



FISH TECH DIGEST

An E-Fisheries Science Quarterly Magazine

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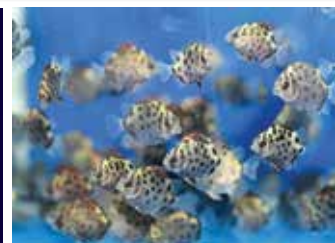
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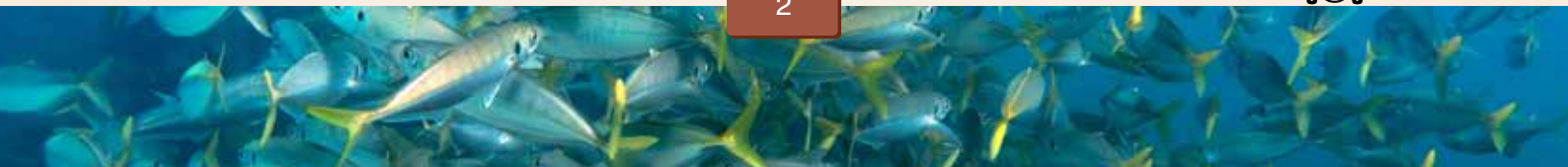
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**Editor,
Fish Tech Digest**



Foreword

It is with immense joy and gratitude to God that I extend my heartfelt greetings to all readers of Fish Tech Digest, a quarterly e-magazine by the St. Devasahayam Institute of Fisheries Science and Technology (DIFST). This magazine is a testament to the innovative spirit and our advancing knowledge and promoting sustainability in fisheries and aquaculture.

The fisheries sector is pivotal in ensuring global food security, enhancing livelihoods, and promoting sustainable aquatic ecosystems. As Chairman of DIFST, I am deeply proud of this initiative, which seeks to bridge the gap between scientific research and practical applications. Fish Tech Digest stands as a platform for sharing insights, innovations, and best practices that will empower students, researchers, fishers and industry professionals alike. This magazine will serve as a beacon of ideas, sharing cutting-edge research, technological advancements, and success stories that can inspire transformative growth in this vital sector.

I commend the editorial team, under the leadership of Prof. S. Felix, for their dedication and effort in crafting a magazine that reflects our mission and vision. Their work exemplifies the spirit of collaboration and academic excellence that defines our institution. I am confident that it will inspire, educate, and serve as a catalyst for growth in fisheries science and technology.

As we launch this magazine, I encourage readers to actively engage with its content, provide feedback, and contribute to its growth. Let us work together to create a sustainable future for the fisheries sector, ensuring that our actions today have a positive impact on generations to come.

May this publication continue to flourish, enlightening minds and fostering sustainable development in this vital field.

Blessings and best wishes,

Most Rev. (Dr.) Nazarene Soosai Th. D.D.D.

Chairman, DIFST

Bishop of R.C. Diocese of Kottar



From the Desk of the Dean

Dear Readers,

Greetings from the DIFST!

In today's rapidly advancing world, the role of technology in agriculture and fisheries has never been more crucial. To ensure that innovations reach their fullest potential, it is imperative for educational institutions, particularly state agricultural universities (SAUs), to actively focus on bridging the gap between laboratory research and real-world application. The dissemination of new knowledge, techniques, and technology must extend beyond academic circles and into the hands of the communities who can truly benefit from them.



Recognizing this, St. Devasahayam Institute of Fisheries Science and Technology (DIFST) is proud to introduce an initiative dedicated to knowledge-sharing and community empowerment: “Fish Tech Digest”—an e-magazine focused exclusively on the latest advancement in fisheries science and technology. This digital platform will showcase articles that cover a broad spectrum of topics, including aquaculture, aquatic environment, aquatic animal health, fish processing, fisheries engineering, fisheries economics, fisheries extension and fishing technology, presenting both research-backed insights and practical applications. Each issue will be carefully curated with high-quality articles supported by reliable national and international data, making Fish Tech Digest a trusted source of knowledge in the field.

