



भारत सरकार
GOVERNMENT OF INDIA
मत्स्यपालन विभाग
Department of Fisheries



FISHTech Report



“To Explore Technologies in Fisheries and Aquaculture Sector”



20
26
JULY



MANAGE Fisheries Innovation and Startup Hub (MANAGE - FISHub)

(A National Fisheries Incubation Centre Supported by the Ministry of Fisheries, Animal Husbandry and Dairying, Govt. of India)

National Institute of Agricultural Extension Management (MANAGE)

(An Autonomous Organization of Ministry of Agriculture and Farmers Welfare, Govt. of India)

Rajendranagar, Hyderabad – 500 030, Telangana, India

<https://www.manage.gov.in/managefishub/>

MANAGE-FISHub

MANAGE – Fisheries Innovation and Startup Hub (MANAGE-FISHub) is a national-level incubation and innovation hub hosted at the National Institute of Agricultural Extension Management (MANAGE). It was established at MANAGE in 2025 with the support of the Department of Fisheries (DoF), Ministry of Fisheries, Animal Husbandry and Dairying (MoFAHD), Government of India, to transform the fisheries and aquaculture sector through innovative technology, entrepreneurship, and ecosystem development.

Vision

The Vision of MANAGE-FISHub is to foster sustainable innovation and entrepreneurship in the fisheries and aquaculture sector by nurturing startups, accelerating technology adoption, and promoting inclusive growth across the value chain.

Collaboration Partner

ICAR–Central Marine Fisheries Research Institute (ICAR–CMFRI)

The ICAR–Central Marine Fisheries Research Institute (ICAR–CMFRI) played a central role by collaborating with MANAGE-FISHub for the FISHTech Webinar Series.

Established on 3 February 1947, the ICAR–Central Marine Fisheries Research Institute (ICAR–CMFRI), headquartered in Kochi, Kerala, is one of the world's leading tropical marine fisheries research institutes under the Indian Council of Agricultural Research (ICAR). Renowned for its excellence in marine fisheries, mariculture, biotechnology, and coastal ecosystem research, ICAR-CMFRI develops innovative technologies, scientific knowledge, and skilled human resources to promote the sustainable growth and resilience of India's marine fisheries and aquaculture sector.

