



FISH TECH DIGEST

An E-Fisheries Science Quarterly Magazine

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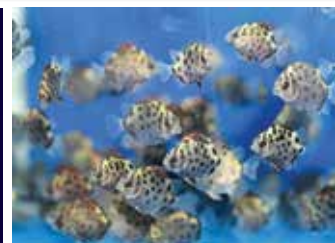
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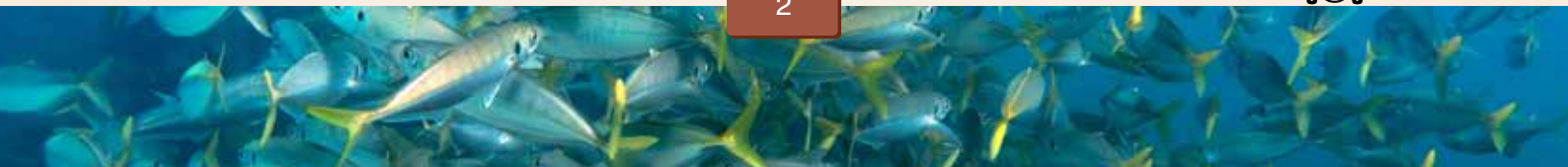
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**Editor,
Fish Tech Digest**



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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Colours of reef: India's Marine Ornamental Species for Global Marine Hobbyists

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Abstract

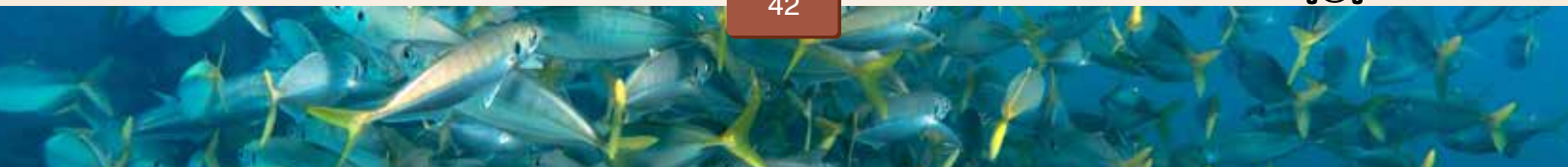
The Indian marine ornamental fish trade has evolved into a vital contributor to the blue economy, offering significant economic potential and ecological value. By profiling a diverse array of ornamental fish including newly introduced clownfish, gobies, wrasses, tangs, anthias, mandarins, butterflyfish, and angelfishes highlighted the growing availability of both endemic and exotic species in the Indian market. The article aims to guide beginners and marine ornamental hobbyists toward exploring underrepresented species, thereby supporting market diversification and bolstering the aquaculture supply chain.

Introduction

India's marine ornamental fish trade, a burgeoning sector of significant economic value, has witnessed consistent growth, driven by the country's rich biodiversity and the increasing demand for exotic and endemic species (Rani *et al.*, 2014). With nearly 400 marine ornamental fish species identified within its waters, including vibrant clownfish like *Amphiprion nigripes* and *Amphiprion sebae*, along with gobies, wrasses, and tangs, India stands out as a potential global hub for the trade (Prakash *et al.*, 2017). While India contributes modestly to the global ornamental fish market ranging from 0.12% to 1.16% between 1991 and 2009 its export potential has been enhanced by advancements in aquaculture and improved market strategies (Chatterjee *et al.*, 2020).

Major trading partners, such as Singapore, Malaysia, Thailand, and Japan, account for more than 70% of India's ornamental fish exports, with Singapore alone dominating 43% of the market share (Rani *et al.*, 2013). Simultaneously, India imports exotic species from these regions to meet domestic demand, augmenting its portfolio with highly prized varieties like angelfish and butterflyfish. The trade faces challenges such as habitat degradation and overexploitation, yet India's focus on breeding programs, sustainable collection practices, and the introduction of lesser-known endemic species positions it as a key player in the global ornamental fish industry (Kumar *et al.*, 2015). Balancing conservation and commerce, the Indian ornamental fish trade not only supports economic growth but also underscores the importance of preserving its unique marine heritage.