Moreover, this e-magazine aims to highlight collaborative efforts within the fisheries sector, drawing contributions from esteemed research institutions, other universities and KVKs (Krishi Vigyan Kendras). We hope to provide a space where the best ideas and practices in fisheries can be shared, with a strong focus on making a positive impact on farming and fishing communities across the state and the nation. Our commitment to this goal is unwavering, as we believe that true progress comes from collective growth and the continuous exchange of knowledge.

Fish Tech Digest is more than just a publication—it is our commitment to serving the community and advancing the field of fisheries science. I look forward to seeing the impactful insights and valuable contributions that will shape each issue, and I am excited for all of you to be a part of this journey.

Thank you for your continued support and engagement.

Warm regards,

S. Felix

Dean, DIFST

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Challenges and Prospects of India's Shrimp Industry: A Balanced Approach to Aquaculture and Wild Capture

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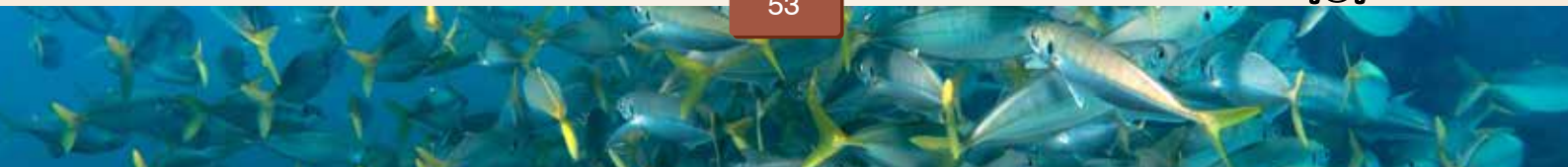
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Abstract

With an annual export of almost 7.16T MT (MPEDA, 2023) and the growing demand for seafood worldwide, the Indian shrimp business is becoming more and more important to the nation's aquaculture sector. This industry, which is dominated by Pacific white leg shrimp (*Penaeus vannamei*) and black tiger shrimp (*Penaeus monodon*), in addition to meeting domestic demands it serves as important export markets, especially the US. The industry's expansion is threatened by issues like a drop in U.S. imports, competition from other shrimp-producing countries, and environmental effects, even with advantageous trade agreements. Advanced farming technologies and sustainability practices, backed by certifications like ASC and BAP, are essential for preserving product quality and satisfying customer expectations. The industry's future depends on resolving these issues through better procedures, government programs like PMMSY, and striking a balance between aquaculture and wild catch. The recent prohibition on the importation of marine-captured shrimp into the United States emphasizes the necessity of efficient conservation methods, and the increase in feed prices emphasizes the significance of creative alternatives such as the incorporation of alternative economical feed ingredients. India can maintain its position as the world's top producer of shrimp by emphasizing sustainability and market flexibility.

Introduction

Indian shrimp industry's contribution to country's aquaculture sector is increasing year by year. India is one of the top shrimps producing country during this period where demand of seafood is keeping on increasing day by day. India's frozen shrimp export has reached up to an approximate of 7.16 MT annually (MPEDA, 2023). Pacific white leg shrimp (*P. vannamei*) and black tiger shrimp (*P. monodon*) are the candidate species that serves as the main contributors of Indian shrimp industry. This increased production contributes both to domestic markets and also to export market. United States is the country which is the main importer of Indian shrimp and countries in Europe and Asia are also destinations of Indian shrimps. This export trend is remaining possible due to increasing demand and favourable trade agreement that exist for the seafood; while focussing on increased production, it is important to have a strong focus on sustainability practices. The main aim of sustainability is to aim product quality and to satisfy modern environment conscious consumers, Certifications of ASC (Aquaculture Stewardship



