae is the root cause of many problems in Aquaculture ponds.....

- Controls toxic blue green algae in pond
- Promotes healthy plankton in water
- Prevents White gut and White fecal disease
- Biological control for shrimp/ fish ponds

**Dose: 3 Kg per Acre single dose only**



**BEFORE**



**AFTER**



**MAYANK**  
AQUA PRODUCTS

Distributed by :

**MAYANK AQUA PRODUCT**

F 17/18 First Floor, Raj Green Heights,  
Near Saroli Bridge, Jahangirpura,  
Rander Road, Surat - Gujarat - India  
☎ +91 99786 29265  
✉ maquapro@gmail.com

**MAYANK AQUA PRODUCT**

Shop No. : 2-16-4 Areti Nagar,  
Undi Road, Bhimavaram - 534202, AP  
☎ +91 9963911133  
TIN: 37299866750

[www.maplshrimp.com](http://www.maplshrimp.com)