English Monthly from Hyderabad, India

# Aqua International

Estd. 1993

Health • Nutrition • Technology • Management

November 2026

Annual Subscription: ₹800 Foreign USD 100

## Inside ...

Editorial:
Aquaculture farms across Andhra Pradesh suffered severe capital and crop losses following the landfall of very severe cyclonic Storm Arnab

Fluctuation in Environment and White Gut Syndrome affecting farmers interest in shrimp ...

Shrimp exports up 1% in July, top 80,000 tonnes mark


P. Jawahar assumes charge as Chairman, MPEDA

CMFRI initiative turns coastal women into successful fisheries entrepreneurs

Beyond the Pathogen: How Environment and Host Resilience Shape Disease Outcomes in Shrimp Farming

Smart Shrimp Health Management: From Reactive Treatments to Predictive Aquaculture

45th Edition
Aquaculture Expo 2026
Exhibition & Panel Discussion

7, 8 & 9 December 2026
SRMT Function Hall,
Kakinada, Andhra Pradesh, India

For stalls booking Contact:
Aqua International,
Hyderabad, India.
M: 96666 89554, 63010 47155
E: aquacultureexpo.nrs@gmail.com

Advanced Nutrition for
**Maximum Immunity**
**Maximum Growth, Maximum Profits**




VanaMax
Premium Quality Shrimp Feed

- **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

Corporate Office: **The Waterbase Limited**, Thapar House, 37 Montieth Road
Egmore, Chennai - 600 008. Tamil Nadu, India. Ph: +91 44 4566 1700, www.waterbaseindia.com




**Fish Oil vs. Algal Omega-3**

| | | | |
|---|---|---|---|
| Origin | Fish / Algae | Allergen-free | No / Yes |
| Toxins | Dioxins & PCBs possible / Free from such toxins | Heavy Metals | Risk of Mercury (Hg), Cadmium (Cd), Lead (Pb) & Arsenic (As) / Free from heavy metals |
| Oxidation | Highly prone / Protected from oxidation | Palatability | Strong Unpleasant odor / Natural algal odor that improves palatability |
| Steroids / antibiotics | Possible contamination / Nil | Quality of Feed | Variable, batch-dependent / Consistent, Standardized |
| Sustainability | Not sustainable / Highly sustainable | | |




Scan to explore the range

**OUR OTHER AQUACULTURE FEED SUPPLEMENTS**




| Spiromax-PS | Spiromax-DR | Vital Omega3 | Vita C | Binder X |
|---|---|---|---|---|
| Growth & yield booster | Disease-resistance enhancer | Growth & immunity support | Stress & immunity support | Natural feed binder |

CAA Certified | FSSC 22000 (V6) | Antibiotic-Free | Non-Marine

+91 94898 47425 | +91 88701 64876 | salesanpl@camlinfs.com | www.algalr.com

HIMEDIA®
For Life is Precious

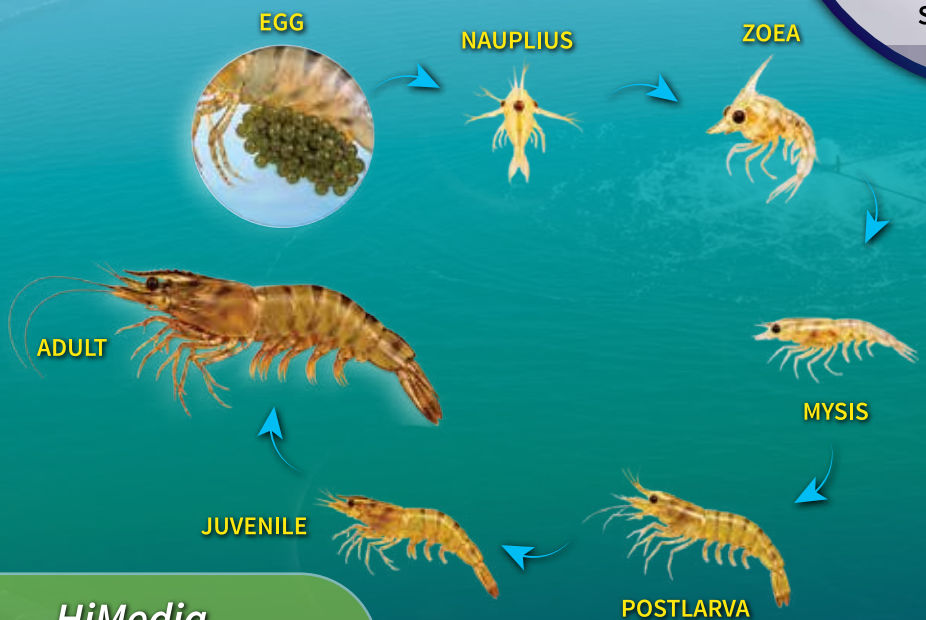
MiCroBiology®
Understanding Microbes

# Trap the Vibrios and Count

## HiVibri-O-Trap Kit (K156)

**Ensure perfect diagnosis to support the healthy growth of your prawns**







*HiMedia Aims for Healthy Aquafarming*

**HiVibri-O-Trap Kit K156 Salient Features :**

- A complete and ready to use kit to count Vibrio's in the aquafarming
- Easy to use for even nonskilled staff
- The medium supports diverse species of Vibrio
- Chromogenic technology imparts powerful differentiation ability
- Safe and easy for disposal of the used kit

www.himedialabs.com

ISO 9001-2015 CERTIFIED ISO 13485-2016 CERTIFIED WHO GMP CERTIFIED CE

• • • expect only quality from us™

info@himedialabs.com +91-22-6147 1919

**Range of HiMedia Products**

| MICROBIOLOGY | CELL BIOLOGY | MOLECULAR BIOLOGY | PLANT TISSUE CULTURE | CHEMICALS & BIOCHEMICALS | LAB CONSUMABLES & INSTRUMENTS | HYDROPONICS SOILLESS FARMING |
|---|---|---|---|---|---|---|

Copyright © 2026 - HiMedia Laboratories Pvt. Ltd. All rights reserved.

Deepak NEXGEN™
Nutrition Empowered

AFT
Aqua-Food Technologies, Inc.
USA

iFEED™
THE TRUE VANNAMEI FEED

CERTIFIED ISO 9001:2008 COMPANY
Q-02140822

DEEPAK NEXGEN FOODS & FEEDS PVT. LTD.
Factory: #53/1, Koyyur Road, Bommuluru, Krishna Dist. - 521 105,
Ph: 08656 - 203399 | ifeed@nexgenfeeds.in | www.nexgenfeeds.in

# POSEIDON BIOTECH®

AN ISO 9001 -2015 Certified Company

POSEIDON 30 YEARS

living and growing with nature

## EHP-SOLV

Natural Bioactive Extracts for EHP control
Aquatic feed supplement
CAA/NOV2025/FA/09345

EHP SOLV is an advanced bio-innovative combination of natural bioactive extracts to effectively suppress the growth of *Enterocytozoon hepatopenaei* (EHP).

- Controls EHP infection by inhibiting spore formation
- Reduces EHP-related stress and internal tissue damage
- Enhances digestive enzyme activity and feed absorption




## Perfect Prawn

Protection for shrimp by restoring gut health naturally and gradually
Aquatic feed supplement

Perfect Prawn is a complete formula that protects and strengthens the hepatopancreas and Gut by combining probiotics, enzymes, immune boosters, prebiotics, and bioactive nutrients.

- Improves digestion and increases feed absorption
- Strengthens shrimp immunity to fight Vibrio, EHP, white feces, white gut, and loose gut problems.
- Reduces gut inflammation and supports healthy microbiome balance







## Soil Marine Tab

Next-Gen Probiotic Tablet Formulations
Aquatic feed supplement
CAA/APRIL2025/PRO/07805

Our advanced formulation, superior strain selection, and fast release technology Tablet make this product the best choice for use in shrimp culture ponds.

- Reduces ammonia and nitrite levels instantly
- Breaks down sludge, improving pond cleanliness
- Minimizes foul odors and unwanted organic buildup

## OXY MARINE

Sustained Release of Oxygen for Aquaculture
CAA/APRIL2025/CHEM/07803

Oxy Marine tablets slowly release oxygen in pond water and maintain optimum DO levels, helping prevent low-oxygen stress, especially during night time.

- Rapidly release oxygen to boost pond water quality
- Prevents mass mortality by enhancing oxygen availability
- Relieves stress in shrimp, promoting healthier growth.







## BLUE YEAST

Natural growth enhancer – Inactive dried Yeast (*Saccharomyces cerevisiae*)
Aquatic feed supplement

BLUE YEAST are high-quality microbial byproduct derived from the controlled fermentation of *Saccharomyces cerevisiae*.

- Provides essential proteins and vitamins for balanced nutrition
- Natural β-glucans and mannan oligosaccharides help to strengthen the immune system.
- Promotes faster growth and better feed utilization.

Manufactured & Marketed by:

**POSEIDON BIOTECH®**

#2 & 3, PKM Cross Street, School Road, Melayanambakkam, Chennai - 600 095

Customer care : +91 94440 24888, Email: customercare@poseidonbiotech.com

www.poseidonbiotech.com

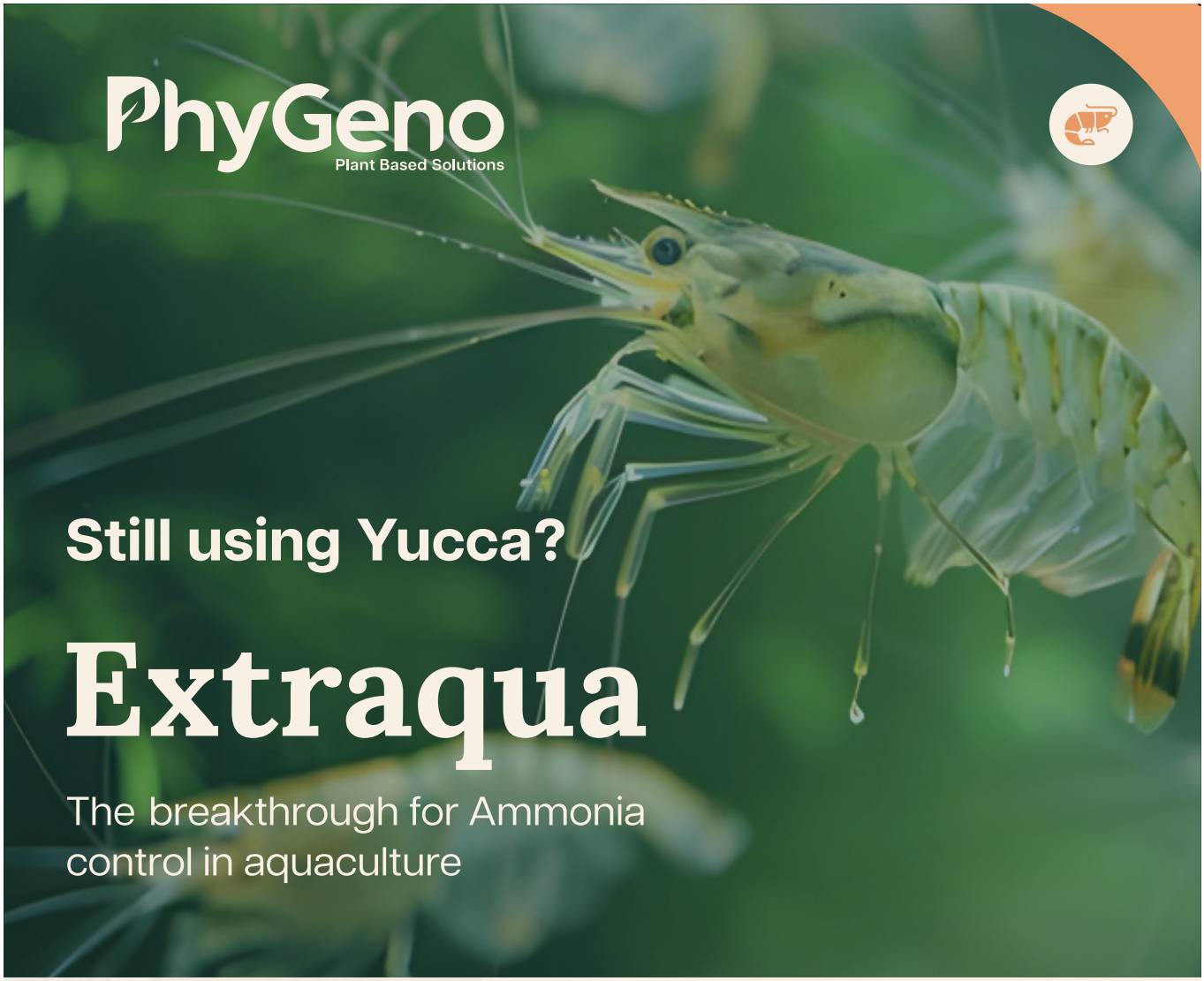
microbasia®

**An ISO 9001:2015 certified company**

4/328, Sivapadham Street, Melayanambakkam,
Chennai - 600 095. India
Customer care : +91 94452 11141,
Email: customercare@microbasia.com



PhyGeno
Plant Based Solutions



Still using Yucca?

# Extraqua

The breakthrough for Ammonia control in aquaculture

## KUFOS study on Extraqua demonstrates

- Superior Ammonia Control
- Enhanced Appearance
- Improved Carapace Health

connect@phygeno.com
www.phygeno.com

Scan to know more

SINCE 2008
HARVESTING DREAMS
YEAR AFTER YEAR

GOLDEN MARINE HARVEST
INDIA

The BEST You Can Get




"Satisfaction is a Rating
Loyalty is a Brand"

BEST AQUACULTURE PRACTICES
CERTIFIED
Cert.No.H10305
www.bapcertification.org

"A Thankful Receiver
Bears a Plentiful Harvest"

The Responsible
Seafood Choice

CORPORATE OFFICE
GOLDEN MARINE HARVEST
Near Valathamman Koil,
Chettikuppam, Marakkanam
District : Villupuram, Tamil Nadu, India

GOLDEN MARINE HARVEST Unit II
Thoduvai Village Kooliyar Post,
Thirumullaivasal, Sirkazhi Tk, Mayiladuthurai
District : Tamil Nadu, India

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

GUJART GOLDEN MARINE
Survey No-312
Velan - 362720
District : Gir-Somnath, Gujarat, India.

GOLDEN MARINE HARVEST Unit III
Chettikuppam, Marakkanam
District : Villupuram,
Tamil Nadu, India

GOLDEN MARINE HARVEST Unit IV
121, Mugaiyur Village, Cheyyur Taluk,
Chengalpattu District,
Tamil Nadu, India

GOLDEN MARINE HARVEST Unit V
Chettikuppam, Marakkanam
District : Villupuram,
Tamil Nadu, India

GOLDEN MARINE HARVEST Unit VI
Chettinagar, Marakkanam
District : Villupuram,
Tamil Nadu, India

GOLDEN MARINE HARVEST Unit VII
Atchikadu, Marakkanam
District : Villupuram,
Tamil Nadu, India

E-mail : info@goldenmarine.in
Website : www.goldenmarine.in

Contact : +91 99944 35858
facebook Golden Marine-Harvest GMH





# Aqua International

English Monthly Magazine
(Established in May 1993)

Volume 34 Number 7 November 2026

**Editor & Publisher**
M. A. Nazeer

**Editorial & Business Office:**
**AQUA INTERNATIONAL**
NRS Publications,
BG-4, Venkataramana Apartments,
11-4-634, A.C.Guards,
Hyderabad - 500 004, India.
Tel: 040 - 2330 3989, 96666 89554
E-mail: info@aquainternational.in
Website: www.aquainternational.com

**Annual Subscription**
India : Rs. 800
Foreign Countries : US $ 100
or its equivalent.

Aqua International will be sent to the subscribers in India by Book Post and to the foreign subscribers by AirMail.

Edited, printed, published and owned by M. A. Nazeer and published from BG-4, Venkataramana Apts., 11-4-634, A.C.Guards, Hyderabad - 500 004, India. Printed at Srinivasa Lithographics.
Registered with Registrar of Newspapers for India with Regn. No. 52899/93. Postal Regn. No. L II/RNP/HD/1068/2021-2023.