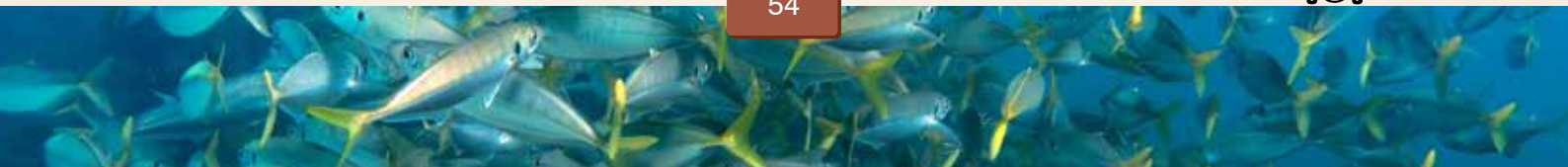
Council) and BAP (Best Aquaculture Practices) ensures sustainability of the product. Adoption of improved farming technologies such as Recirculatory Aquaculture System (RAS), biofloc technology, improved feed quality based on scientific studies etc, help to increase production and reduce the disease impact. However, change in climatic factors which could result in the crop losses, competition faced by other major shrimp producing countries such as Ecuador, Vietnam, Indonesia etc which could result in demand variability are some of the challenges that the industry mainly faces. Recently the government initiatives are a great support to the farming community, schemes of PMMSY (Pradhana Mantri Matsya Sampada Yojana) provides financial support to the projects with the aim of enhancing competitions of the industry. India's shrimp industry is growing even though the growth rates got reduced recently due to reduced import (MPEDA, 2023), however it is essential to address the challenges in relation to sustainability, disease outbreaks, competitions in markets to maintain India's status among the leading shrimp producing countries.

Marine Captured Shrimp and Farmed Shrimp

Marine shrimp capture has been declining mainly due to overfishing, habitat degradation and climate change. *Penaeus indicus*, *Metapenaeus monoceros*, *Metapenaeus dobsoni*, *Parapeneopsis styliifera* etc are the main landed shrimp varieties. Shrimp production through aquaculture is growing significantly according to the demand in the market through advancement in aquaculture technologies. *Penaeus vannamei* (Pacific white leg shrimp) is the dominant species in the shrimp aquaculture industry followed by *Penaeus monodon* (Black tiger shrimp). Both marine captured shrimp and farmed shrimp market are interrelated, Advancement in aquaculture of shrimp has paved the way to reduction in overfishing of marine population. It has also resulted in reduction in usage of destructive fishing practices and helped to conserve the habitats of the marine environment. Reduced price of marine shrimp is one of the disadvantages faced by marine fishermen due to advancement of shrimp farming. Marine capture fisheries support shrimp farming in contributing wild caught brooders for seed production and to improve genetic diversity. Achievement of sustainability of India's shrimp industry is possible only if there is a balance between wild capture and farmed shrimp production. Sustainable fishing practices, responsible aquaculture by following BAP's, habitat conservation and regulation of shrimp market could be given needed priority to ensure wellbeing of India's shrimp industry. Marine ecosystem health, meeting of domestic and international demand for shrimp could be maintained by ensuring this balance.

Decline in US Shrimp Imports of Wild Caught Shrimp

Import of shrimp reduced by about 12% in July 2024 when compared to the previous year. Shrimp import in the previous year was 152.9 million pounds (69,356 MT) which dropped to 134.4 million pounds (60,981 MT) in 2024 (NOAA Fisheries, 2024). India remains as the nation's top importer but in 2024 India's export to US increased only by less than 1%. The export of Ecuador to US declined



by 30%, it reduced to 28.4 million pounds from 40.9 million pounds reported in the previous year and export. Other main exporting countries such as Indonesia, Vietnam, Thailand and Argentina also had decline in their quantity of export by 11%, 16%, 12% and 1.56% respectively. The usage of banned antibiotics, presence of veterinary drug residue, nitrofurant contamination, misbranding, added bulk etc are the main factors which result in the entry line refusal by the US Food and Drug Administration (FDA) according to Southern Shrimp Alliance (S. S. A).