FISHTech Webinar

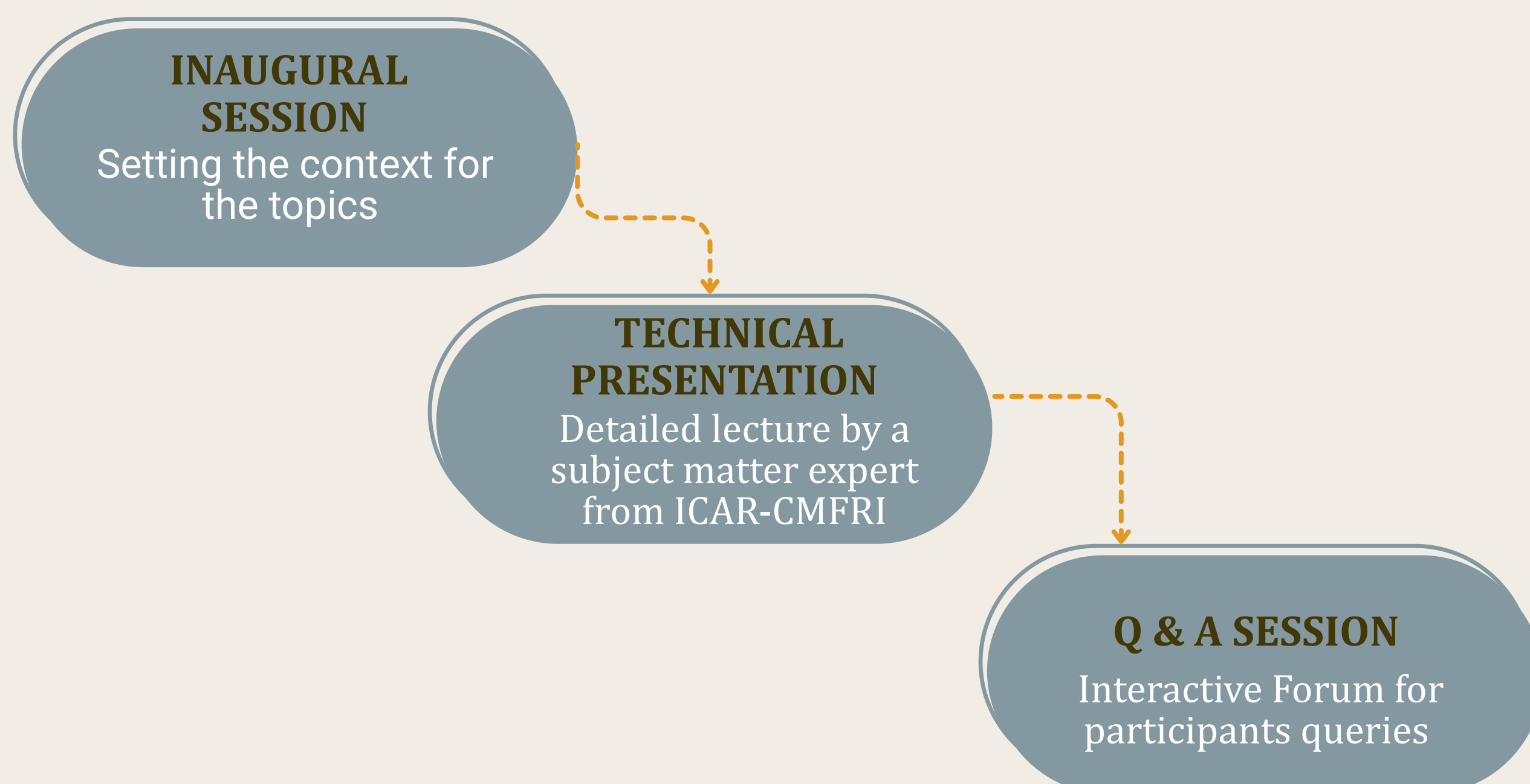
FISHTech Webinar series is a flagship online knowledge-sharing initiative of MANAGE–FISHub, designed to showcase innovative technologies developed by fisheries research institutions, ICAR institutes, State Fisheries Universities, and other academic and R&D organizations across India. The series aims to bridge the gap between technology developers and end users by creating a structured national platform for technology dissemination.

Objective of the Webinar

- To disseminate knowledge on emerging fisheries technology developed by fisheries institutes.
- To facilitate technology awareness among budding aquapreneurs, innovators, rural youth, students and fisheries professionals.
- To showcase commercialization pathways and startup opportunities linked with institution-developed fisheries technology
- To strengthen capacity building through expert-led sessions.
- To facilitate interaction among scientists, startups, aspiring aquapreneurs and students, thereby fostering collaborative learning and innovation ecosystems.

Program Schedule

The MANAGE-FISHub Webinar Series was organized as a structured 15-day intensive program, with each day dedicated to covered cutting-edge technologies and emerging trends within the fisheries sector.



Promotional Activities

The outreach focused on both institutional and public digital platforms

Regular updates and speaker profiles shared across social media handles

Short coming soon posters were used to redirect the participants

A key collaborating partner, **CMFRI** promoted the series through their internal WhatsApp Group

Information brochures and daily session links were shared through all WhatsApp groups



Formal invitation and program posters were sent to various fisheries colleges, KVKs and participants of MANAGE-FISHub Program

Personalized emails were sent to the MANAGE-FISHub participants

Regularly reminder Email were sent to registered participants 12 hours and one hour before each live session

MANAGE-FISHTech Webinar Meet Our Speakers



MANAGE-FISHTech Webinar



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Mass Production of Marine Copepods