This study underscores the critical role of species diversification in enhancing the appeal of India's ornamental fish trade to hobbyists, showcasing the country's ornamental richness through a broader variety of vibrant, lesser-known species. By introducing new and exotic species, the industry can meet evolving consumer preferences, keeping the market dynamic and engaging while fostering innovation. This diversification not only positions India as a leader in the global



ornamental fish market but also significantly contributes to the growth and modernization of its trade, ensuring sustained interest and economic advancement.

Species Profiles

Clownfish (Family: Pomacentridae)

Clownfishes are known for their vibrant colours and symbiotic relationship with sea anemones, making them highly sought after in the ornamental trade. Endemic species include *Amphiprion clarkii* (Fig 1A), notable for its yellow body and contrasting white and black stripes; *Amphiprion sebae* (Fig 2B), with its distinctive black and orange coloration and wide white bands; and *Amphiprion nigripes* (Fig 1C), found in the Indian Ocean and admired for its vivid orange body and pinkish hue. Exotic designer hybrid variants such as Midnight (Fig 1D), Black Storm (Fig 1E), and orange storm (Fig 1F) are popular due to their unique, striking patterns. Clownfish are easy to breed in captivity, representing a sustainable choice for traders and aquarists.



Fig 1. Clownfish: a) *Amphiprion clarkii*, b) *Amphiprion sebae* c), *Amphiprion nigripes* d) midnight, e) black storm, f) orange storm

Fig 2 Gobies: a), *Ptereleotris zebra* b), *Ecsenius bicolor* c), *Exallias brevis* d) *Nemateleotris decora*, e) *Nemateleotris magnifica*, f), *Stonogobius dracula*

Gobies (Family: Gobiidae)

Gobies are small, peaceful species known for their diverse coloration and ecological roles in reef ecosystems. Key species include *Ptereleotris zebra* (Fig 2A), recognized for its elongated body and zebra-like stripes; *Ecsenius bicolor* (Fig 2B), a hardy species with striking blue and orange coloration; and *Exallias brevis* (Fig 2C), featuring intricate spotted patterns and thriving in coral reefs. Exotic key species include *Nemateleotris magnifica* (Fig 2E) and *Nemateleotris decora* (Fig 2D), known as “firefish” and appreciated for their vibrant dorsal fins, and *Stonogobius dracula* (Fig 2F), commonly known as Dracula goby, admired for its unique colours and bands.

Wrasses (Family: Labridae)

Wrasses are known for their dynamic colour changes and active swimming behaviour. Endemic species include *Labroides dimidiatus* (Cleaner wrasse) (Fig 3A), essential for reef health as they remove parasites from other fish; *Paracheilinu scarpenteri* (Fig 3B), renowned for its dazzling hues and unique “flasher” display; and *Anampsescaeruleo punctatus* (Fig 3C), vibrant with its blue neon spots. Exotic species such as *Cirrhilabrus cyanogularis* (Fig 3D), *Pseudocheilinus hexataenia* (Fig 3E), and *Cirrhilabrus rubrisquamis* (Fig 3F) are popular for their exotic coloration and reef-friendly nature. Their vibrant colours and fascinating behaviours enhance the aesthetic appeal of reef tanks.