Views and opinions expressed in the technical and non-technical articles/ news are of the authors and not of Aqua International. Hence, we cannot accept any liability for any loss or damage arising from the use of the information / matter contained in this magazine.

- Editor



NRS PUBLICATIONS
www.aquainternational.in


## CONTENTS


### Editorial

11. Aquaculture farms across Andhra Pradesh suffered severe capital and crop losses following the landfall of very severe cyclonic Storm Arnab.

### News

14. Fluctuation in Environment and White Gut Syndrome affecting farmers interest in shrimp farming; Cost of Production has gone up.
15. Vijay Traders, Vellapallam opening another branch in TN.
16. Khyber Aquaculture Secures FSSAI approval, Sets stage for packaged Himalayan Trout Business.
17. P. Jawahar assumes charge as Chairman of MPEDA.
18. Andhra Pradesh: Eluru aqua farmers form association to curb shrimp diseases.
18. Women Farmers' Day: CMFRI initiative turns coastal women into successful fisheries entrepreneurs.
20. Shrimp exports up 1% in July, top 80,000 tonnes mark.
21. India eyes 30 million tonnes fish output in 5 years, seafood exports of Rs 1.25 lakh crore.
22. Reinventing the pond: How this Bengal start-up is helping fish farmers battle climate and credit crisis.

### Articles

26. Outlawed in Indian Aquaculture: The Tale of the African Catfish.
32. Smart Shrimp Health Management: From Reactive Treatments to Predictive Aquaculture.
36. Digha and neighbouring regions in West Bengal – A place of attraction for both tourists and Fisheries Science students.





42. Beyond the Pathogen: How Environment and Host Resilience Shape Disease Outcomes in Shrimp Farming.


## ADVERTISERS' INDEX


| | | | |
|---|---|---|---|
| Aditi Enterprise | 31 | Microbasia | 6 |
| Algalr Nutrapharms Pvt Ltd | 2 | Nihal Traders | 35 |
| Avitech Nutrition Pvt Ltd | 7 | Phileo by Lesaffre | 47 |
| Deepak Nexgen Foods & Feeds Pvt Ltd | 4 | Poseidon Biotech | 5 |
| Famsun Co Ltd | 10 | Sribs Biotechniqs Pvt Ltd | 13 |
| FECPI India Pvt Ltd | 41 | SyAqua Siam Co. Ltd | 27 |
| Golden Marine Harvest | 8 | The Waterbase Limited | FC |
| HiMedia Laboratories Pvt Ltd | 3 | Uni-President Vietnam Co. Ltd | 19 |
| Hitech Life Sciences Pvt Ltd | 33 | Zhanjiang Hengrun Machinery | 24 & 25 |


**Subscriptions for Aqua International, English monthly, should be sent to:**
The Circulation Department, Aqua International, BG-4, Venkataramana Apartments, 11-4-634, A.C.Guards, Near Income Tax Towers, Hyderabad - 500 004, India. Email: info@aquainternational.in

FAMSUN

*Integrated Solution Provider*

# Vacuum coater

## Exceptional design & Flexible operation

Vacuum coater for the application of oil or fat, pigments, flavors, functional improver, vitamins, etc. onto pellets after drying and/or cooling. Aquafeed and pet food in particular.




**FAMSUN Co., Ltd.**

Add: No.1 Huasheng Road, Yangzhou, Jiangsu, China 225127
T:+86-514-87848880
E-mail:mypublic@famsungroup.com
www.famsungroup.com

**India Office**

Add: No 401 , Dega Towers , Raj Bhavan Road , Somajiguda , Hyderebad , Telangana - 500082
T: +62-21-30027458; 30027459
Contact: Arun Kumar K
E-mail : arunkumar@famsungroup.com
Mob: +91 9901916554

Contact: Shelby
E-mail: lxb@famsungroup.com
Mob: +91 9100436652

# Aquaculture farms across Andhra Pradesh suffered severe capital and crop losses following the landfall of very severe cyclonic Storm Arnab

Shrimp production is often attributed to pathogen presence or genetic quality, yet the same shrimp line and management practices can produce markedly different outcomes between crops. The same management and the same shrimp do not always face the same challenge. Understanding what changed is the first step towards a better crop..



Dear Readers,

The November 2026 issue of Aqua International is in your hands. In the news section, you may find news about....

Aquaculture farms across Andhra Pradesh have suffered severe capital and crop losses following the landfall of Very Severe Cyclonic Storm Arnab on October 28, 2026. Because Andhra Pradesh maintains highly commercialized, high-investment aquaculture setups, the structural and biological damage per hectare from this storm has been exceptionally steep. Official joint field inspections by revenue and fisheries departments are underway to map out the exact total financial and spatial figures. However, initial assessments from ground reports, satellite updates and aerial surveys outline severe impacts.

The worst damage to aquaculture ponds is concentrated in the delta and coastal districts of West Godavari, BR Ambedkar Konaseema, and Krishna districts. Torrential rains amounting to over 30 cm in various coastal belts caused heavy flooding. This has breached pond bunds and led to extensive water overflowing, causing shrimp and fish stock to wash away.

**Salinity & Water Quality Shock:** The massive influx of freshwater from heavy rainfall and overflowing rivers (such as the Gosthani and Nagavali) has critically disrupted the salinity, pH, and oxygen levels of brackish water shrimp ponds, killing off surviving stocks.

**Infrastructure Ruin:** The destruction of over 15,000 electricity poles and multiple substations caused massive power grid failures across Konaseema and West Godavari. The resulting prolonged blackout stopped mechanical aerators from operating, leading to widespread mass mortality of biomass due to oxygen depletion.

**Related Marine & Fishery Losses** Beyond inland aquaculture ponds, the broader coastal seafood sector has been heavily hit.

**Hatcheries and Drying Units:** In coastal hubs like Visakhapatnam and Srikakulam, continuous rain and lack of sunlight completely ruined inventories at open-air fish and shrimp drying businesses.

**Craft & Gear Damage:** At the Odalarevu landing center alone, over 100 fishing boats were broken into pieces, and specialized nets used for harvesting prawns and pomfrets were tangled and destroyed.

**Government Actions**

Chief Minister N. Chandrababu Naidu conducted aerial surveys over the flooded aqua ponds in Krishna, West Godavari and Konaseema to evaluate the ground reality. The state government has requested an inter-ministerial central team to expedite disaster assessments and release advance relief packages to offset these capital shocks.

**The country's shrimp exports have registered** a 1 percent increase for seven months in the calendar year 2026, with July reaching a record 81,674 tonnes, up 8.2 percent year-on-year, higher than expectations of 80,000 tonnes. A report by InCred Research said exports during the first seven months of 2026 reached 4,55,489 tonnes, up 1 per cent y-o-y. This reverses the marginal decline recorded in the first half and confirms an improving volume trajectory. Strong Signal: With the US market potentially normalising and India gaining share in the UK and EU, 2026 remains on track for record export volumes and value, the report said.

**A senior executive with 26 years** experience

*Contd on next page*

NRS GROUP

### *Our Mission*

*Aqua International* will strive to be the reliable source of information to aquaculture industry in India.

***AI*** will give its opinion and suggest the industry what is needed in the interest of the stakeholders of the industry.

***AI*** will strive to be The Forum to the Stakeholders of the industry for development and self-regulation.

***AI*** will recognize the efforts and contribution of individuals, institutions and organizations for the development of aquaculture industry in the country through annual Awards presentation.

***AI*** will strive to maintain quality and standards at all times.

TALK TO US

SEND AN EMAIL:
info@aquainternational.in
Please do not send attachment.

FOLLOW US:
facebook.com/aquainternational.nrs
twitter.com/nrspublications

***Send a letter:*** *Letters to the Editor must include writer's full name, address and personal telephone and mobile numbers. Letters may be edited for the purposes of clarity and space. Letters should be addressed to the Editor:*

**AQUA INTERNATIONAL,** BG-4, Venkataramana Apartments, 11-4-634, A.C.Guards, Near Income Tax Towers, Masab Tank, Hyderabad - 500 004, T.S, India.
Tel: +91 040 - 2330 3989, 96666 89554. Website: www.aquainternational.in

in aquaculture sector B.V. Ramana says, due to fluctuation in environment and White Gut Syndrome, presently the farmers are struggling to get required Liveability and FCR in shrimp farming, and farmers today had to spend more money (cost of production has gone up) on farming although shrimp raw material prices are good presently with Rs 285 per kg for 100 count.

**Women Farmers' Day: CMFRI initiative turns coastal women** into successful fisheries entrepreneurs. 84 micro enterprise units established across Kerala; Household income rises by 30–35%. From fish farming and ornamental aquaculture to seafood value addition, coastal women in Kerala are building new livelihoods as entrepreneurs, supported by a science-led initiative of ICAR-Central Marine Fisheries Research Institute (CMFRI). In an effort to improve livelihoods and create opportunities for income diversification, CMFRI's Science, Technology and Innovation (STI) Hub helped setting up of 84 micro entrepreneurial interventions across eight districts of the state between 2022 and 2026.

**India has initiated a national action plan** for inland small-scale fisheries to increase fish production. The plan aims to achieve a target of 30 million tonnes over the next five years. It will focus on improving livelihoods and sustainability amid climate change challenges. Stakeholder consultations will be conducted to finalise the plan, which covers diverse aquatic ecosystems. India has entered the development phase of a national action plan for inland small-scale fisheries, aiming to boost fish production to 30 million tonnes over the next five years, a senior official said recently. Union Fisheries Secretary Dr Abhilaksh Likhi, who formally launched the development phase of the National Plan of Action (NPOA) for small-scale inland fisheries, said the initiative will focus on improving livelihoods, strengthening value chains, and enhancing coordination and better management of freshwater resources. "India has set a target of 30 million tonnes in fish production over the next five years, while seafood exports are expected to rise to Rs 1.25 lakh crore," an official release quoted Likhi as saying. The plan is being developed under the framework of the UN Food and Agriculture Organisation (FAO), and the initiative is being led by the Union Department of Fisheries in collaboration with the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO).

In the Articles section, **Outlawed in Indian Aquaculture: The Tale of the African Catfish** authored by Swapnil Ghatge, Krishna Patil, Dr Rajiv Rathod says that african catfish (Clarias gariepinus) is a highly adaptable invasive species threatening India's native aquatic biodiversity. Rapid growth, air-breathing ability, broad feeding habits and high fecundity facilitate its spread and ecological dominance. Illegal culture and use of animal waste pose serious ecological, environmental and public-health concerns. Strict enforcement of regulations, public awareness and reporting are essential to prevent its further spread in India.

Another article titled, **Smart Shrimp Health Management: From Reactive Treatments to Predictive Aquaculture**, authored by Dr K. Pani Prasad discussed that shrimp farming has emerged as one of the most dynamic and export-oriented sectors of Indian aquaculture. Over the past two decades, technological advances, improved seed quality, and strong global demand have transformed shrimp culture into a major source of income and employment, particularly in coastal states such as Andhra Pradesh. However, despite this impressive growth, shrimp farming remains one of the most biologically sensitive and economically risky forms of animal production. Traditionally, shrimp health management has been largely reactive. Farmers respond to disease only after visible signs such as reduced feeding, white faeces, weak swimming, red discoloration, or surface crowding appear. By the time these symptoms are noticed, the disease process is often already advanced, leaving very limited scope for effective intervention. Emergency chemical applications, indiscriminate antibiotic use, and panic harvesting become the default responses.

Another article titled, **Digha and neighbouring regions in West Bengal – A place of attraction for both tourists and Fisheries Science students** authored by Subrato Ghosh says that in this article, the normal activities at two Govt of India research institutes, one fish farm-cum-laboratory and three activities concerning and featuring post-harvest fishery technology aspects in three private sectors have been presented – the institutes and other sites are located at and in close proximity to Digha, a well-known seaside destination in West Bengal. Digha is not just a place to enjoy and spend time with family and friends, but students of Fishery Sciences will be able to gain much first-hand knowledge, real experiences, many concepts and insights from these sites of different types if they plan and come on a trip under supervision of their teachers. Some lesser known important features of the seven different places of academic interest near to Digha have been presented in this article, students and other stakeholders may like reading it and gain interest.

Another article titled, **Beyond the Pathogen: How Environment and Host Resilience Shape Disease Outcomes in Shrimp Farming** authored by Suparat Taengchaiyaphum and Natthinee Munkongwongsiri stated that Shrimp production is often attributed to pathogen presence or genetic quality, yet the same shrimp line and management practices can produce markedly different outcomes between crops. Similar management does not necessarily create the same biological conditions, and a different crop outcome does not automatically indicate a problem with either genetics or farm management. Disease and production performance reflect dynamic interactions among pathogen pressure, environmental conditions, and host resilience, with environmental fluctuations affecting physiology, immunity, and microbial balance. Understanding these interactions helps answer the fundamental question: "We did everything the same, why is this crop different?" This article integrates farm observations and scientific evidence to identify key factors affecting shrimp production and support more effective risk management and production strategies. "The same management and the same shrimp do not always face the same challenge. Understanding what changed is the first step towards a better crop."

*Farmers are advised not to neglect and do not compromise in good farming and management practices to get specified results. As shrimp, fish and crabs are food for human consumption, maintain quality in all aspects to get better acceptance and price to your produce. Readers are invited to send their views and comments on the news, special feature and articles published in the magazine Aqua International which would be published under "Readers Column".*

**M.A.Nazeer**
Editor & Publisher
Aqua International

## SRIBS BiotechniQs Private Limited...
## Now recognised amongst top 10 Aquaculture Companies!







***Quality Inputs - Quality Management... Towards Sustainable Aquaculture!!***

SRIBS

**SRIBS BiotechniQs Private Limited**

302, Wing-A, Cello Triumph, I.B.Patel Road, off Western Express Highway,
Goregaon East, Mumbai 400063, Maharashtra, India. +9122 26861441 / 26851442
info@sribsbio.in / marketing@sribsbio.in www.sribsbio.in

SRIBS sustainability simplified®

**Because of poverty and limited resources, B.V. Ramana faced great difficulties with his education during his youth**

# Fluctuation in Environment and White Gut Syndrome affecting farmers interest in shrimp farming; Cost of Production has gone up



***B.V. Ramana,***
*Divisional Sales Manager, Amalapuram Division, A.P, Deepak Nexgen Feeds Pvt Ltd*

**Amalapuram:** Mr B.V. Ramana, Divisional Sales Manager, Amalapuram Division, Andhra Pradesh, Deepak Nexgen Feeds Pvt Ltd, had faced significant academic challenges while completing his 10th grade secondary education.

B.V. Ramana wanted to have tuition for his Maths and English subjects in his 10th grade secondary education and approached a tuition teacher with a monthly fees of Rs 30 and studied for 45 days. Due to poverty and poor financial condition, his father could not afford to spend even Rs 30 for his son's tuition. Financial constraints forced him to discontinue his private tuition, and the teacher looking at Ramana's curiosity and hard work in studies encouraged the boy Ramana to continue coming for tuition without paying fee, but Ramana could not receive it. That 45 days tuition studies helped him to pass Maths and English subjects along with other subjects in his 10th standard with good marks.

He did miscellaneous works to scrape together enough money to buy a bicycle at Rs 450 in which Rs 50 was given by his mother. The bicycle helped him to go to the school and college those days. During his Post Graduation, M.Sc, he used to feel shy to have Tea along with his college mates and stopped going for Tea with friends as he had no money to spend.

Because of poverty and limited resources, B.V. Ramana faced great difficulties with his education during his youth. Owing to his hard work, he is now securely established financially and is able to make his daughter Jyotsna an MBBS.



*B.V. Ramana with his wife Ms Aruna Kumari and daughter Jyotsna who is doing her MBBS 4th year.*

B.V. Ramana started his career on 19 January 2000 with Avanti Feeds as Technical Service Officer and worked there for 8 years. In July 2008, he joined Virbac Animal Health and worked there till February 2018. In 2018, he joined Deepak Nexgen Feeds Pvt Ltd and today he is the Divisional Sales Manager, Amalapuram Division of the company. All the 26 years he worked in aquaculture sector based at Amalapuram in East Godavari District, Andhra Pradesh.