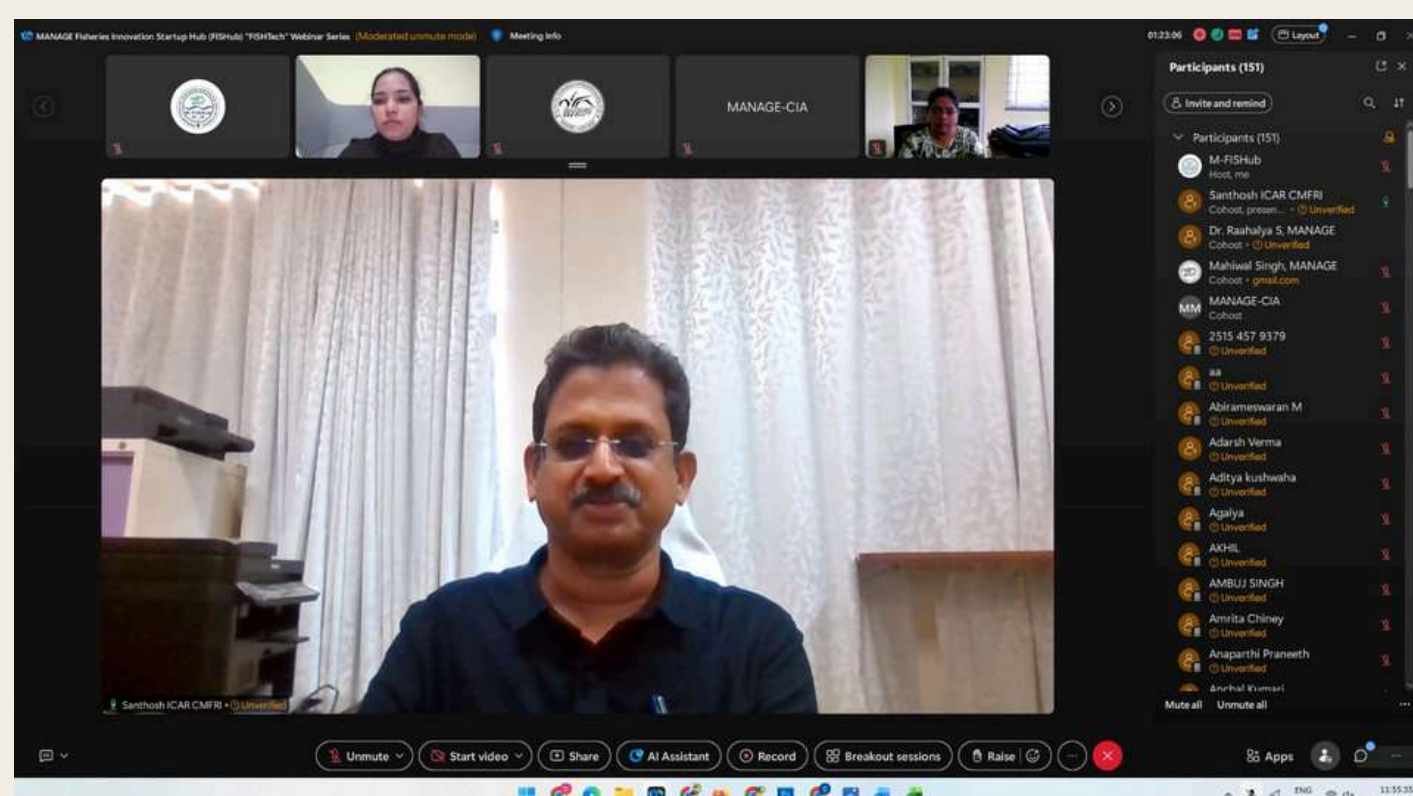
Dr. B. Santhosh
Principal Scientist & Head
ICAR-CMFRI
Regional Centre, Vizhinjam
santhoshars@gmail.com

Dr. Santosh, delivered a comprehensive presentation on the mass production of marine copepods, highlighting their critical role as a live feed in marine fish hatcheries. He explained that copepods are indispensable during the early larval stages of many high-value marine fishes, including groupers, snappers, pompano, and ornamental species.

Due to their small size, superior nutritional composition, and high digestibility, copepods provide an ideal first feed for marine fish larvae with underdeveloped digestive systems and limited yolk reserves, thereby significantly improving larval survival and growth.