Fig 3. Wrasse: a) *Labroides dimidiatus*, b) *Paracheilinus carpenteri* c) *Anampsescaeruleo punctatus* d) *cirrhilabrus rubrisquamis*, e) *cirrhilabrus cyanogularis*, f) *Pseudocheilinus hexataenia*

Fig 4. Tangs: a) *Acanthurus leucosternon*, b) *Ctenochaetus strigosus* c) *Zebrasoma scopas*, d) *Zebrasoma gemmatum*, e) *Zebrasoma rostratum*, f) *Zebrasoma xanthurum*

Tangs (Family: Acanthuridae)

Tangs are popular in the ornamental fish trade due to their vibrant colours and unique body shapes. Endemic species include *Acanthurus leucosternon*, known as the Powder Blue Tang (Fig 4A), featuring a striking blue body with a yellow dorsal fin and black face; *Ctenochaetus strigosus* (Fig 4B), commonly known as the Kole Tang, with a brownish body and fine yellow horizontal stripes; and *Zebrasoma scopas* (Fig 4C), also known as the Brown Tang or Scopas Tang, with a brown body and subtle lighter stripes. Exotic species include *Zebrasoma gemmatum* (Fig 4D), the highly prized Gem Tang with a dark body covered in white spots; *Zebrasoma rostratum*, the Black Tang (Fig 4E), characterized by its entirely black body; and *Zebrasoma xanthurum*, the Purple Tang

(Fig 4F), with a vibrant purple body and yellow accents on the tail and pectoral fins. These species are valued for their beauty and contribute significantly to the ornamental fish trade.

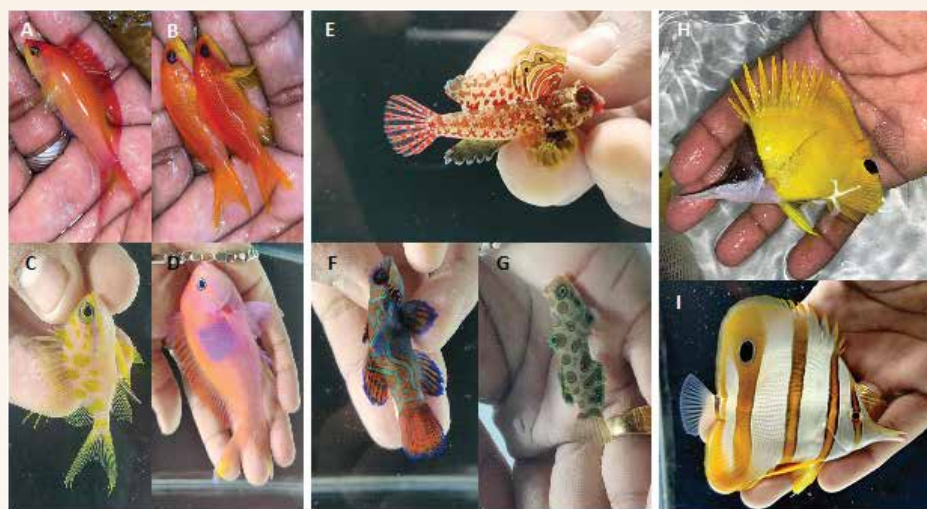


Fig 5. Anthias, mandarin and butterfly fishes: a) *Pseudanthia signatus*, b) *Pseudanthias squamipinnis* c), *Holanthias borbonius* d) *Pseudanthias pleurotaenia*, e) *Synchiropus stellatus*, f) *Synchiropus splendidus*, g) *Synchiropus picturatus*, h) *Forcipiger flavissimus*, i) *Chelmon rostratus*.

Anthias, mandarin, and butterfly fishes

Anthias, mandarins and butterfly are mostly imported together because of their demand in Indian market over marine tanks. Endemic anthias species include *Pseudanthias ignites* (Fig 5A), known for its fiery red and orange hues, and *Pseudanthias squamipinnis* (Fig 5B), with its striking orange body and purple highlights. Exotic anthias species include Deepsea *Holanthias borbonius* (Fig 5C) admired for its pink and yellow coloration with distinctive spots, and *Pseudanthias pleurotaenia*, (Fig 5D) featuring a vibrant pink body with a prominent lateral stripe. Endemic mandarin/scooter blenny species include *Synchiropus stellatus* (Fig 5E), known for its star-like patterns and vivid colours. Exotic mandarin/scooter blenny species include *Synchiropus splendidus*, (Fig 5F) the Green Mandarin, famous for its psychedelic blue and green patterns, and *Synchiropus picturatus*, (Fig 5G) the Spotted Mandarin, with its intricate spotted design. Endemic butterflyfish species include *Forcipiger flavissimus*, (Fig 5H) the Yellow Longnose Butterflyfish, recognized for its bright yellow body and elongated snout. Exotic butterflyfish species include *Chelmonrostratus* (Fig 5I), the Copperband Butterflyfish, known for its distinctive yellow and white bands and long snout.