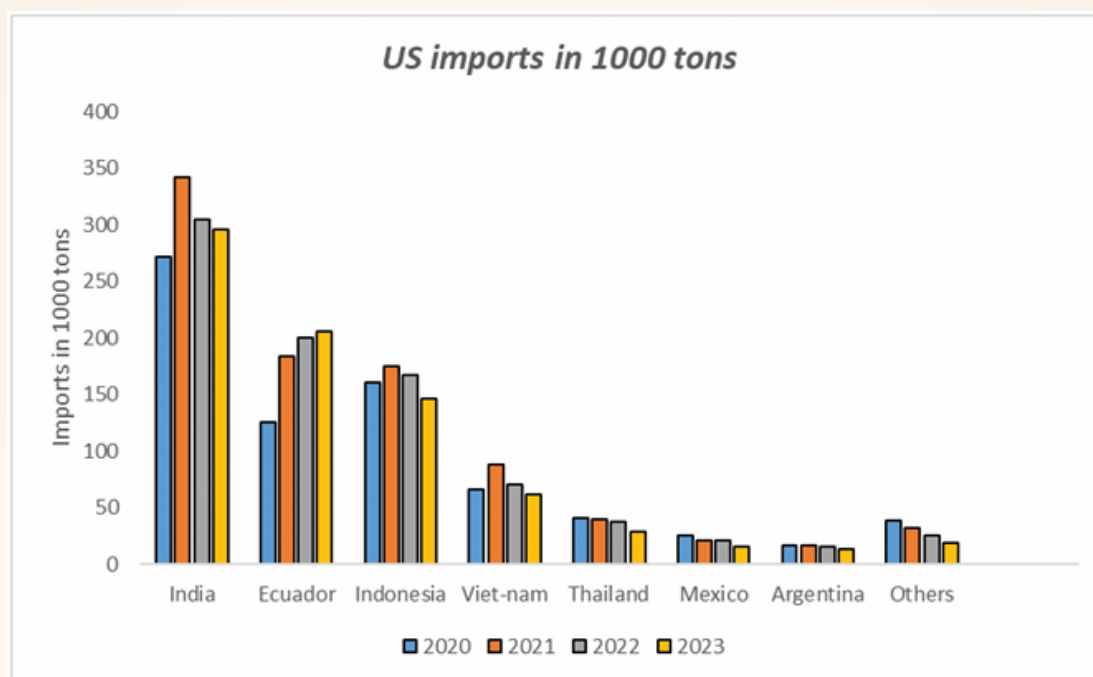


Fig 1. Trend of US imports in previous year, Source: Global trade tracker, 2024

Rejection of India's Captured Shrimp by USA and Use of TED

Ban implemented by US in import of marine captured shrimp from India created a heavy loss in Indian shrimp industry. This not only resulted in reduced export income but also created more competition in domestic markets and resulting in low price for the shrimps. The ban exists from 2018 May after the US department of the state found out the fishing practices followed in India were non adherent with the US regulations to protect marine turtles. Indian wild captured shrimp had almost 11% contribution in the total shrimp export to the US. Sea turtles are mainly captured as by catches during the operation of shrimp trawlers which is the main reason for the cause of this issue in shrimp industry. India is following measures for conservation of sea turtles already; sea turtles generally live in coastal waters up to 5 nautical miles so India has implemented trawl fishing ban within 5 nautical miles under "Fishing regulation Act". It is estimated that about 600 tons of sea food/ day is consumed by olive ridley turtles in India, so the coastal resources of India is utilized so much for conservation of turtles. Apart from these facts, the interest of the importer in a product must be given prior importance. It has been almost 2 years now after the US implemented the law for TED and it has been almost 6 years now after the US banned