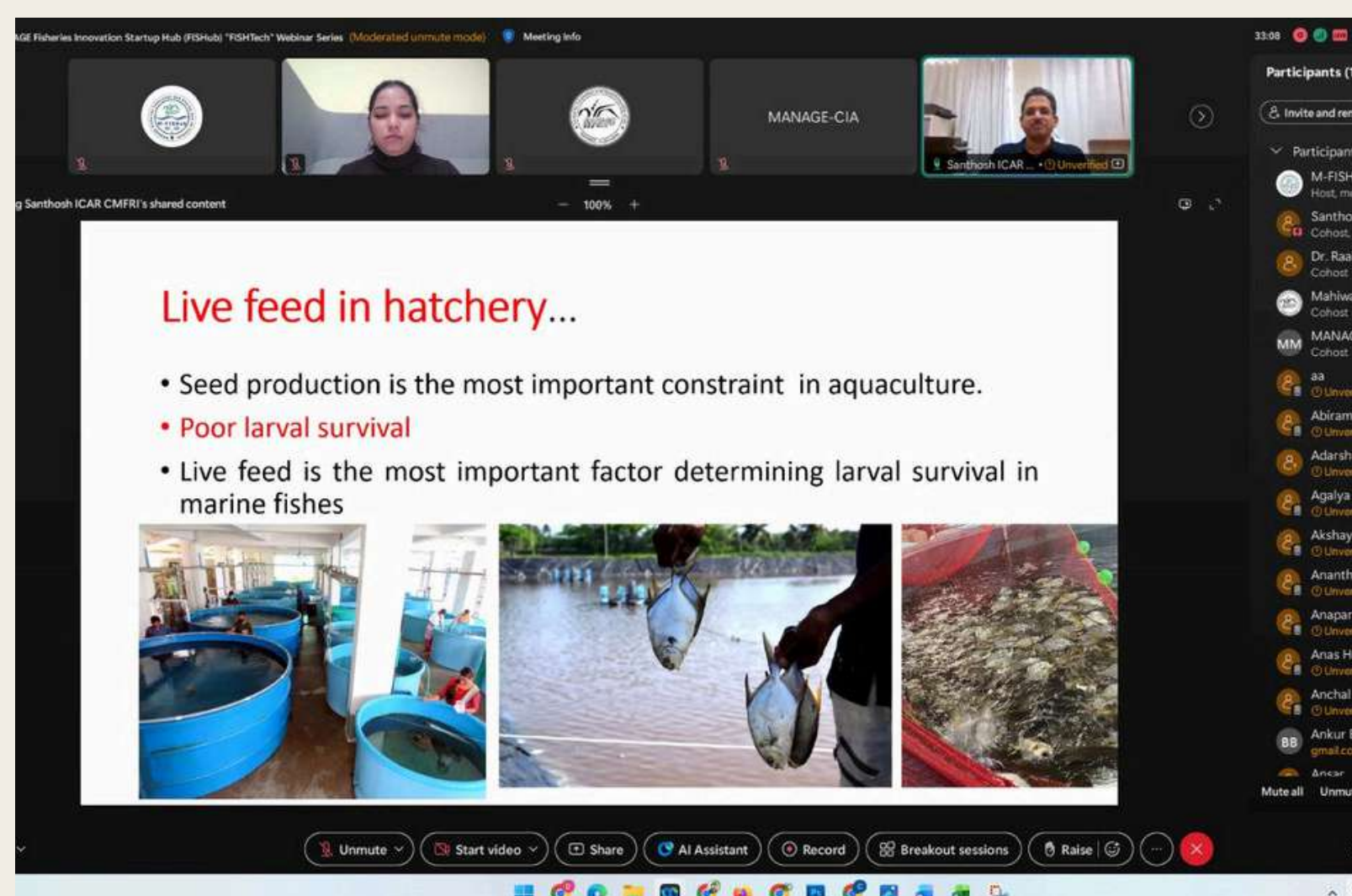
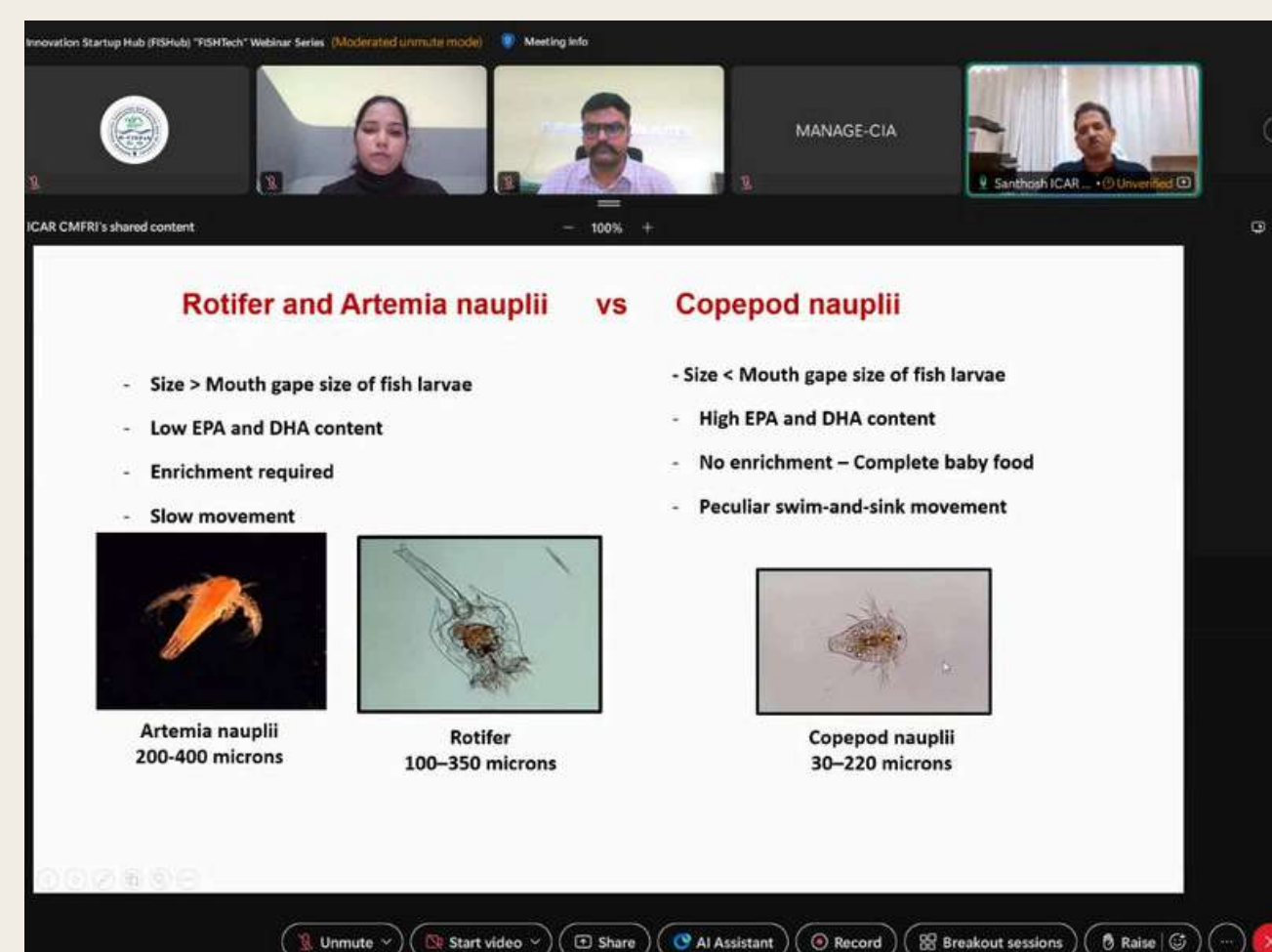
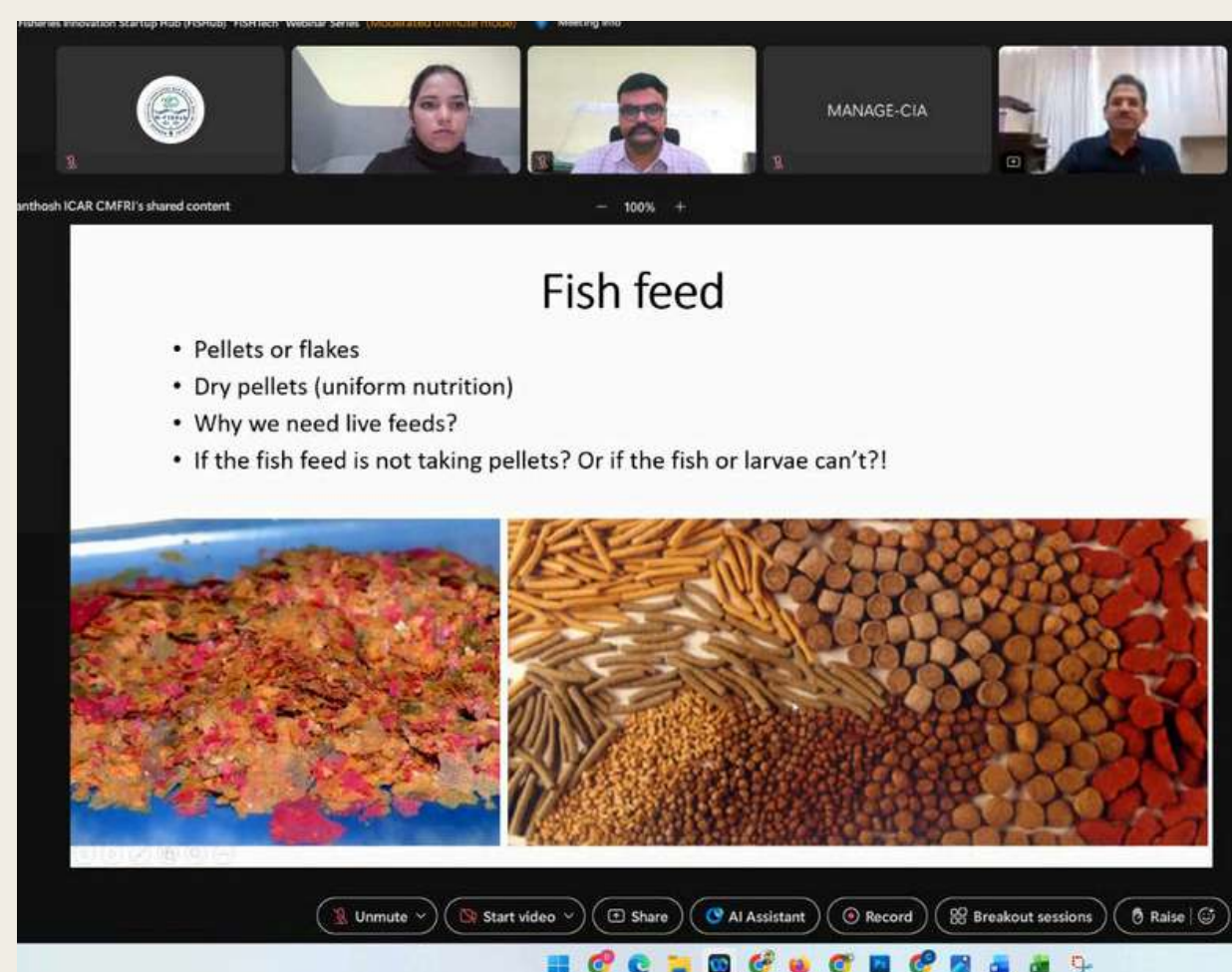
The speaker emphasized the nutritional superiority of copepods over conventional live feeds such as rotifers and Artemia. Copepods are naturally rich in essential fatty acids, particularly EPA (Eicosapentaenoic Acid) and DHA (Docosahexaenoic Acid), along with high-quality proteins and essential amino acids required for healthy larval development. Their small nauplii stages, ranging from 20–100 μm , make them particularly suitable for species with very small mouth openings, ensuring better feed acceptance, faster growth, improved pigmentation, and higher survival rates during the critical early life stages.