When B.V. Ramana took charge as Divisional Sales Manager of Deepak Nexgen in 2018, the company had annual sales of 1,200 tonnes of feed in Amalapuram division, and today after 8 years of hard work the company supplies 15,000 tonnes of shrimp feed annually in the division. The company has 17 sales and technical services team members in Amalapuram division alone under B.V. Ramana.

The Divisional Sales Manager says that due to fluctuation in environment and White Gut Syndrome, the farmers are struggling to get required liveability and FCR in shrimp farming and farmers today had to spend more money (cost of production has gone up) on farming although shrimp raw material prices are good presently with Rs 285 per kg for 100 count.

## All three helped me

I learnt basics in aquaculture from Avanti Feeds, then sales and marketing skills from Virbac Animal Health. He received 3 gold medals



*Aitabattula Ananda Rao, MLA, Amalapuram Constituency, felicitating A. V. Subramaniam, Managing Director, Deepak Nexgen Feeds Pvt Ltd on 11 August 2025 at Govt. High School, Allavaram.*



*A view of students studying in Govt. High School, Allavaram*



*B.V. Ramana, along with his team of Sales & Technical services during their review meeting held on 15 October 2026 at Amalapuram, Andhra Pradesh, when Aqua International editor happened to visit them.*

from Virbac Animal Health for his best performance during his days in Virbac. With the support receiving from the management of Deepak Nexgen Feeds, I am not facing any difficulty in selling of the feed because demand for the feed is increasing year after the year in the aquaculture industry, said Mr Ramana.

Mr B.V. Ramana is happy that he is working in aquaculture in rural areas of the country which is free from pollution and other health hazards due to good environmental conditions.

**Deepak Nexgen contributes ₹10 lakhs to Allavaram Govt. School**

Deepak Nexgen Managing Director Mr A. V. Subramaniam contributed ₹10 lakhs to government high school to construct school building and other amenities in Allavaram, East Godavari district which has 422 students from 1st Standard to 12th Standard.

## Vijay Traders, Vellapallam opening another branch in TN



*Balamurugan, Proprietor, Vijay Traders, Vellapallam, Tamil Nadu.*

**Vellapallam:** Mr Balamurugan, Proprietor, Vijay Traders, Vellapallam in Tamil Nadu is a noted person in supply and services of Aerators and Shrimp Pond related equipment in and around Velangani area. He gives services to more than 400 farmers in the region. Aqua International Editor M.A. Nazeer travelled shrimp farming areas in the region on 27 & 28 October 2026 and met some of the farmers and dealers.

Vijay Traders deals with Sudharshan Engineering Aerators of Coimbatore and Jyanthi Aerators of Kaikaluru, Andhra Pradesh. Balamurugan is expanding his business through opening one more branch outlet in Jambunadai, 60 Kms to Vellapallam.

Read and Advertise in

Aqua International

English Monthly Magazine

Annual Subscription Cost: Rs. 800

SCAN QR CODE

To subscribe, Contact:

NRS Publications

BG-4, Venkataramana Apartments,
11-4-634, A.C. Guards,
Hyderabad - 500 004, Telangana, India.
Tel: 040-2330 3989 • Mobile: 96666 89554
Email: info@aquainternational.in

# Khyber Aquaculture Secures FSSAI approval, Sets stage for packaged Himalayan Trout Business

## Company to launch consumer-ready trout products and first branded retail outlet as it expands beyond traditional markets



**Srinagar, Jammu & Kashmir, India: Khyber (K2) Aquaculture**, which operates one of India's largest integrated RAS-based Himalayan trout farming and processing facilities in Jammu & Kashmir, has secured its **Food Safety and Standards Authority of India (FSSAI) licence** at its facility at Chak Akhal Kangan, Ganderbal, Jammu & Kashmir, marking an important milestone in the company's move towards premium retail and HoReca markets.

The licence covers the Manufacture, Trade & retail of fish and fish products, providing the regulatory foundation for Khyber Aquaculture to take forward processing / packaging / storage / distribution – as applicable of its Himalayan trout products. The company is now preparing to introduce packaged trout products for consumers while expanding its presence across retail, distribution and institutional channels.

**Yunus Trumboo, Director at Khyber Aquaculture, said,** "Securing our FSSAI licence is an important step as we move into the next phase of our business. We have invested in building the production and processing infrastructure needed to grow trout at scale. Our focus now is to bring our sustainably farmed, clean and biosecure trout closer to consumers. We will also use Modified Atmosphere Packaging (MAP), which uses a carefully controlled mix of carbon dioxide and nitrogen to help keep the trout fresh for longer."

For Khyber Aquaculture, the FSSAI licence marks more than a regulatory achievement. It brings together its integrated farm-to-consumer value chain - from hatchery and trout farming to processing, food safety, packaging, cold-chain management and retail - and creates a structured pathway to take Himalayan trout beyond traditional regional markets.

The development builds on Khyber Aquaculture's investment in large-scale, technology-led trout production at Akhal, Kangan, Ganderbal, where its integrated facility brings together hatchery, grow-out, processing and packaging capabilities supported by Recirculating Aquaculture System (RAS) technology.

With the licence now in place, Khyber Aquaculture is preparing to launch its initial range of products across fresh, chilled and frozen formats. The first range will include boneless **skin-on portion cuts, Supreme Fillets and trout steaks**. The portion cuts will feature thick, chunky pieces taken from larger fish, with packs designed to serve a traditional household family. The Supreme Fillets will cater to home cooks looking to prepare trout at home, while the steaks will offer another convenient cut for every day cooking. These initial offerings will be followed by ready-to-cook curry cuts, sushi and sashimi products, among others, as the company expands its product range.

For the **HoReCa segment**, which includes hotels, restaurants and catering businesses, Khyber Aquaculture will offer larger packs suited to professional kitchens and bulk requirements. These will include a **3.2 kg pack of Supreme Fillets containing four pieces**, designed to meet the needs of food-service businesses.

Khyber Himalayan Trout will be available in fresh, chilled forms to support freshness, safe handling, traceability, and consumer convenience. The products will have a chilled shelf life between 5 to 8 days and frozen shelf life of up to 12 months, *subject to prescribed storage and handling conditions.

Khyber's processing facility has a current daily capacity of up to 10 tonnes, providing the infrastructure to support the packaged-product rollout and future market expansion.

The FSSAI milestone comes ahead of the opening of





Khyber Aquaculture's **first branded retail store at Karan Nagar, Srinagar in J&K**, which will offer all live / fresh / packaged chilled / frozen products.

"Consumers will also be able to select live trout and have it cleaned, cut and packed at the store", stated Mr Trumboo.

"This gives us a strong foundation to expand our retail and distribution presence while maintaining the quality and standards at the heart of our business", ***further added MrTrumboo.***

The facility currently has an annual production capacity of 1200 MT, with plans to scale to **7,000 MT.**

Following the FSSAI milestone, Khyber Aquaculture plans to progressively expand across [J&K / Delhi-NCR / North India / Other Markets] distributors & Modern Retail / Horeca & e-Commerce Direct-to-Consumer channels.

"Our immediate priorities include the launch of packaged trout SKUs, opening of our first branded retail store and expansion of the cold-chain and distribution infrastructure required to take Himalayan trout to a wider consumer market. We are also working towards obtaining the Best Aquaculture Practices (BAP) certification, which will be an important step in expanding our presence into global markets", ***concluded Mr Trumboo.***

### About Khyber Aquaculture

Khyber Aquaculture is a leading player in the cold-water fisheries business. Founded in 2022, Khyber Himalayan Trout brings premium, nutrient-rich trout from the pristine Himalayan mountain waters of Kashmir. The company integrates scientific farming practices, modern infrastructure, and environmental stewardship to deliver premium-quality aquaculture products for domestic and international markets.

### About the Khyber Group

The Khyber Group is Jammu & Kashmir's leading business conglomerate with interests spanning luxury hospitality, cement, real estate, healthcare and sustainable aquaculture. Established over 50 years ago in the heart of the Kashmir Valley, the group is known for its commitment to regional economic development. The group has consistently invested in ventures that create long-term value, generate employment, and contribute to the socio-economic advancement of the region.

# P. Jawahar assumes charge as Chairman of MPEDA



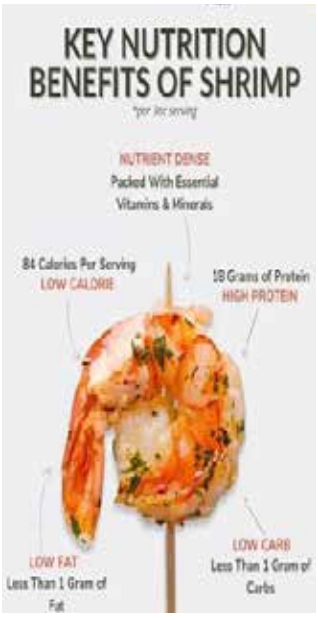
*P. Jawahar, IAS*

Shri P. Jawahar, (AGMUT Cadre, 2007 Batch), has assumed charge today as the Chairman of the Marine Products Export Development Authority (MPEDA). MPEDA is the apex body under the Government of India responsible for the promotion and development of the nation's marine products sector and seafood exports.

An officer of the Indian Administrative Service, Shri P. Jawahar brings extensive administrative experience spanning multiple sectors. His expertise encompasses industries, commerce, education, elections administration, sustainable development, and public governance. Prior to taking charge as Chairman of MPEDA, he served as the Chief Electoral Officer and Commissioner/Secretary to the Government of Puducherry, handling key departments including Industries & Commerce, Education, and Elections.

Shri P. Jawahar also possesses a strong multidisciplinary academic background in agriculture, environmental science, and urban development. This diverse qualification is expected to bring valuable perspectives to the sustainable and responsible development of India's seafood sector. His expertise is anticipated to further strengthen critical initiatives related to sustainable fisheries and aquaculture, infrastructure development, value addition, export competitiveness, innovation, and global market expansion for Indian seafood products.

Under his leadership, MPEDA looks forward to accelerating efforts towards enhancing India's position in the global seafood trade. The authority will focus on ensuring sustainability, quality assurance, traceability, and robust livelihood support for various stakeholders across the fisheries and aquaculture value chain.



# Andhra Pradesh: Eluru aqua farmers form association to curb shrimp diseases

## Members have voluntarily spent Rs 20 lakh to repair damaged canal embankment roads along the two channels to ease transport of medicines and feed.



*Shrimp affected by White Spot Syndrome displayed by a farmer in Lanka villages of Eluru district.*

**Eluru, 17 October, 2026:** About 60 aqua farmers from five villages in Kalidindi and Kaikaluru mandals have formed Sri Matsya Aqua Unity Farmers Association to prevent shrimp diseases from spreading across 2,000 acres near Pedakommuleru and Venkatapuram channels.

Farmers from Gopalapuram, Vemavarappadu, Tamarakollu, Ayodhyapatnam and Venkatapuram will follow common biosecurity measures, including promptly harvesting infected ponds, safely burying dead shrimp and disinfecting ponds and bunds.

They share updates on symptoms and preventive steps through WhatsApp groups.

Members have voluntarily spent Rs 20 lakh to repair damaged canal embankment roads along the two channels to ease transport of medicines and feed.

Speaking to TNIE, B Raj Kumar, Assistant Director of Fisheries at Aqua Lab Kaikaluru, said early identification and reporting of diseases were essential to minimise losses. Fisheries Department is creating awareness about the Report Fish Disease mobile app, which allows farmers to upload photos and details of suspected infections.

"Farmers should report symptoms as soon as they notice them. By uploading photos and details through the app, they can seek scientific guidance from experts and take preventive measures," he said.

The app is part of Phase II of the National Surveillance Project on Aquatic Animal Diseases under Pradhan Mantri Matsya Sampada Yojana, which supports early detection, lab diagnosis and scientific guidance. Apart from white spot and white gut diseases in shrimp, farmers can seek guidance on tail rot, red disease and parasitic infestations.

The department is also creating awareness on regular testing of pond water and soil to maintain culture conditions and reduce disease risk.

Fisheries official at Bhimadole, Surendra, said farmers were being educated on water and soil testing, disease prevention, and use of the app, and no aqua disease complaints had been received at lab so far.

# Women Farmers' Day: CMFRI initiative turns coastal women into successful fisheries entrepreneurs

## 84 micro enterprise units established across Kerala; Household income rises by 30–35%

**Kochi:** From fish farming and ornamental aquaculture to seafood value addition, coastal women in Kerala are building new livelihoods as entrepreneurs, supported by a science-led initiative of ICAR-Central Marine Fisheries Research Institute (CMFRI).

In an effort to improve livelihoods and create opportunities for income diversification, CMFRI's Science, Technology and Innovation (STI) Hub helped setting up of 84 micro entrepreneurial interventions across eight districts of the state between 2022 and 2026. Most of the beneficiaries of the Department of Science and Technology (DST)-funded STI Hub, belong to Scheduled Caste community.

Led by Dr Vipinkumar V.P., Principal Scientist, the project directly benefitted 469 people, including 220 women and six



*CMFRI's SIT Hub beneficiary Subha L S near her cage farming site in Ezhikkara*

Uni-President

# 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

## 3. DECREASE AMMONIA CONTENT

Prevent the accumulation of toxic substances such as $NH_3$, $NO_2$, 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. > 1x $10^{11}$ cfu/kg | 15% |
| *(Bacillus subtilis, Bacillus amyloliquefaciens, Bacillus licheniformis)* | |
| Carrier (rice bran, corn gluten) | 75% |
| Moisture | 10% |




## * STORAGE:

Keep at dry, well-ventilated condition. Avoid direct sunlight exposure and use as soon as possible once opened for best quality.

## * DIRECTION OF USE:

No cultivation is needed. Apply Nuri BSL with water-soluble bag near to the working water wheel or pour into the pond evenly. Recommend apply Uni-Light PSB together with Nuri-BSL on sunny day to achieve a clear pond more efficiently.




**UNI-LIGHT PSB Funtion:**

- Decompose pond bottom
- Inhibit the growth of *Vibrio* spp.
- Purification of water quality

**BSL Dosage:**

| /10,000 m² Quantity | 10 - 30 pl/m² tiger prawn or < 80 pl/m² Vannamei | For >30 pl/m² tiger prawn or > 80 pl/m² Vannamei | For > 150 pl/m² Vannamei |
|---|---|---|---|
| 7 days before stocking | 800 g - 1,000 g | 1,200 - 1,500 g | 1,200 - 1,500 g |
| Day of stocking | 300 g - 500 g | 800 g - 1,000 g | 800 g - 1,000 g |
| Every 7 - 10 days after stocking | 300 g - 500 g | 800 g - 1,000 g | 3 - 5 days / use 1,000g - 2,000g |

****Dosages can be adjusted according to the water conditions and practices.*

**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



*CMFRI's SIT Hub beneficiary Dr Akhilamol near her fish seed production unit in Kodungallur.*

transgenders, with indirect benefits expected to reach around 2,500 others.

"According to the impact assessment of the project, household incomes of beneficiaries have increased by 30–35 per cent", Dr Vipinkumar said, adding that the STI Hub extended 141 training programmes that strengthened their technical and entrepreneurial skills.

The enterprises span a range of activities, including cage fish farming, pearl spot seed production, ornamental fish culture, integrated fish farming, mussel and oyster farming, and clam cultivation, alongside fisheries value addition, fish vending and dry fish production.

"The initiative helped women move beyond traditional livelihood roles to become producers, skilled service providers and business owners in the fisheries value chain", he said.

A good number of beneficiaries established themselves as skilled professionals in diverse fisheries-based livelihood activities, including cage fabrication, aquarium technology, integrated farming, seed and broodstock distribution.

CMFRI extended support in technology transfer, hands-on training, entrepreneurial guidance and market linkages facilitated through the institute's Agricultural Technology Information Centre and Krishi Vigyan Kendra.

"The STI Hub demonstrates how scientific interventions can translate into tangible economic opportunities. The initiative offers a replicable model for empowering women and promoting inclusive growth in the fisheries sector", said CMFRI Director Dr Grinson George.