Fig 6. Angelfishes: a) *Pygoplites diacanthus*, b) *Pomacanthus imperator* c) *Apolemichthys trimaculatus* d) *Centropyge bispinosus*, e) *Centropyge loricula*, f) *Centropyge flavissima*.

Angelfishes (Family: Pomacanthidae)

Angelfishes are renowned for their striking colours and patterns, making them highly desirable in the ornamental fish trade. Endemic species include *Pygoplites diacanthus*, (Fig 6A) known as the Regal Angelfish, with its vibrant blue and yellow stripes; *Pomacanthus imperator*, the Emperor Angelfish, (Fig 6B) featuring bold blue and yellow bands with a distinctive face mask; and *Apolemichthys trimaculatus*, (Fig 6C) the Threespot Angelfish, recognized by its yellow body and three black spots. Exotic species include *Centropyge bispinosus*, (Fig 6D) the Coral Beauty Angelfish, admired for its deep blue and orange coloration; *Centropyge loricula*, (Fig 6E) the Flame Angelfish, with its fiery red and orange body and vertical black stripes; and *Centropyge flavissima*, (Fig 6F) the Lemon peel Angelfish, known for its bright yellow body and blue eye ring. These species contribute significantly to the ornamental fish trade, enhancing the visual appeal of marine aquariums with their beauty and unique characteristics.

Conclusion

The Indian marine ornamental fish trade has evolved into a vital contributor to the blue economy, offering significant economic potential and ecological value. By profiling a diverse array of ornamental fish, including newly introduced clownfish, gobies, wrasses, tangs, anthias, mandarins, butterflyfish, and angelfishes, this article highlights the growing availability of both endemic and exotic species in the Indian market. The images featured in this article, were

provided by Let's Go Fishing, ET Marine, Kanniyakumari and Marine Aquatics, further illustrate this rich diversity. The article aims to guide beginners and marine ornamental hobbyists toward exploring underrepresented species, thereby supporting market *diversification* and bolstering the aquaculture supply chain.

References

- Chatterjee, A., Ghosh, S., Bhattacharya, R., Chatterjee, S., Saha, N.C., 2020. Scholars Academic Journal of Biosciences.
- Kumar, T.T.A., Gunasundari, V., Prakash, S., 2015. Breeding and Rearing of Marine Ornamentals, in: Perumal, S., A.R., T., Pachiappan, P. (Eds.), Advances in Marine and Brackishwater Aquaculture. Springer India, New Delhi, pp. 101–107. https://doi.org/10.1007/978-81-322-2271-2_11
- Prakash, S., Ajith Kumar, T.T., Raghavan, R., Rhyne, A., Tlustý, M.F., Subramoniam, T., 2017. Marine aquarium trade in India: Challenges and opportunities for conservation and policy. Mar. Policy 77, 120–129. <https://doi.org/10.1016/j.marpol.2016.12.020>
- Rani, P., Immanuel, S., Ananthan, P., Ojha, S., Kumar, N.R., Krishnan, M., 2013. Export performance of Indian ornamental fish-an analysis of growth, destination and diversity. Indian J Fish 60, 81–86.
- Rani, P., Immanuel, S., Kumar, N.R., 2014. Ornamental fish exports from India: Performance, competitiveness and determinants. Int. J. Fish. Aquat. Stud. 1, 85–92.