Dr. Santosh highlighted that ICAR-CMFRI has successfully standardized the mass production of 14 marine copepod species, representing one of the largest live collections maintained globally. He described the biological diversity of copepods, including egg-scattering and egg-carrying species, and explained that maintaining healthy cultures requires careful management of microalgal feed, water quality, and stocking density. Proper algae management is essential, as overfeeding can lead to deterioration of water quality and contamination by undesirable microorganisms such as ciliates.



The speaker discussed the standardized production technology adopted by ICAR-CMFRI for large-scale copepod culture. He recommended the use of indoor high-density polyethylene (HDPE) tanks with light-colored interiors to facilitate culture management. Environmental parameters such as temperature (25–28°C) and salinity (30–35 ppt) should be maintained within optimum ranges for maximum productivity. Continuous culture systems were identified as the most efficient production method, allowing daily harvesting of nauplii and ensuring a continuous supply of live feed for marine hatcheries throughout the production cycle.

Dr. Santosh further emphasized the economic significance of copepod production in supporting India's expanding marine aquaculture sector. Dependence on imported Artemia cysts can substantially increase hatchery operating costs, whereas locally produced copepods provide a sustainable and cost-effective alternative with superior nutritional quality. The technology has immense potential for commercial hatcheries producing marine finfish and ornamental fishes, while ongoing research at ICAR-CMFRI focuses on cryopreservation techniques, resting egg production, and further optimization of mass culture protocols for commercial-scale adoption.





Q & A Session

Q1. What artificial feeds are recommended for copepod culture?

Ans: Dr. B. Santosh explained that there is no standard artificial feed recommended for copepod culture. Microalgae, particularly *Chlorella* and other suitable algal species, remain the primary feed source. Although a very small quantity of powdered fish pellet feed may occasionally be used for harpacticoid copepods, it is generally discouraged because overfeeding can lead to contamination, poor water quality, and culture crashes.

Q2. What career opportunities are available in the field of copepod production and fisheries enterprise management?

Ans: The speaker highlighted that significant career opportunities exist in the fish processing and seafood export industries, as well as in marine hatchery management, ornamental fish production, and live feed enterprises. He noted that establishing commercial hatcheries and ornamental fish units requires adequate infrastructure, technical expertise, and investment but offers excellent entrepreneurial potential.

Q3. How can environmental fluctuations be managed in copepod culture systems?

Ans: Dr. Santosh emphasized the importance of maintaining stable environmental conditions to prevent culture crashes. He recommended storing and conditioning artificial seawater before use and adopting Recirculating Aquaculture Systems (RAS) to reduce frequent water exchange and maintain stable salinity, temperature, and overall water quality.

Q4. What are the current research priorities in copepod culture?

Ans: The speaker explained that current research focuses on developing intensive mass production protocols, inducing resting egg production for long-term storage, improving culture management practices, and utilizing copepods as model organisms in toxicological, nutritional, and biochemical research.

Q5. Is cryopreservation of copepods commercially feasible?

Ans: Dr. Santosh stated that although cryopreservation techniques have shown promising results under experimental conditions, they are still in the developmental stage and require further research before becoming commercially viable for hatchery operations.

Q6. Does temperature influence the nutritional quality of copepods?

Ans: Yes. The speaker explained that lower culture temperatures generally enhance the Highly Unsaturated Fatty Acid (HUFA) content of copepods. He also noted that the nutritional quality depends greatly on the species of microalgae provided as feed, with algae such as *Isochrysis galbana* contributing significantly to improved fatty acid profiles.