Through this initiative, CMFRI aimed to improve the socio-economic conditions of coastal communities facing subsistence-level incomes, and limited livelihood opportunities. By addressing gaps in access to finance, technical knowledge and essential infrastructure, the project promoted sustainable livelihood diversification and fisheries-based entrepreneurship, Dr George added.

CMFRI will celebrate Women Farmers' Day on Thursday at the farm of Dr Akhilamol in Kodungallur, a national award-winning entrepreneur and beneficiary of the STI Hub project. The event will spotlight the achievements of women entrepreneurs, with beneficiaries sharing their success stories and experiences in fisheries-based enterprises.

# Shrimp exports up 1% in July, top 80,000 tonnes mark

**Kochi:** The country's shrimp exports have registered a 1 percent increase for seven months in the calendar year (CY)26, with July reaching a record 81,674 tonnes, up 8.2 percent year-on-year (y-o-y), higher than expectations of 80,000 tonnes.

A report by InCred Research said exports during the first seven months of CY26 reached 4,55,489 tonnes, up 1 per cent y-o-y. This reverses the marginal decline recorded in the first half and confirms an improving volume trajectory.

**Strong Signal**

With the US market potentially normalising and India gaining share in the UK and EU, CY26 remains on track for record export volumes and value, the report said.

The July data provides a stronger signal than the first-half numbers. More importantly, the strong July print has pushed the cumulative CY26 trajectory into positive y-o-y territory.

The sequential improvement is becoming increasingly visible: the year started on a softer note, but monthly export momentum strengthened materially through June and July.

"Our CY26 thesis remains intact: Indian shrimp exports are tracking towards record volumes and value," InCred Research said.

The latest data suggest that the Indian supply cycle



is expanding at the margin rather than weakening, with cumulative export volumes now back in positive y-o-y territory.

**Key Question**

The key question now shifts from whether Indian exports can return to record levels to how much further the monthly run rate can expand. This is particularly relevant as India continues to build its presence in the UK and EU, while the US market could provide an additional leg of growth, said Nitin Awasthi of InCred Research.

KN According to Raghavan, Secretary General of Seafood Exporters Association of India, the positive growth trajectory of the shrimp export sector stands as proof of its core strength and resilience. Exporters have been looking to diversify from "one species, one product, one market" to-wards "many species, multiple products, and different markets".

This has led to increased exports of black tiger shrimp which has good acceptance in East and South-East Asian markets, more focus on value added products and added thrust on exports to the EU, the UK, Russia, Vietnam and China.

# India eyes 30 million tonnes fish output in 5 years, seafood exports of Rs 1.25 lakh crore

**Synopsis**

India has initiated a national action plan for inland small-scale fisheries to increase fish production. The plan aims to achieve a target of 30 million tonnes over the next five years. It will focus on improving livelihoods and sustainability amid climate change challenges. Stakeholder consultations will be conducted to finalise the plan, which covers diverse aquatic ecosystems.



**October 23, 2026, Bhopal:** India has entered the development phase of a national action plan for inland small-scale fisheries, aiming to boost fish production to 30 million tonnes over the next five years, a senior official said on Friday.

Union Fisheries Secretary Dr Abhilaksh Likhi, who formally launched the development phase of the National Plan of Action (NPOA) for small-scale inland fisheries, said the initiative will focus on improving livelihoods, strengthening value chains, and enhancing coordination and better management of freshwater resources.

"India has set a target of 30 million tonnes in fish production over the next five years, while seafood exports are expected to rise to Rs 1.25 lakh crore," an official release quoted Likhi as saying.

The plan is being developed under the framework of the UN Food and Agriculture Organisation (FAO), and the initiative is being led by the Union Department of Fisheries in collaboration with the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO).

Addressing the gathering, Likhi called for a mission-mode outreach programme to take the proposed NPOA to fishing communities across the country.

"The document must translate into practical improvements in livelihoods rather than remain confined to government offices", he said, adding that the proposed plan must prioritise sustainability amid the climate crisis and strengthen value chains to improve the income of fishermen.

Highlighting the sector's current status, the senior official said that India had achieved an annual fish production of 19.7 million tonnes, with inland fisheries contributing approximately three-fourths of this output, while seafood exports had crossed Rs 70,000 crore.

He, however, stressed that production and export growth must go hand in hand with securing the livelihoods of small-scale fishermen.

Likhi also flagged climate change and deteriorating water quality as major concerns for inland fisheries, citing challenges such as declining oxygen levels in water bodies.

He said that the plan must incorporate measures to build climate resilience, drawing on the experience of fishing communities who directly confront these challenges.

"India's diverse inland fisheries sector, with its varied ecosystems, fishing communities and region-specific challenges, could serve as a model for the FAO to collaborate, pilot region-specific approaches and take the learnings to wider geographies. The experiences of fishing communities across the country could help shape context-specific approaches to sustainable fisheries management and livelihood development, offering valuable lessons for wider application," he said.

The proposed plan covers fisheries in rivers, canals, reservoirs, lakes, floodplain wetlands, tanks and cold-water systems.

"The development phase is expected to address issues relating to fishing rights and resource management, employment and decent work, gender equality, value chains and post-harvest trade, as well as disaster risks and climate change," said Dr P Krishnan, director of BOBP-IGO.

The plan will be finalised through stakeholder consultations before its public launch next month and subsequent implementation, it was stated.

*Source: The Economics Times*

UP COMING EVENT

45th Edition
Aquaculture Expo 2026
Exhibition & Panel Discussion

7, 8 & 9 December 2026

SRMT Function Hall, Kakinada, Andhra Pradesh, India

For stalls booking Contact:
Aqua International,
Hyderabad, India.
M: 96666 89554, 63010 47155
E: aquacultureexpo.nrs@gmail.com

# Reinventing the pond: How this Bengal start-up is helping fish farmers battle climate and credit crisis



*Essential Aquatech helps these farmers with a variety of solutions, including technology-based predictions, solutions around incoming disasters, and farm inputs. They also create credit scores for fish farmers.*

*At a time when climate change is impacting world resources, including the aquatic system, Jalpaiguri's Essential Aquatech is working to empower smallholder fish farmers by turning data into actionable insights and measures.*

**October 22, 2026:** At a conference in Japan in 2017, Arka Prava Das learned about the devastating effects of **climate change** on global protein sources, such as beef, pork, chicken, and fish. A native of West Bengal's Jalpaiguri, a city well-known for its variety of freshwater fishes and **aquaculture** farming, Das began to worry about the **fish farmers** in the region. Along with his childhood friend, environmental speaker Subhadeep Mitra, he conducted a survey across north eastern India to assess how aware the farmers are about the threats climate change poses to aquaculture. "We came to know (fish) farmers are not ready for climate change, and they do not even understand what is coming and what is going to happen. The farming experience they have of 15-20 years will no longer give them an edge. These farmers are reactive; they only take measures after disasters hit them. They needed to be pro-active, and technology will be one of the key factors for the predictive part," said Das, explaining the whole context of why he and Mitra started **Essential Aquatech** in 2019.

Das pointed out that over 90% of farmers in the region have very small farms, with less than 1 hectare of pond, and are traditionally run. Essential Aquatech helps these farmers with a variety of solutions, including technology-based predictions, solutions around incoming disasters, and farm inputs. They also create credit scores for the fish farmers.

The team currently monitors over 5,000 farmers, managing 8,000 acres of aquaculture across eastern and north eastern India.

## No fish to fry?

The freshwater fisheries segment is about 10 times larger than the shrimp sector in India. The eastern and north eastern belts of India account for the larger share of consumption. "More than 52% is consumed on this part only," Das said. In the last 10 years, the fisheries sector in India has shown a sustained annual average growth rate of 8.74%, and the total fish production jumped from 95.79 lakh tonnes in 2013-14 to 197.75 lakh tonnes in 2024-25, as per data from the Ministry of Fisheries, Animal Husbandry & Dairying. While fish production in the country is growing, just like the rest of the world's resources, aquaculture is facing the impact of climate change. "Due to rising temperatures, ecological changes are happening in the ponds, particularly based on the plankton basis, and the dissolved oxygen ratios are getting down. This is leading to the spread of particularly bacterial or fungal disease at a rapid rate, which used to be seen mostly in winter. However, now it is coming in July. This, in turn, is further leading to the farmer losing his entire crop by 72 hours," Das explained.



*Arka Prava Das, Co-Founder, Essential Aquatech.*

India's average temperature has increased by almost 0.7 degrees Celsius during 1901-2018, the Ministry of Earth Sciences recently told Parliament. Frequency of very strong cyclonic storms in the post-monsoon season has increased significantly (+1 event per decade) in the past two decades (2000–2018). And the frequency of daily precipitation extremes (rainfall intensities >150 mm per day) increased by 75% in 1950-2015. The frequency and spatial spread of droughts have also increased significantly during 1951-2015, it said.

Divya Kumar Gulati, Chairman, Compound Livestock Feed Manufacturers Association (CLFMA) of India, said that climate change is becoming an increasingly important risk for India's fisheries and aquaculture sector, with rising sea temperatures, erratic rainfall, changing salinity levels, and extreme weather events affecting aquatic ecosystems, fish availability, and farming conditions.

"Technology will be central to anticipating and managing these risks. Real-time monitoring of water temperature, dissolved oxygen and salinity, combined with early-warning systems, weather forecasts, disease surveillance and data-led farm management, can help farmers take preventive action rather than respond after losses occur," he said.

Essential Aquatech has built a preventive measure system that gives farmers alerts for the next 15 days about rains, heatwaves, and incoming disease, among others, along with actionable advisory. This is powered by artificial intelligence(AI) and is run on WhatsApp. A farmer can send details about his pond, his crops, the kind of farming he does, etc. Then,

**Essential Aquatech Private Limited financials**

| Financial Year | Revenue (INR) | Net Profit (INR) | Profit Margin (%) |
|---|---|---|---|
| FY 20-21 | 1.1 Cr | 1.3 L | 1.18% |
| FY 21-22 | 43.5 L | 97.4 K | 2.24% |
| FY 22-23 | 64.1 L | 1.5 L | 2.34% |
| FY 23-24 | 96.6 L | 2.3 L | 2.38% |
| FY 24-25 | 1.4 Cr | 3.5 L | 2.50% |

Source: Essential Aquatech Private Limited and Tracxn

SME

the Essential Aquatech team tracks their pond through a satellite system and a weather monitoring system and provides the farmers with the respective alerts.

For example: "Your pH will be down, so you have to use lime." If the farmer has a 1-acre pond, the system tells him how much lime to use in how much time.

For this feature, a Voice AI model has been integrated directly into WhatsApp. "Farmers simply need to speak in their local languages without needing to type anything," he said.

In this process, the company is also creating a database of the farmers' crop growth, which in turn will help build a credit score for lending purposes, known as AquaIQ. Das explained that less than 2% of fish farmers have access to formal credits or an insurance system. Schemes like PMMSY and Kisan Credit Card are not able to work due to poor credit scores because most of the farmers do not have the right kind of bank account.

"Therefore, alternative data becomes crucial, whether that farmer is doing good, whether his business is profitable, etc.," he said, adding that the non-performing assets in aquaculture are double that of agriculture with the former being 15%and the latter 4-6%.

Another key feature of the company's platform is TOROS Next, which caters to larger enterprises, FPO cooperatives, and government bodies by building on their AquaIQ financial intelligence module. It provides live geospatial registry data across states like West Bengal and Assam, detailing existing wetlands, active fish farming locations, and real-time production yields.

## Challenges

Today, the most critical issue, Das said, is widespread input adulteration in the freshwater fishery sector, ranging from commercial feeds and raw ingredients to water treatment supplements and medicines. "Due to a lack of regulatory over sight, farmers often fall into the trap of buying low-cost, counterfeit products. Believing they are cutting costs, they un wittingly ruin their entire crop, which in eastern and north eastern India directly translates to losing their primary livelihood," he said.

## Brisk future

While the company's AI-driven advisory and technology is completely free of charge to farmers, its primary revenue stream comes from selling high-quality farming inputs. Das said that through our in-house research, they have developed a proprietary line of 22 eco-friendly products, including soil, water, and gut probiotics, as well as specialised water treatment solutions, tailored for every stage of fish farming.

"Additionally, we supply farmers with high-grade fingerlings (fish seeds) and nutritionally balanced fish feeds. When ever our platform generates actionable advisory for a farmer, such as recommending specific protein feeds or probiotic treatments, the required inputs are made accessible through multiple sales channels. These include our own e-commerce platform, Fishart.com, third-party marketplaces like Amazon, Flipkart, and ONDC, as well as an on-ground distribution network of B2B dealers and Village Level Entrepreneurs (VLEs)," he said.



*Through their in-house research, Essential Aquatech have developed a proprietary line of 22 eco-friendly products, including soil, water, and gut probiotics, as well as specialised water treatment solutions, tailored for every stage of fish farming.*

He added that this freemium advisory model has driven strong financial growth, yielding a 47% CAGR over the last three years, with projected revenues crossing Rs 3 crore for the current fiscal year. They are now planning to monetise AquaIQand TOROS Next, among other solutions via API subscription models to larger institutions.

Anurag Chaturvedi, Senior Business Advisor, Greenr by TechnoServe, an accerator supporting the company, said, "Following our three-stage assessment of applicants, Essential Aquatech emerged as a unique aquaculture technology company working to reform India's inland fish farming value chain. Their solutions cover the entire value chain: from integrated AI-driven water testing, disease analysis, and pond health management to providing high-quality, nutrient-rich feed and facilitating reliable market linkages, ensuring fair pricing and instant payments for farmers."

The company is now targeting to expand its reach by 10-fold to 50,000 farmers over the next five years.

*Source & Courtesy:*
*The Economic Times*

HRIN 恒润机械





## Hengrun HR Series Extruder

Suitable for all kinds of floating & sinking aquatic feed
The screw permutation is adjustable to fit different formulation
Advanced automatic touch screen control system

| Model | HR165 | HR118X2 | HR145X2 | HR168X2 |
|---|---|---|---|---|
| Capacity(t/h) | 3-5 | 3-6 | 6-10 | 10-15 |
| Type | Single-screw | Twin-screw | Twin-screw | Twin-screw |






## Hengrun HRHG ( FB ) Series Rotating-Type Dryer

Moisture evenness≤1.5%
Use only one-third power compared to other competitors.

**ZHANJIANG HENGRUN MACHINERY CO., LTD**
Shapo Industrial Zone, Suixi, Zhanjiang, Guangdong,
China (524300)
Email: COLEPANG0614@163.COM/HRSAML@163.COM
Tel: +86 759 7770818 Mobile: +0086-137-2691-0838(WhatsApp Accessible)

# Professional Feed Machinery Manufacturer





## Hengrun SWFL Series Vertical Pulverizer

Vertical shaft with no-screen grinding, Bearing no maintenance. The production is uniform and the fineness is adjustable ( Range from 40-200 mesh.)





## Hengrun HRYTZ Series Vacuum Sprayer

Totally enclosed spraying space, Precision & Efficient spraying proportion widely ranged from 2%-30%.

# Outlawed in Indian Aquaculture:
## The Tale of the African Catfish

**Swapnil Ghatge[1], Krishna Patil[2], Dr Rajiv Rathod[1]**
[1]College of Fishery Science Morshi, Maharashtra Animal and Fishery Sciences University, Nagpur,
[2]College of Fisheries Ratnagiri, Email: swapnilghatge@mafsu.ac.in

**Highlights:**

- African catfish (Clarias gariepinus) is a highly adaptable invasive species threatening India's native aquatic biodiversity.
- Rapid growth, air-breathing ability, broad feeding habits and high fecundity facilitate its spread and ecological dominance.
- Illegal culture and use of animal waste pose serious ecological, environmental and public-health concerns.
- Strict enforcement of regulations, public awareness and reporting are essential to prevent its further spread in India.