this marine import from India. Implantation of TED is not an easy task, but it is a measure that should be seriously considered and implemented to resolve this issue for the wellbeing of Indian shrimp industry, there had been conflicts by US fishermen as well as Malaysian fisher men while implementation of TED had taken place in their countries. TED developed by ICAR- CIFT is now approved by US export team, so it is better to do necessary procedures to install it in shrimp trawl nets and resolve this issue. The major constraints raised by the fishermen are the loss in their catch that happen while operating their trawl nets installed with TED. This TED will allow sea turtles to escape but it will also result in the escape of 4% of the catch but the fishermen claim a loss of 30% of their catch due to this and also, they concern about the profit they get after spending cost of fuel. Occurrence of bycatches and marine wastes along with the catch usually happen during trawl net operation and it results in the damage to the shrimp while separating it, it is estimated that 41% of shrimp loss its export quality. TED could exclude this marine waste's, unwanted catches etc to a certain level is an advantage that the fishermen gain with the TED installation. The cost of TED that the fishermen should spend is another constrain, it cost around 25,000- 30,000 ₹ per unit. Development of mobile application for the observation of sea turtles, counselling to fishermen for installation of TED in all trawl nets by utilising schemes of PMMSY, training and demonstration to fishermen representatives by using the vessels of FSI (Fisheries Survey of India), training for operation of TED to fishermen by utilising the support offered by US etc are some of the recommendations for resolving this issue to ensure a sustainable growth of Indian shrimp industry in future.

Escalating Cost of Shrimp Feed -Major Challenge in Shrimp Aquaculture Industry

Annual growth of 7.53% was registered by Indian fisheries and aquaculture sector in the past five years. Shrimp farming is mainly done by using brackish waters, in India there is a potential of 1.2 million hectares of brackish water land available but only 10% is being used. This vast resource gives more strength to Indian shrimp feed industry. At present there are around 40 feed mills in India that produce shrimp feeds. Andhra Pradesh represents the largest market for the shrimp feed (55%) followed by West Bengal (13%), Gujarat (11%), Tamil Nadu and Puducherry (10%), Odisha (75%) and Maharashtra (2%) (Bhosale, 2022). The shrimp feed price increased two to three times in a year by ₹ 10/kg. Average shrimp feed rate in the last year was ₹ 84 /kg while it increased from it recently at present the price of shrimp feed is an approximate of ₹ 94/kg. The main reason for this price hike recently was the increase in price of soya bean meal which is a main ingredient in the feed. The shortage of this raw material resulted in importing the grain by several feed companies. Protein and lipid levels in the shrimp feeds produced are usually in the range of 32-41% and 5-6% respectively and also shrimp feed require various ingredients and feed additives which are sourced by India and other multinational enterprises. These are the main factors which result in hiking the price of shrimp feeds. Inclusion of black soldier fly larvae (BSF) (*Hermetia illucens*) in shrimp feed is a sustainable method which is attaining great attention recently (M. Yildirim- Aksoy et al., 2022). It is an example of an alternate protein and lipid source



ingredient in the shrimp feed which could reduce the dependence of traditional feed ingredients, enhance nutrition of shrimps, reduce feed cost and also could minimize the overexploitation of resources. Nutritional composition of BSF larvae include crude fat (10-15%), crude protein (60-70%), moisture (5-10%), fibre(5-10%), Calcium (1-2%) and phosphorous (1-2%). The inclusion of BSF larvae in shrimp feed paves the way for promising opportunities for sustainable aquaculture. Production of more soybean grains and ensuring their availability in the markets, and discovery of new protein and lipid-rich ingredients in the fish meal after needed research are some of the factors that could be done to reduce the price hiking of shrimp feed in the future.

Conclusion

In summary, the Indian shrimp business is a vital component of the country's aquaculture sector and has been steadily expanding in response to the growing demand for seafood around the world. Species like Pacific white leg shrimp and black tiger shrimp are essential to this expansion, with annual output reaching over 8 lakh tons. The main benefits of this increase are domestic markets and export prospects, especially to the United States. A recent drop in U.S. shrimp imports, environmental constraints like climate change, and rivalry from other shrimp-producing countries are just a few of the major obstacles the sector must overcome. The sector must concentrate on putting best practices into effect, improving farming technologies, and resolving important concerns like the U.S. import restriction and growing feed costs in order to maintain sustainable growth. While government programs like the PMMSY scheme are crucial, preserving India's competitive edge requires striking a balance between the production of farmed shrimp and wild catch. In order to overcome these obstacles and maintain its position as a leading aquaculture sector globally, the Indian shrimp industry must prioritize sustainability and innovation.

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