*Clarias gariepinus (Burchell, 1822)*

**The African Catfish:**

Belonging to the family *Clariidae*, the African catfish (*Clarias gariepinus*, Burchell, 1822) is commonly known as the African magur or North African catfish. Locally, in Maharashtra, it is called Sarkari magur or Thai magur. This species has a wide native range, encompassing much of the African continent, excluding regions like Maghreb, Upper and Lower Guinea, and South Africa's Cape provinces. Thriving in tropical freshwater and brackish habitats, the African catfish can tolerate temperatures between 8°C and 35°C and salinity levels up to 14 ppt.

Renowned for its resilience, this species reaches a maximum length of 1.7 meters, with a standard length of about 90 cm, and can weigh up to 60 kg. It has a lifespan of approximately 8 years and prefers a pH range of 6.5 to 8.0. Adaptable and hardy, the African catfish has become a subject of intrigue and contention in aquaculture due to its ecological impact and regulatory status.

**A Walking Predator:**

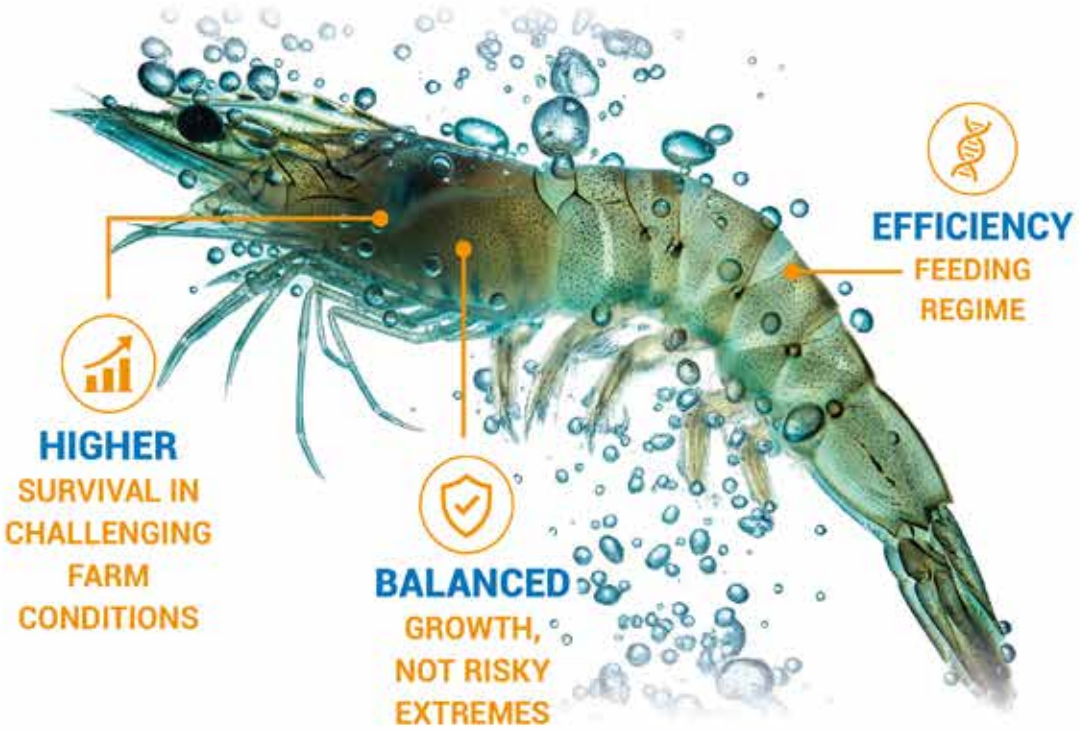
The African catfish is no ordinary fish—it is an air-breathing species capable of walking out of water using its strong pectoral fins and spines to search for land-based food or nearby water bodies. Known for its remarkable adaptability, this species thrives in extreme environmental conditions, matures across diverse habitats, and exhibits high fecundity. Its superior growth rate and survival under various agro-climatic conditions give it a competitive edge over native species. It has a broad food preference, often overlapping with the feeding habits of endemic fish, further threatening their populations. With no natural predators or competitors in Indian waters, its proliferation goes unchecked. These traits make it a dominant predator and a formidable competitor, posing a significant risk to the biodiversity of indigenous freshwater and brackish water fish communities.

**Ecological aspects:**

The African catfish is a remarkable freshwater species, predominantly found in quiet waters such as lakes, pools, and slow-flowing rivers, though it can adapt to fast-flowing rapids. This air-breathing catfish is highly resilient and can survive in turbid waters with low dissolved oxygen levels. It is often the last or only fish species in remnant pools of drying rivers. Notably, it can leave water at night, using its strong pectoral fins and spines to search for land-based food or traverse shallow pathways to breeding grounds. Ecologically, this catfish is a formidable competitor. Its wide tolerance to extreme conditions, ability to mature in diverse habitats, and high fecundity give it a significant edge over local species. It lacks natural predators or competitors in Indian water bodies,

Syaqua
Sustainable Shrimp Technologies
GENETICS • NUTRITION • HEALTH
#BlueBalanceAssured

# BALANCED GENETICS FOR REAL FARM PERFORMANCE




REAL GENETICS. BUILT FOR REAL FARMING CONDITIONS

CONTACT US
FOR OUR GENETIC NOW

SCAN
TO LEARN MORE

enabling unchecked proliferation. Its overlapping food preferences with endemic species disrupt local ecosystems, making it a superior predator and competitor against indigenous freshwater and brackish fish fauna.

A true omnivore, the African catfish exhibits scavenging and predatory behaviour, feeding on a broad array of food items, including insects, snails, crabs, shrimp, fish, earthworms, plants, fruits, seeds, and even terrestrial organisms. Its diet includes dead animals, birds, reptiles, amphibians, and small mammals. Cannibalism is observed in the fry stage and aquaculture; it is often fed waste products from slaughterhouses and processing industries. The species can even hunt in packs, herding and trapping smaller fish. These traits underscore its adaptability and dominance in various ecosystems.

**Why it is classified as an Invasive Species:**

The African catfish has earned its status as an invasive species due to a combination of biological and ecological traits that give it a significant advantage over local aquatic fauna. Its ability to tolerate extreme environmental conditions and higher survival rates across diverse agro-climatic zones makes it remarkably adaptable. Its superior growth rate and aggressive carnivorous behaviour often overshadow native species, disrupting ecological balance. A dietary generalist, the African catfish can consume a wide variety of food, including the same resources relied upon by endemic species, leading to direct competition. Its ability to attain maturity in various habitats, air-breathing capabilities and the unique ability to crawl over land to new areas ensures its rapid spread. Furthermore, its high fecundity contributes to explosive population growth, leaving little room for natural checks in ecosystems lacking predators or competitors. These combined traits make the African catfish a dominant, invasive force, outcompeting indigenous species and threatening biodiversity in Indian waters.

**Spread and Impacts : Global to Local**

The invasive nature of the African catfish is evident through its widespread ecological and economic impacts across the globe. In Thailand, its escape into the wild has resulted in gene introgression with the native species *Clarias macrocephalus*, altering local genetic diversity. In the Eastern Cape of South Africa, it has devastated native fish and crab populations, disrupting ecological balances. Similarly, introducing this species in Bangladesh has contributed to the decline of about 56 indigenous fish species, highlighting its threat to biodiversity.

In India, the invasive presence of African catfish has been reported in all states, including the Andaman and Nicobar Islands. It has infiltrated significant river systems such as the Ganga, Yamuna, Sutlej, and Godavari, progressively appearing in fish catches. Specific examples include Andhra Pradesh's Kolleru Lake, where the decline of commonly occurring indigenous species has been observed, and Rajasthan's Bharatpur Bird Sanctuary, where reports indicate it preys on the critically endangered moorhen (*Gallinula chloropus*).

Beyond India, other countries have imposed restrictions to curb its spread. For instance, due to its ecological risks, Germany has restricted trade in African catfish. Experiments have also demonstrated its invasiveness in polyculture systems, where its presence causes significant losses (78–86%) to carp populations. These examples underscore the widespread and far-reaching ecological disruption caused by this species.

**A Looming Ecological Crisis:**

The introduction and spread of the African catfish pose several significant threats to local biodiversity and ecological systems. One of the major concerns is the potential for genetic pollution, as this species can hybridise with native fish such as *Clarias batrachus*, potentially altering the genetic integrity of wild populations. Additionally, the use of animal waste as feed in aquaculture raises the risk of zoonotic disease outbreaks. For example, studies in Egypt's Nile Delta have revealed natural *Brucella melitensis* biovar 3 infections in African catfish feeding on disposed animal waste, showcasing its role in disease transmission. The species threatens indigenous aquatic fauna, including fish, invertebrates, crabs, shrimps, and even birds. It harbours at least 20 recorded parasites, and its translocation could facilitate the spread of these pathogens, potentially leading to local extinctions as native species often lack resistance to these new threats. Without a natural predator in non-native ecosystems, the African catfish population grows unchecked, further exacerbating its impact. The cumulative effect of these factors could lead to a severe loss of endemic diversity, undermining the ecological stability of affected regions. The African catfish's invasive characteristics and associated risks demand urgent measures to mitigate its spread and impact.

**Illegal Aquaculture:**

Despite a legal ban on the culture of African catfish, illegal farming of this species persists, driven by its fast growth and high market demand. Often, this clandestine aquaculture involves feeding the fish with highly unsanitary inputs such as rotting flesh, slaughterhouse waste, chicken waste, and fish and prawn byproducts from processing industries. These practices not only violate regulatory norms but also raise serious concerns about public health, environmental contamination, and the spread of zoonotic diseases. The unchecked continuation of such activities exacerbates the ecological and societal threats this invasive species poses.

**Legislation under the Central**

45th Edition

# Aquaculture Expo 2026

Exhibition & Panel Discussion

## Panel Discussion

Experts - Farmers Interaction Meet

**7, 8 & 9 December 2026**

**SRMT Function Hall, Kakinada, Andhra Pradesh, India**

## LAYOUT OF STALLS




**For Stalls Booking, Contact:**

NRS Events, Aqua International,
Plot Nos: 18 & 19, BS – IV, Westend Meadows Township,
Behind 7 Hills Towers, Narsingi – Kokapet Road,
Hyderabad – 500 075, Telangana.
M: 96666 89554, 63010 47155
E: aquacultureexpo.nrs@gmail.com

**Organised By** NRS EVENTS

**Aqua International**

English Monthly since 1993

**Government:**
The Government of India has implemented measures to control the spread and cultivation of the African catfish due to its ecological risks. Through Circular No. 31016/1-96FY(3) dated December 19, 1997, the Ministry of Agriculture, Department of Animal Husbandry & Dairying, officially banned the cultivation of this species in India. Furthermore, Circular No. 33035/5/98-FY(2), dated July 17, 2000, directed immediate action to destroy existing stocks of the exotic *magur* (*Clarias gariepinus*) in the country.

In its order dated January 22, 2019 (OA No. 435/2018), the National Green Tribunal prohibited the breeding and culturing of exotic catfish (*Clarias gariepinus*), including its hybrids such as Thai Magur, across all States and Union Territories in India. The order mandated the immediate destruction of existing stocks. Additionally, the tribunal required all catfish breeders to procure their stock exclusively from State Fisheries Departments or authorized agencies to ensure compliance with regulations.

## DO'S
- Make people aware.
- Report its occurrence in natural waters.

## DON'TS
- Do not culture it.
- Don't breed it
- Do not Purchase it.
- Do not eat it.

**References:**
Froese, R. and D. Pauly. Editors. 2025. FishBase. World Wide Web electronic publication. www.fishbase.org, version (04/2025).

Government of India, Ministry of Agriculture, Department of Animal Husbandry & Dairying circular No. 31016/1-96FY(3), dated 19th December 1997

Government of India, Ministry of Agriculture, Department of Animal Husbandry & Dairying circular No. 33035/5/98-FY(2), dated 17th July 2000

Krishnakumar, K., A. Ali, B. Pereira & R. Raghavan (2011). Unregulated aquaculture and invasive alien species: a case study of the African Catfish Clarias gariepinus in Vembanad Lake (Ramsar Wetland), Kerala, India. Journal of Threatened Taxa 3(5): 1737–1744.

Lakra W.S, Singh A. K. and Ayyappan S. (2008) Editors Fish Introductions in India Status, Potential; and Challenges. Narendra Publishing House, New Delhi 303p.

Singh A. K. and J. K. Jena (2012). Proceedings of National Consultation on ' Alien Fish Species in Aquaculture and Aquarium Trade: Issues and Perspectives'. National Bureau of Fish Genetic Resources, Lucknow, India. 52p.

Wael F. El-Tras, Ahmed A. Tayel, Mahmoud M. Eltholth, Javier Guitian Brucella infection in freshwater fish: Evidence for natural infection of Nile catfish, Clarias gariepinus, with Brucella melitensis Veterinary Microbiology, Volume 141, Issues 3–4, 24 March 2010, Pages 321–325









Manufacturer of

## "TOXIC Free" POTASSIUM (K)

- **Highly Pure** – Ensures no side effects to shrimp and fish
- **Professionally Formulated** – By an expert team focused on aquaculture needs
- **State-of-the-Art Facility** – Ensures purity, consistency and accurate **K%.**
- **Flexible Use** – Direct Pond use, feed mix with binder, or inclusion in nutrition/micro-nutrition blends




**Strong Supply Network – Covering all regions of Andhra Pradesh, Telangana, Odisha, Tamil Nadu & Kerala.**



ISO 22000

fssai
Lc. No. 10723007000237

ISO

hidden Creative - rjt. 9904736474

**ADITI ENTERPRISE**

Mfg. Of Micro Nutrition, Animal & Agri Minerals

Plot No. 1031/B, GIDC, Little Hut Chowkdi,
ANKLESHWAR-393002, Gujarat - INDIA.

Contact : +91 93134 60234
+91 95588 05321

aditienterprise70@gmail.com

www.mineralsaditi.co.in

# Smart Shrimp Health Management:
## From Reactive Treatments to Predictive Aquaculture

Dr. K. Pani Prasad, Professor & Research Coordinator Andhra Pradesh Fisheries University
Vijayawada, Andhra Pradesh, Email: kpaniprasad1962@gmail.com

**Dr K. Pani Prasad** is an aquatic animal health and biosecurity specialist with over three decades of experience in shrimp and fish health management, disease surveillance, and AMR mitigation. Formerly Dean (ER) & Principal Scientist at ICAR-CIFE, Mumbai and currently Professor and Research Coordinator at Andhra Pradesh Fisheries University, Andhra Pradesh. He has contributed extensively to farmer training, national programs, and policy advisory work in aquaculture health management.

### Introduction

Shrimp farming has emerged as one of the most dynamic and export-oriented sectors of Indian aquaculture. Over the past two decades, technological advances, improved seed quality, and strong global demand have transformed shrimp culture into a major source of income and employment, particularly in coastal states such as Andhra Pradesh. However, despite this impressive growth, shrimp farming remains one of the most biologically sensitive and economically risky forms of animal production.

Disease outbreaks continue to be the single largest cause of crop failure in shrimp farming. Sudden mass mortalities, growth retardation, poor feed conversion, and export rejections are still common experiences for farmers. In many cases, even well-managed farms suffer unexpected losses due to factors that are not immediately visible or easily understood.

Traditionally, shrimp health management has been largely reactive. Farmers respond to disease only after visible signs such as reduced feeding, white faeces, weak swimming, red discoloration, or surface crowding appear. By the time these symptoms are noticed, the disease process is often already advanced, leaving very limited scope for effective intervention. Emergency chemical applications, indiscriminate antibiotic use, and panic harvesting become the default responses.

In recent years, a new paradigm known as **smart shrimp health management** has begun to reshape the way health risks are understood and managed in shrimp aquaculture. This approach emphasizes early warning, continuous monitoring, diagnostic confirmation, and system-level correction rather than symptom-based treatment. Smart shrimp health management represents a shift from "fighting disease" to "preventing risk".

### Why Conventional Shrimp Health Management Is No Longer Sufficient

Conventional shrimp health management practices were developed during a period when stocking densities were lower, culture durations were shorter, and disease pressure was comparatively limited. Under current semi-intensive and intensive farming systems, these approaches are increasingly inadequate.

One of the major limitations of traditional health management is the reliance on periodic water quality testing. Most farms measure key parameters such as dissolved oxygen, pH, and temperature only once or twice a day. However, the most critical stress events in shrimp ponds occur during late night and early morning hours, when dissolved oxygen drops sharply or sudden temperature fluctuations occur. These stress episodes often go completely unnoticed.

Disease diagnosis under conventional systems is also largely based on visual observation and experience. While farmer experience is valuable, many shrimp diseases show overlapping or non-specific symptoms. As a result, incorrect assumptions and inappropriate treatments are common. In the absence of confirmatory diagnostics, farmers often resort to empirical use of chemicals and antibiotics, which may temporarily suppress symptoms without addressing the root cause.

Another serious concern is the indiscriminate use of antimicrobials. Excessive antibiotic use contributes to antimicrobial resistance (AMR), threatens export acceptance, and poses risks to environmental and public health. International organizations such as the Food and Agriculture Organization of the United Nations have repeatedly emphasized the need to minimize antibiotic use in aquaculture and adopt preventive, science-based health management strategies.

These limitations clearly indicate the need for a more systematic, data-driven, and preventive approach to shrimp health management.

### What Is Smart Shrimp Health Management?

Smart shrimp health management is an integrated approach that combines technology, biological understanding, and disciplined management practices to maintain shrimp health throughout the culture cycle. It is not a single device or product, but a **framework for decision-making**.

At its core, smart health management relies on five interconnected components: continuous environmental monitoring, behaviour-based health indicators, rapid and reliable diagnostics, digital biosecurity and traceability, and antimicrobial-

# PROXY® PS

with Photosynthetic Formula

**POND CONDITIONER**





A Unique Combination
of Live Multi-strain
SOIL and WATER Probiotic

CAA Regn. No. CAA/MAY18/PRO/01684

# Min Total™

## Organic & Inorganic Minerals






- Natural Moulting
- Growth of Plankton
- Controls Body Cramp
- Pond Water Mineralization
- Shell Formation

CAA Regn. CAA/MAR2023/FA/04601

**HI-TECH PHARMA®**

Solutions for Animal Health & Nutrition

ISO 9001 : 2015 Certified ISO 22000 : 2018 Certified GMP Certified

email : info@hitechpharma.co
Cust. care No.: +91 97010 22555
website : www.hitechpharma.co

resistance-safe intervention strategies.

The central philosophy of this approach is simple but powerful. Instead of asking "Which medicine should I apply?", smart health management asks "What early signal did the shrimp give, and how can the farming system be corrected before disease develops?"

By focusing on early signals rather than late symptoms, farmers gain valuable time to intervene in a controlled and cost-effective manner.

### Pond Environment as the Foundation of Shrimp Health

Shrimp health is inseparable from pond environment. Shrimp are ectothermic animals with limited physiological capacity to cope with sudden environmental fluctuations. Even short-term exposure to suboptimal conditions can cause stress, suppress immunity, and increase susceptibility to pathogens.

Key environmental parameters influencing shrimp health include dissolved oxygen, temperature, pH, alkalinity, salinity, ammonia, nitrite, and organic load. In conventional systems, farmers often focus only on a few parameters and overlook their interactions.

Smart shrimp health management emphasizes continuous monitoring of these parameters using real-time sensors. Continuous data reveals patterns that are invisible through manual testing. For example, repeated night-time oxygen dips or gradual pH instability may not cause immediate mortality but can significantly weaken shrimp over time.

Early correction of environmental stress through aeration adjustment, water exchange, alkalinity management, or sludge control can prevent disease outbreaks without any chemical intervention. In this sense, environmental management is the first and most important form of disease prevention.

### Shrimp Behaviour as an Early Health Indicator

One of the most valuable but underutilized tools in shrimp health management is behaviour observation. Shrimp may not show obvious disease signs initially, but they respond quickly to stress through changes in behaviour.

Healthy shrimp exhibit active feeding response, uniform swimming patterns, regular molting, and consistent growth. Stressed or diseased shrimp often show reduced feed intake, delayed response to feed, erratic swimming, surface aggregation, or accumulation near pond edges.

Smart shrimp farms quantify behavioural changes using feeding trays, underwater cameras, and acoustic monitoring systems. Among these, feeding response is one of the earliest and most reliable indicators of health status. A sudden reduction in feed intake frequently appears several days before visible disease signs or mortality.

By linking behavioural data with environmental parameters, farmers can distinguish between nutritional issues, environmental stress, and early disease onset. This allows timely and targeted corrective action.

### From Guesswork to Diagnostics: The Smart Approach

Accurate disease diagnosis is essential for effective health management. Smart shrimp health management follows a tiered diagnostic approach that combines field-level screening with laboratory confirmation.

At the field level, gross examination of shrimp gut and hepatopancreas, combined with behavioural and growth trend analysis, provides valuable preliminary information. However, these observations are not sufficient for definitive diagnosis.

Laboratory-based molecular diagnostics such as polymerase chain reaction (PCR) play a crucial role in confirming the presence of major shrimp pathogens including Acute Hepatopancreatic Necrosis Disease (AHPND), *Enterocytozoon hepatopenaei* (EHP), White Spot Syndrome Virus (WSSV), and Infectious Myonecrosis Virus (IMNV).

An important principle of smart health management is routine surveillance testing, even in apparently healthy ponds. Early detection of subclinical infections allows farmers to adjust management practices, reduce stress, and prevent sudden disease outbreaks.

### Digital Biosecurity and Traceability

Biosecurity is the cornerstone of shrimp disease prevention. Most shrimp pathogens enter farms through infected seed, contaminated water, shared equipment, or human movement between ponds and farms.

Smart shrimp health management introduces digital biosecurity systems that ensure consistent implementation and documentation of biosecurity measures. Seed source, stocking details, water exchange, equipment disinfection, visitor entry, and health events are systematically recorded.

Digital traceability not only improves farm discipline but also enhances transparency and accountability. These records are increasingly important for accessing bank credit, insurance coverage, and premium export markets. Traceability transforms health management from an informal practice into a verifiable system.

### AMR-Safe Intervention Strategies

A defining feature of smart shrimp health management is its strong emphasis on antimicrobial-resistance-safe practices. Antibiotics are not viewed as first-line solutions but as tools of last resort, to be used only when scientifically justified.

Preferred interventions focus on correcting environmental stress, improving gut health, strengthening immunity, and optimizing nutrition. Functional feeds, probiotics, mineral supplementation, and carbon management are used strategically to restore system balance.

Partial harvesting during stress periods is another smart intervention that reduces biomass load and improves overall pond stability. By

treating the system rather than suppressing symptoms, smart health management reduces dependence on chemicals and antibiotics.

### Disease-Specific Early Warning and Response

Different shrimp diseases present distinct early warning patterns. For example, AHPND is often preceded by sudden feed refusal and empty gut, while EHP manifests as slow growth and increasing feed conversion ratio. White Spot outbreaks are frequently associated with abrupt temperature changes and stress events.

Smart health management uses these disease-specific signals to trigger predefined response protocols. This structured approach prevents panic-driven decisions and ensures timely, proportionate action.

### Economic Benefits of Smart Shrimp Health Management

The economic impact of smart shrimp health management is significant. Farmers adopting this approach consistently report higher survival rates, improved growth performance, lower feed conversion ratios, and reduced crop variability.

Perhaps more importantly, smart health management improves predictability. Predictable outcomes make shrimp farming more bankable, insurable, and attractive to long-term investment. Reduced antibiotic use also enhances market acceptance and export sustainability.

### Adoption Pathway for Indian Shrimp Farmers

Smart shrimp health management does not require large upfront investment. A phased adoption approach works best under Indian conditions.

Farmers can begin with basic sensor-based water quality monitoring and feeding discipline. Once confidence builds, routine diagnostic surveillance and digital record-keeping can be introduced. Over time, farms can integrate full health dashboards and traceability systems.

This stepwise approach ensures affordability while delivering tangible benefits at each stage.

### Conclusion

Shrimp farming is no longer just about feeding and harvesting. It is about understanding biological signals, managing risk, and making informed decisions. Smart shrimp health management provides a practical framework to achieve these goals.

Shrimp may not speak, but they constantly communicate their health through behaviour, growth, and response to the environment. Smart shrimp health management teaches farmers how to listen early, act wisely, and farm responsibly.

As Indian shrimp aquaculture moves forward, embracing smart health management is not merely an option—it is a necessity for sustainability, profitability, and global competitiveness.


AVAILABLE FROM OUR READY STOCKS

AVAILABLE FROM OUR READY STOCKS:

- SPIRULINA POWDER SPRAY DRIED, CHOLESTROL
- YUCCA SCHIDEGERA - 80% & 30%
- SODIUM PERBORATE MONO, SODIUM PER CARBONATE, CALCIUM, PEROXIDE, TRIPLE SALT, HYDROGEN PEROXIDE, etc.
- BKC - 50%, GLUTRALDEHYDE - 50%, FORMAL DEHYDE - 37%, CETRAMIDE SOLUTION, PROPIONIC ACID etc.
- IODINE, POTASSIUM IODIDE, EMULSIFIER
- FERROUS SULPHATE, MANGANESE SULPHATE, MAGNESIUM, SULPHATE, ZINC SULPHATE, COPPER SULPHATE, COBALT SULPHATE, ZINC OXIDE, MAGNESIUM OXIDE, SODIUM SELENATE, AMMONIUM, MOLYBDATE, CHROMIUM etc. FLAVOURS, COLOURS, VITAMINS
- PROBIOTICS & ENZYMES
- PEPTONE, BEEF, BILE, MALT, PROTEIN, LIVER & YEAST EXTRACTS
- STARCH, DEXTROSE, DCP, TALC, KAOLIN, TSP, CALCIUM & OTHER BASE MATERIALS
- CHARCOAL, VITAMIN C, CALCIUM PROPIONATE, EDTA, CMC, GELATIN, GENTION VIOLET, MALCHITE GREEN.

Kindly contact for any requirements in Aqua Culture, Veterinary and Poultry Industry.

NIHAL TRADERS PVT LTD

3-3-66, Flat no. 103, Sikhara Heights, Besides Manjira Hotel,
Chappal Bazar, Hyderabad - 27 (A.P)
Ph: 040-24656968, 24746534, 24650253
Tele Fax: 040-24658097; Mobile: 9848040025
Email : nihaltraders@yahoo.com; www.nihaltraders. com

# Digha and neighbouring regions in West Bengal – A place of attraction for both tourists and Fisheries Science students

Subrato Ghosh, Kalighat, Kolkata – 700026, West Bengal, Email: subratoffa@gmail.com

**Highlight points**

In this article, the normal activities at two Govt of India research institutes, one fish farm-cum-laboratory and three activities concerning and featuring post-harvest fishery technology aspects in three private sectors have been presented – the institutes and other sites are located at and in close proximity to Digha, a well-known seaside destination in West Bengal. Digha is not just a place to enjoy and spend time with family and friends, but students of Fishery Sciences will be able to gain much first-hand knowledge, real experiences, many concepts and insights from these sites of different types if they plan and come on a trip under supervision of their teachers. Researchers work in depth at the two research institutes; also studies on socio-economic profile and livelihood of professional marine fishermen and dry fish producers can be conducted. Some lesser known important features of the seven different places of academic interest near to Digha have been presented in this article, students may like reading it and gain interest.

## Introduction

Purba Medinipur district leads in West Bengal among all 23 districts in almost all areas of fisheries and inland aquaculture. This includes grow-out aquaculture and production of big-sized Indian major carps, export-oriented brackishwater shrimps, giant freshwater prawn, and marine capture fisheries-cum-marine fish production. Digha, located in coastal Purba Medinipur is a very popular tourist attraction point and destination in West Bengal. The newly built Kalinga-style temple



*Acanthopagrus latus at Digha Mohona market*

in New Digha namely Sri Jagannath temple has become an added piece of attraction. With the quiet and peaceful sea beach (which is a part of Bay of Bengal coast), casuarina trees, calm sea with gentle waves – the scenic beauty of Digha altogether is highly charming. Tourists from West Bengal and neighbouring states enjoy holidays by gathering and spending time along the sea beach particularly at New Digha, bathing, eating delicious seafood and staying in nearby hotels. New Digha, having wider sea beach is located at about 2km from Old Digha.

In addition to the above, Digha and its surrounding areas are places to learn many things in connection with fish, fishery science and aquaculture. In this article, we will discuss about the important sites at and nearby to Digha where under-graduate and post-graduate students of Fishery Sciences and Zoology may visit in a team (of particular Year/Semester) from their college/university at their convenient time with guide teachers and acquire much field and practical knowledge about shrimp processing (freezing) technique; finfish drying method; identification of marine foodfishes, marine ornamental fishes and marine invertebrates; important concepts of marine fisheries in West Bengal; freshwater fish culture; carp hatchery operation; induced fish breeding; fish biodiversity protection approaches; aquaculture biotechnology techniques – covering a considerable portion of their syllabus in entire study period. It will provide them a sound knowledge base, from which they will be benefitted and it will prove useful for them. The places of academic interest have been dealt with individually.

## Marine Aquarium and Research Centre

The Marine Aquarium and Regional Centre, located very close to New Digha sea beach and Digha Railway Station is under administrative control of Zoological Survey of India, Govt of India. The Centre exhibits diverse kinds of live marine finfishes (particularly aquarium/ornamental marine fishes), elasmobranchs, and coastal and marine invertebrates normally found in this region (north-east coast of Bay of Bengal), both economically-important and less economically-important ones, with proper labeling and authentic information of each of the species. The Centre also discusses about their importance for study and research, steadily depleting resource (fish stock) and need of their conservation (protection) with common people, UG and PG students of Zoology and Fishery Sciences of different college and university. The Centre has advanced high-end filtration, regulated water supply and seawater circulation system for maintaining its exquisite aquarium facilities and fish tanks. It is open for general public. Aquaria at this Centre have both marine and freshwater sections comprising 22 tanks and 8 tanks respectively.

Every person will love to visit this Research Centre and see the fascinating world of important marine foodfish, ornamental fish and ornamental marine invertebrates.

The Centre is important both in terms of academics (education) and recreation. The well-maintained glass fish tanks mimic natural marine habitat. Training courses on study of coastal and marine ecosystem is conducted here, research on the subject matter is performed here by high quality scientific expertise in well-equipped laboratories having advanced microscopes and analytical equipments. The skeleton of ancient Bryde's whale is a very good item of attraction here. Very good piece of MSc and PhD Dissertation research work in Fishery Science and Marine Biology are carried out here under supervision of scientists. Both UG and PG students of Fishery Sciences will gain much knowledge after visiting here, on principle differences between freshwater and marine aquarium, functioning of marine aquarium and other aspects after discussing with scientists and technical persons working here.

### Digha Regional Research Centre of ICAR-CMFRI

The Digha Regional Station of ICAR-Central Marine Fisheries Research Institute, located at Chouddo-mile near Ramnagar and 12-12.5km from Digha, aims to cater more with a focused approach to need of marine fisheries research in West Bengal and generating sustainable livelihood for coastal fishermen community. This Station assesses the commercially-important marine fish stocks of the state including *Hilsa ilisha*, investigates on value chain marketing of the marine fish catch. It provides recommendations to West Bengal Government for management of marine fish stocks by way of framing regulations and aims to provide technical and scientific support. The Station has improved the process of regular monitoring of marine fish landings and assessment of fish stocks, which in turn is expected to be helpful in managing the marine fishery resources in this north-east region of Bay of Bengal including West Bengal and Odisha coasts. This Station also aims to popularize recently-developed mariculture, *i.e.*, marine cage culture technologies of commercially important marine fishes developed by ICAR-CMFRI and which are suitable for adoption, and that will alleviate pressure on quite regularly exploited wild fish stocks.



*A big grouper at Digha mohona market*



*A big Telkoi under Perciformes at Digha mohona market*

This Station organizes training and awareness programmes on conservation of depleting stocks of important marine teleosts and elasmobranchs, culture of *Mugil cephalus,* taxonomy of marine fishes, grow-out culture and fattening of mud crabs, and other topics for marine fishermen and stakeholders. Both UG and PG students of Fishery Sciences will be able to gain complete knowledge and know more from scientists and technical officers working at this Station on and about marine fish stock (resource) assessment process for sustainable fisheries; research, extension and developmental activities of ICAR-CMFRI; overfishing; quantum of marine bye-catch; maximum sustainable yield; potential yield; sustainable exploitation of important marine fishery resource; major fishing operations, bionomics of important marine fish and their fishery; identifying features of different groups (families) of tropical marine finfishes; new research priorities and findings; prevention of capture and sale of undersized economically-important marine fishes.

### Digha Mohona fish market

Digha Mohona wholesale fish market and auction centre, located about 3.5-4km from Digha proper towards Ramnagar, is one of very important marine fish wholesale markets in Asia. It is located near to



*Sun-dried fishes near Junput coast*

office of Digha Fishermen and Fish Traders Association (DFFTA) at Digha Mohona. It is a noisy place full of activity in dawn and morning hours, meant for commercial auction and sale of various kinds economically-important and high-valued marine foodfishes and shellfishes having high market demand. It is brought in fresh condition by local marine fishermen, who operate in mechanized-motorized and motorized fishing trawlers in Bay of Bengal in 12 Nautical mile zone (22km from coast into open sea) and beyond it. About 10000-12000nos fishermen stay at this market permanently. It organizes weeklong 'Gangotsov' or Sea Food Festival during mid-January every year where, in addition to other activities, proper identification and nutritional importance (benefits of eating) of over eighty species of marine finfishes are made known to visitors, which are displayed as formalin-preserved specimens in glass jars.

At Digha mohona, a '2-month' long ban period in marine fishing every year is strictly observed for conservation and preventing resource depletion of important marine finfishes. On an average, transaction of Rs 4 crores occurs everyday at this fish market, the largest marine fish wholesale market in eastern India. Marine and estuarine fishes of various kinds are landed everyday at this fish landing centre by fishing trawlers of different kinds, and, with support of these, 17,500nos fishermen are involved in marine capture fishery. There are 145 fish auction points here, through which fishermen sell their captured fishes directly to the customers. Around 400-450 tonnes of marine and brackishwater fish

and shellfish (on average) are sold through this fish market everyday, that comprise of 80-100 different species. Around 1,00,000 tonnes of fish are sold in a season from this landing centre-cum-fish market and transported to different parts of West Bengal and even abroad (exported). Both UG and PG students of Fishery Sciences, escorted by their guide teachers may visit this place in early morning hours with camera, note book and pen for properly and scientifically knowing species name and noting identifying features of freshly-caught important marine fishes and shellfishes of different size.

### Sun-dried fish production in private sector

Hygienic sun-dried marine fish production in a large commercial scale and trade for human consumption is an important sector of fisheries in Purba Medinipur. Junput, located about 30km backwards from Digha towards Contai town is one of the main sun-dried marine fish production centres in coastal West Bengal. From here, dry fish is transported to markets in north Bengal, Odisha, Assam, Sikkim, Tripura, other north-eastern states, Nepal, Bhutan, and Bangladesh. About 200 dry fish producers work directly at Digha Mohona Matsya Khoti, with approximately 5000 more people indirectly involved in related activities. More than 50,000 marine and coastal fishermen in Digha Mohona, Mandarmoni and Junput are directly or indirectly involved in dry fish production in fish drying yards and trade for their livelihoods. From Mandarmoni Matsya Khoti alone, 40-50 large vehicles loaded with dry fish supply markets across eastern India each year. Commercial fish drying at Junput Matsya Khoti began about 70-75 years ago.

Other Matsya Khotis in coastal Purba Medinipur are at Soula, Kadua, Petuaghat, Haripur, Boguran, Jaldha, Khorpai, Jalpai, Shankarpur, Dadanpatrabar and Gopalpur - all coastal fishing villages. Dried fish production at Junput is most active from late autumn through to next



*Bombay duck dried under sunshine*

year's spring. Presently, 550-600 dry fish producers make up Junput Khoti. Important species of marine fishes sun-dried at this Khoti in well-maintained clean conditions on split bamboo racks and cemented floor are *Coilia ramkarati*, *Harpodon nehereus*, *Coilia dussumieri*, *Trichiurus lepturus*, *Lepturacanthus savala*, *Opisthopterus tardoore*. From on-site conversation with elderly and experienced dry fish producers and workers, both UG and PG students of Fishery Sciences will be able to know the important management steps and entire procedure of the hygienic fish drying technique in vogue.

### Shrimp processing (freezing) centre

The KNC Agro Limited is a much renowned brackishwater shrimp *Penaeus monodon* and *Litopenaeus vannamei* processing unit (meant for export), a specialized industrial facility for the important exportable commodity shrimp in West Bengal under private sector, having EU approval number. Its location at Pichhaboni is about 22km from Digha towards Contai. It supplies safe and hygienic seafood to the world maintaining the environment, sustainability and better livelihood of shrimp farmers. Complying with HACCP principles, here, economically-important shrimps are processed with high degree of freshness. Considering other infrastructure, this plant has seven contact freezers (for block frozen material), four raw IQF (Individual Quick Frozen) machines and one Cooking Line, well-equipped in house Laboratory. Presence of even minimum traces of pathogenic and non-pathogenic microorganisms like *Vibrio* sp, *Salmonella* sp, *Pseudomonas* sp, *Escherichia coli*, *Staphylococcus aureus*, total and faecal coliform bacteria (if any) (total aerobic plate count in CFU, MPN coliforms) is thoroughly checked both in the raw material and final frozen product. All specialized machineries used in this shrimp processing unit are imported. Product type at KNC Agro Limited, both 'raw' and 'cooked' separately, includes 'Head-on Shell-on'; 'Headless Shell-on'; 'Headless Shell-on Easy-peel'; 'Peeled, deveined Tail-on'; 'Peeled, deveined Tail-off'; 'Peeled and deveined'; 'Peeled undeveined'; 'Skewer'; 'Butterfly'. The cold storage works here at -18°C, temperature is maintained.

All steps of processing/post-harvest (freezing) activities from receiving of adult shrimps from its own farm ponds, handling to production of final marketable products, ready for export to global markets, are done at this ultra-modern shrimp processing plant complying to strict hygienic principles (including personal hygiene) and adhering to food safety and quality standards. Both quality and shelf life of shrimps are increased in the process, value-added and prepared for consumption. Both UG and PG students of Fishery Sciences will get acquainted with freezers, other equipments and machineries, shrimps frozen at -40°C, will be able to learn all the scientific steps of modern state-of-the-art shrimp processing and get an idea what strict hygiene and sanitation measures is all about.

### Aquaculture Pathology Laboratory

Disease diagnosis is an important step in commercial modern shrimp farming system in brackishwater ponds. The Aquaculture Pathology Laboratory at Government Fish



*A fish pond at Government Fish Farm, Junput*

Invitation

# 45th Edition Aquaculture Expo 2026

## Exhibition & Panel Discussion

## 7, 8 & 9 December 2026

## Kakinada, Andhra Pradesh, India

***Exhibition & Panel Discussion***
***to Update Knowledge and for Better Business Opportunities***



Organized by NRS EVENTS

**Aqua International**

English Monthly since 1993

## 7, 8 & 9 December 2026

## Kakinada, A.P., India

**Venue:** **SRMT Function Hall**
**Kosurivari Street, Kakinada, Andhra Pradesh, India**

Exhibition Timings: 10 AM to 6 PM

**Panel Discussion & Interaction Meet**

Experts and Consultants in Aquaculture are invited to take part in Panel Discussion and answer to the queries and issues of the farmers during the meet on 7 December 2026

**EXHIBITION • PANEL DISCUSSION**



*Carp fry harvested from nursery pond*

Technological Station (GFTS), Junput under Department of Fisheries, Govt of West Bengal is a centre for disease diagnosis of farmed brackishwater shrimps - a well-equipped shrimp virus detection centre of high standard. Here, samples are analyzed, shrimp pathogen detection and necessary testing of shrimp samples is accomplished *via* one-step PCR method, targeting the specific 941bp gene of White Spot Syndrome Virus in infected shrimp, if present. At present, all needed research infrastructure and testing facilities exist at APL for testing of the deadly WSSV causing White Spot Disease in shrimp samples, disease diagnosis work has started. Slowly and steadily, testing facilities for another two kinds of important pathogen and parasite will be made available. Shrimps farmers from different areas of coastal Purba Medinipur bring their 'apparently healthy but suspiciously infected' shrimp samples (sub-adults), shrimp post-larvae for WSSV screening before stocking in ponds and moribund samples under culture having preliminary disease symptoms at APL for testing.

After detection of WSSV (whether present in shrimp body or not) *via* PCR technology and diagnosis of the disease, farmers are given authentic Report, recommendations about how to tackle the pathogenic virus in future, implementation of Best Management Practices for shrimp farming, methods of disease prevention. Through molecular biology-based PCR technique icw proper, early (timely) and accurate disease diagnosis at APL, shrimp farmers by profession of West Bengal are expected to get meaningful support, disease-free marketable-sized shrimps will be produced in increased amounts, massive crop loss can be prevented. APL is actively engaged with farmers in nearby and distant areas, giving full effort to address farmers' need in a timely manner. Both UG and PG students of Fishery Sciences may visit here to get basic concept about molecular biology techniques, principles of DNA extraction, gel electrophoresis, histopathology, bacteriology and others.

## Government Fish Technological Station

Government Fish Technological Station and Fish Farm, located at Junput, about 32 km from Digha is the largest and oldest actively-functioning State Government fish farm in West Bengal. Both freshwater & brackishwater fish culture is done here simultaneously. A well-maintained fish seed production unit (*i.e.*, Chinese carp hatchery) fulfills its seed (spawn, fry, fingerling) demand as well as earns revenue every year through public sale of carp spawn, fry, advanced fry, fingerlings. There is a State-level residential training centre here where



*A grow out pond at GFTS Junput*

progressive fish farmers are given 3-4 days training on freshwater fish hatchery management, fish disease management, ornamental fish culture, and others. Training is also given to Government officers and Fishery Sciences students of different colleges in classroom session and demonstration. Augmentation of quantity of production (both fish seed and table fish) adopting modern technology of aquaculture is a primary focus here. Total area of this farm is 67 hectare, effective water area is 40.7ha (approx). Total number of ponds is 48 and recently 5 additional numbers of ponds have been formed. Good quality healthy spawn of IMC, exotic carps and medium carps are produced here through induced breeding.

The table fish production unit comprises both freshwater and brackishw ater ponds, there are 13 grow-out water bodies of different sizes with total 25.4ha area. For conservation and propagation of indigenous depleting fish species, the 'Chuno Punti Mourola Jolasaay'/'Avoy Pukur' has been introduced by Fisheries Department in collaboration with Biodiversity Board, Govt of West Bengal. Two ponds have been earmarked and being maintained *icw* this fish sanctuary concept which are protected by aquatic and semi-aquatic vegetation on its periphery. Few threatened species have already started natural breeding here. Production of seeds of air-breathing catfish *Heteropneustes fossilis* and non-air-breathing catfish *Ompak pabda* have been done successfully. Important soil and water physico-chemical parameters of major carp and shrimp farmers' ponds are analyzed and tested at APL using water and soil samples. Both UG and PG students of Fishery Sciences may come to this farm in educational tour and will be able to gain much knowledge about nursery pond management, composite fish culture, supplementary fish feeding, induced fish breeding, carp hatchery management and other aspects.



*Sun-dried fishes meant for transportation in truck*



*A giant marine fish at Digha Mohona market*

FECPI

SOLUTION FOR SUSTAINABLE

AQUA CULTURE....




*Our Products are Registered with CAA as Antibiotic-free Aquaculture Inputs*

Manufactured & Marketed by

# FECPI India Pvt. Ltd.

Regd. off : Sy No. 94/1A1, Ground Floor
Vanagaram-Ambattur Road, (Next To Apollo Hospital),
Ayanambakkam, Chennai - 600095
Cusstomer Care : +91 99449 88192, +91 44 495 23456
Email : info@fecpi.in Visit us at : www.fecpi.in

Visit us at : **www.fecpi.in**

# Beyond the Pathogen: How Environment and Host Resilience Shape Disease Outcomes in Shrimp Farming

**"We Did Everything the Same. Why Is This Crop Different?"**

Suparat Taengchaiyaphum and Natthinee Munkongwongsiri

Shrimp production is often attributed to pathogen presence or genetic quality, yet the same shrimp line and management practices can produce markedly different outcomes between crops. Similar management does not necessarily create the same biological conditions, and a different crop outcome does not automatically indicate a problem with either genetics or farm management. Disease and production performance reflect dynamic interactions among pathogen pressure, environmental conditions, and host resilience, with environmental fluctuations affecting physiology, immunity, and microbial balance. Understanding these interactions helps answer the fundamental question: "We did everything the same, why is this crop different?" This article integrates farm observations and scientific evidence to identify key factors affecting shrimp production and support more effective risk management and production strategies.

## Beyond the Pathogen: Disease is an Interaction

The Disease Triangle Theory explains that disease results from dynamic interaction among pathogen, host, and environment, rather than from pathogen presence alone. In shrimp farming, disease risk is determined by pathogen pressure (load, virulence, and co-infection), host resilience (genetics, age, nutrition, immunity, and physiological condition), and environmental conditions (temperature, salinity, DO, pH, water quality, stocking density, microbial balance, and fluctuations) (Rowley et al., 2024). Even under high pathogen pressure, disease may not develop when shrimp are resilient and environmental conditions are favorable; conversely, environmental stress can weaken host resilience and alter pathogen activity, shifting a balanced system toward disease. Therefore, pathogen presence does not necessarily equal disease. Disease outcome can be viewed through the interaction of Pathogen × Host × Environment × Time, helping explain why the same shrimp line may perform differently between production cycles despite apparently similar management.

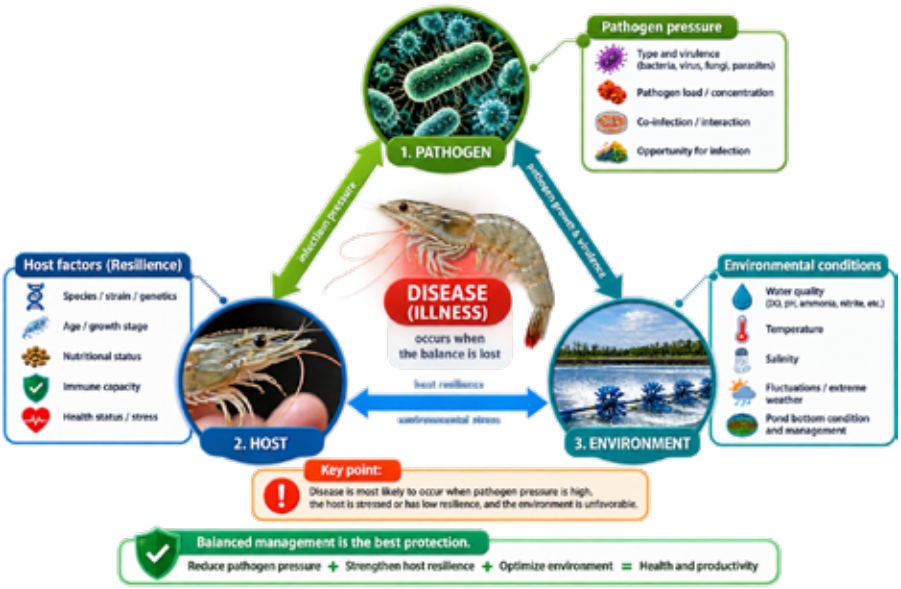



*Figure 1: Disease triangle theory in shrimp health. Disease development results from the interaction among pathogen pressure, host resilience, and environmental conditions. Disease is most likely to occur when pathogen pressure is high, host resistance is reduced, and environmental conditions are unfavorable. Balanced management targeting all three components can reduce disease risk and support stable shrimp production.*

> *"The same management and the same shrimp do not always face the same challenge. Understanding what changed is the first step toward a better crop."*

Based on current evidence and scientific findings, several key factors are changing and increasingly influencing shrimp production. These factors and their potential impacts are discussed below.

## The Challenge is also Changing: Pathogens Do Not Stand Still

The emergence of AHPND, TPD, and EHP demonstrates that pathogen pressure in shrimp farming is continuously changing, both in virulence and in the type of production impact it causes. Vibrio populations can evolve through horizontal gene transfer, plasmid acquisition, recombination, and

# Aqua International

**is the authenticated and well read quality magazine in India with the largest readership. Aqua International is known as the most trusted and reliable source of media / information on aquaculture sector in India.**




**SUBSCRIBE NOW**

**SCAN QR CODE**
and pay towards subscription charges to Aqua International, English monthly

English monthly on Aquaculture sector since 1993

**Aqua International**

www.aquainternational.in

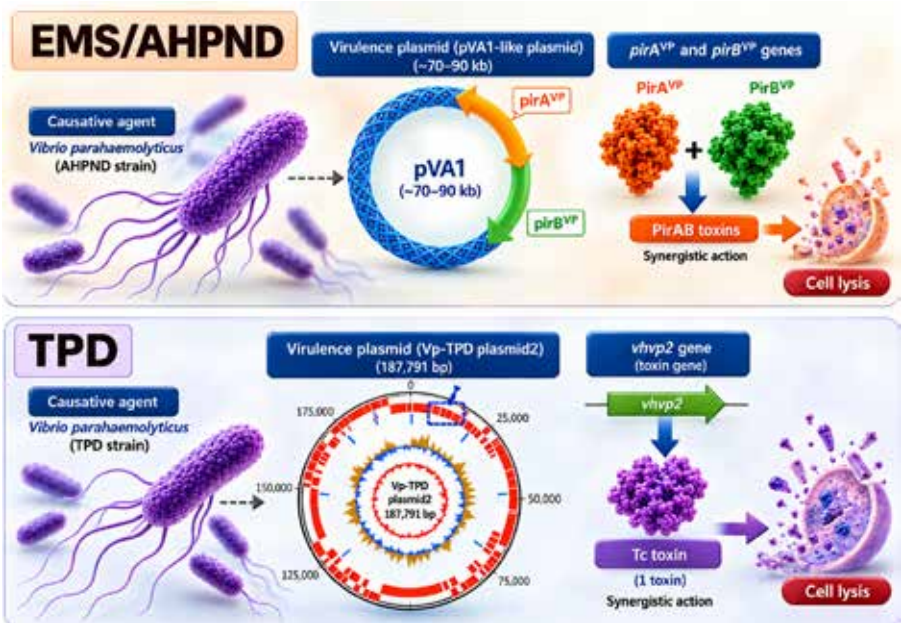



*Figure 2: Evolution of virulence in Vibrio parahaemolyticus. Acquisition of toxin-encoding virulence plasmids can rapidly increase bacterial pathogenicity. AHPND strains carry pirAVP/pirBVP, whereas TPD strains harbor vhvp2, illustrating how horizontal gene transfer can drive the emergence of new virulent strains in shrimp production.*

changes in virulence regulation; for example, AHPND emerged through acquisition of the pVA virulence plasmid carrying pirA and pirB (Sirikharin et al. 2015), while TPD-associated Vibrio carries distinct mobile virulence determinants, including vhvp-2, capable of causing severe mortality in post-larvae (Liu S, et al. 2023). At the same time, disease pressure is not limited to acute mortality.

Chronic pathogens such as EHP may allow shrimp to survive while progressively reducing growth, size uniformity, feed efficiency, resilience, and final productivity, with environmental stress potentially increasing these effects (Chaijarasphong T, et al. 2021). Together, these examples support an important message for Beyond the Pathogen: shrimp genetics and management may remain relatively unchanged while the biological challenge continues to evolve, from newly emerging virulent strains that cause rapid mortality to persistent infections that quietly reduce crop performance. Therefore, declining survival or productivity should not automatically be interpreted as deterioration of shrimp genetics, and survival alone does not necessarily indicate a healthy or productive crop.

## The Environment is also Changing: Temperature as a Key Driver

Shrimp are ectothermic animals, meaning their physiological processes are strongly influenced by the surrounding water. Temperature affects metabolism, oxygen demand, energy allocation, growth, immunity and ultimately host resilience. With global warming and increasing temperature variability, thermal stress is becoming an increasingly important challenge for shrimp production. Prolonged exposure to extreme temperatures can increase metabolic demands and oxidative stress, disrupt immune function and microbiome stability, and reduce the energy available for growth and other physiological functions, potentially increasing susceptibility to disease. These effects may be further amplified when temperature stress occurs together with other environmental challenges, such as low DO, salinity changes, or elevated ammonia. Therefore, changes in temperature intensity, duration, and fluctuation, rather than average temperature alone, can significantly influence growth, survival, and overall crop performance.

## How Temperature Affects Shrimp Production: Research-Based Evidence

1. Higher maintenance cost and altered energy allocation (Shirly-Lim YL. Et al, 2024): Temperature strongly influences shrimp metabolism, oxygen demand, feeding, and energy use. Under thermal stress, increasing feed consumption does not necessarily translate into greater growth because more energy may be allocated to basal metabolic

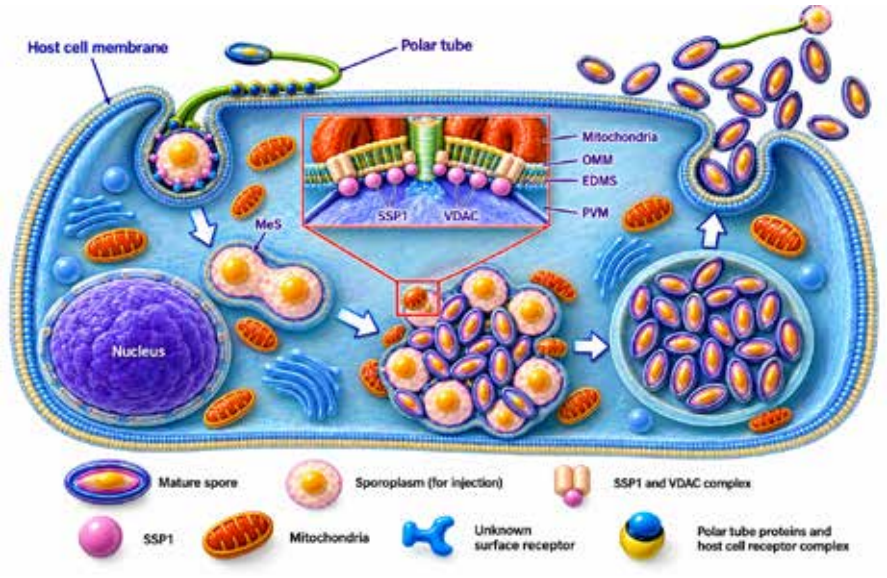



*Figure 3: EHP-induced energy robbery and growth retardation. EHP exploits host energy and mitochondrial resources for intracellular replication, redirecting energy from normal metabolism and ultimately contributing to growth retardation in shrimp.*

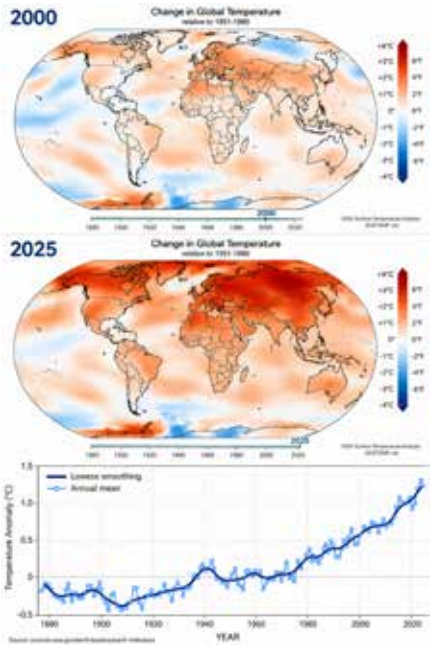



*Figure 4: Long-term global temperature change. Global temperature anomaly records illustrate the broader trend of increasing temperature over recent decades. While actual shrimp-pond temperatures are determined by local climate, season, pond characteristics, and farm management, these long-term trends provide important context for the increasing attention given to thermal stress and temperature variability in aquaculture.*

maintenance rather than somatic growth. For example, under combined high-temperature (34°C) and low-pH stress, metabolic oxygen uptake increased by approximately 40%, while ammonia excretion increased approximately two-fold. Energy reserves in the muscle and hepatopancreas were mobilized to support basal metabolic requirements rather than growth. This shift in energy allocation can reduce production efficiency and leave less physiological capacity to cope with additional challenges.

2. Reduced physiological and host resilience (Duan Y, et al (2025): Prolonged thermal stress can affect more than growth. Chronic exposure to 33°C for seven days has been associated with oxidative stress, inflammatory responses, intestinal epithelial and mucus-barrier damage, hepatopancreatic injury, immune dysregulation, altered metabolism, and disturbance of the intestinal microbiome. Together, these changes can reduce the shrimp's capacity to maintain normal physiological function and potentially increase susceptibility when pathogen pressure is also present.

3. Interaction with other environmental stressors (Zhu X, et al. 2026): Temperature should not be considered independently from other environmental conditions. Experimental evidence demonstrates a strong temperature–salinity interaction: under low salinity, thermal stress was associated with a 47% reduction in intestinal villus height and a 15.83% reduction in survival. Similarly, combined high-temperature and low-pH exposure substantially increased metabolic costs. Thus, a temperature that remains tolerable under favorable conditions may become physiologically damaging when shrimp simultaneously experience other environmental stressors.

## Same Management Does Not Mean the Same Biological Pressure

A farmer may follow the same management protocol used in previous successful crops, but this does not mean that shrimp experience the same biological conditions. Temperature is a clear example: under favorable temperatures, shrimp maintain normal metabolic and oxygen demands, providing a larger biological safety margin. In contrast, prolonged high temperatures increase metabolic demand, oxygen requirements, and maintenance costs, reducing the energy available for growth and resilience and narrowing the biological safety margin. Therefore, even when genetics and management remain unchanged, crop performance can differ because the management may be the same, while the biological pressure on the shrimp is different.

Importantly, when a farmer says, "I managed this crop the same way as before," that observation may be completely valid. The difference is that management describes what we do, while biological pressure describes what the shrimp experience. Temperature, pathogen pressure, biomass, and other environmental conditions can change between crops even when the management protocol remains consistent. Good management therefore requires not only consistency, but also the ability to recognize when the biological conditions have changed and adapt accordingly.

## Beyond Disease Resistance: Breeding Shrimp for Robustness Across Environments

Selective breeding for specific disease resistance remains an important strategy in shrimp production, but performance under controlled challenge conditions may not fully predict performance on commercial farms, where shrimp experience multiple pathogens, environmental fluctuations, and physiological stress simultaneously. This limitation is supported by evidence of genotype-by-environment (G×E) interactions in shrimp: a recent meta-analysis found stronger G×E effects for survival than for growth, indicating that families performing well in one environment may not maintain the same ranking under different production conditions (Hasan M, et al., 2024). Therefore, breeding programs can extend beyond resistance to individual pathogens toward robustness, the ability to maintain survival, growth, and health across variable environments. Combining standardized disease challenges, accurate phenotyping, genomic selection, and field-performance data provides an increasingly powerful foundation for understanding and improving robustness across commercial environments. The objective is not to develop shrimp that are unaffected by environmental change, but to increase their capacity to maintain survival, growth, and health across a

wider range of biological conditions. Genetic improvement cannot remove environmental or pathogen pressure, but greater robustness can provide a larger biological safety margin under commercial conditions.

**Future Perspective**

When farmers say, "We did everything the same, so why is this crop different?", they may be right. The management may be the same, but the conditions around the shrimp may not be. Temperature and water conditions can change, pathogen pressure can increase or new strains can emerge, and shrimp may respond differently when several stresses occur together. This means that a poor crop should not automatically be attributed to the shrimp, the pathogen, or farm management alone. A better question is: "What changed this time?" Understanding what changed in the balance among pathogen pressure, host resilience, and environmental conditions over time can help farmers identify risks earlier and respond more effectively. Moving forward, more consistent shrimp production will depend on both good farm management to reduce unnecessary stress and pathogen pressure and continued genetic improvement to produce shrimp that remain strong under changing conditions.

**Selected reference list:**

Rowley, A. F., et al. (2024). Diseases of marine fish and shellfish in an age of rapid climate change. iScience, 27(9), https://doi.org/10.1016/j.isci.2024.110838.

Liu S, et al. (2023). Vibrio parahaemolyticus becomes lethal to post-larvae shrimp via acquiring novel virulence factors. Microbiol Spectr 11:e00492-23. https://doi.org/10.1128/spectrum.00492-23.

Sirikharin R., et al (2015). Characterization and PCR detection of binary, Pir-like toxins from Vibrio parahaemolyticus isolates that cause acute hepatopancreatic necrosis disease (AHPND) in shrimp. PLoS One.10(5):e0126987. doi:10.1371/journal.pone.0126987.

Chaijarasphong T,.et al (2021). The shrimp microsporidian Enterocytozoon hepatopenaei (EHP): biology, pathology, diagnostics and control. J Invertebr Pathol. 186:107458. doi:10.1016/j.jip.2020.107458.

Shirly-Lim YL., et al (2024). Pacific whiteleg shrimps compromize their physiological needs to cope with environmental stress. Environ Adv. 15:100492. doi:10.1016/j.envadv.2024.100492.

Duan Y, et al (2025). High-temperature stress impairs the intestinal functional homeostasis of Litopenaeus vannamei by altering mucosal integrity, immune signaling, and microbial community. Fish Shellfish Immunol. 167:110701. doi: 10.1016/j.fsi.2025.110701.

Zhu X., et al (2026). The effects of thermal stress on the morphology, physiological functions, gut microbiota, and metabolism of Penaeus vannamei under seawater and low-salinity conditions. Aquaculture. 612(Pt 1):743188. DOI: 10.1016/j.aquaculture.2025.743188.

Hasan M.M., et al. (2024). A Review and Meta-Analysis of Genotype by Environment Interaction in Commercial Shrimp Breeding. Genes;15(9):1222. doi: 10.3390/genes15091222.

45th Edition
Aquaculture Expo 2026
Exhibition & Panel Discussion

7, 8 & 9 December 2026
SRMT Function Hall,
Kakinada, Andhra Pradesh, India

Stalls Booking in progress

Rush to Reserve your choice of Stalls

Contact:
**Aqua International,**
Hyderabad, India.
**M: 96666 89554, 63010 47155**
E: aquacultureexpo.nrs@gmail.com

# SafMannan

**Predictable performance**

## May the force be with you!




Safmannan® is an exclusive premium yeast fraction rich in natural active ingredients such as mannans and betaglucans. Manufactured using a unique approach in our state of the art factory, Safmannan® delivers outstanding consistency and quality, for performance you can rely on every time. Based on published research and field investigation Safmannan® helps to:

- Support natural defences
- Reduce pathogen pressure
- Promote gut function
- Mitigate stress impact

**phileo-lesaffre.com**

For more info, please contact:

Mr Suvranil Mitra +91 8478-972160

Phileo by Lesaffre

*The information provided in this document is at the best of our knowledge, true and accurate. However products must only be used in compliance with local laws and regulations and we cannot guarantee freedom of use for every intended application or country.*

SMn-AP-1607-EN • Avalone

Date of Publishing:
7 November 2026

RNI Regn. No.: 52899/93
Postal Regn. No.: HCD-1068/2024-2026

Date of Posting:
8th, 9th November 2026

Posting at BPC-IV, Patrika Channel, Nampally, Hyderabad - 500 001


# Aqua International

**is the authenticated and well read quality magazine in India with the largest readership. Aqua International is known as the most trusted and reliable source of media / information on aquaculture. Stakeholders of all segments of Aquaculture sector read this magazine regularly.**




Advertise in
**Aqua International**
English Monthly

**SCAN QR CODE**
and pay towards Advertisement charges to Aqua International, English monthly

Payment may also be sent by online transfer

English monthly on Aquaculture sector since 1993

**Aqua International**

www.aquainternational.in