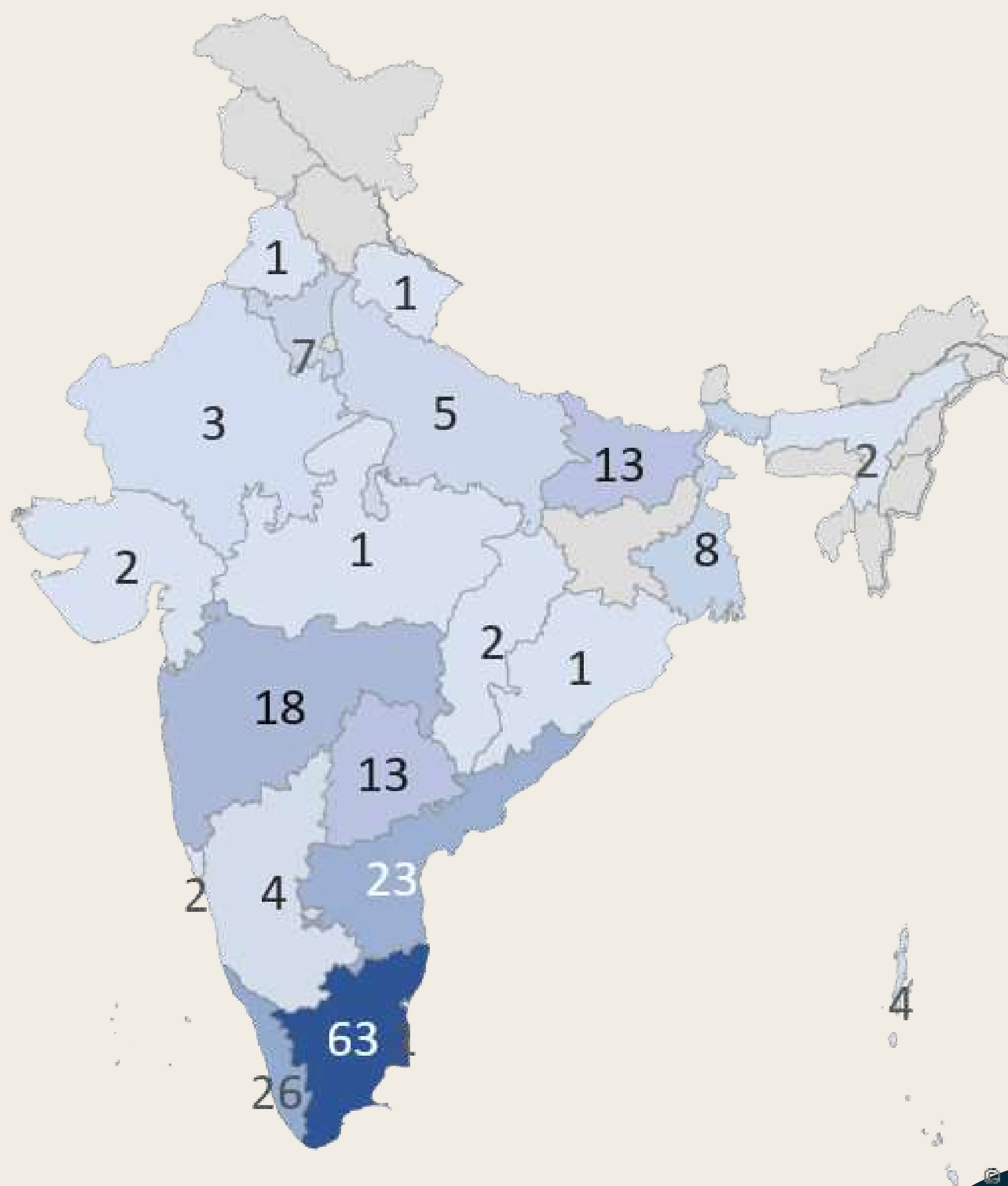
Q7. How can cannibalism be minimized in continuous copepod culture?

Ans: The speaker recommended selecting non-predatory copepod species such as *Paracalanus*, maintaining appropriate stocking densities through regular harvesting, and continuously monitoring larval-to-adult population ratios to reduce cannibalism and improve culture stability.

Q8. What is the typical hatching rate of calanoid copepods?

Answer: Dr. Santosh informed participants that calanoid copepods exhibit an exceptionally high hatching success, with hatching rates generally ranging between 98% and 100% under optimum culture conditions, making them highly suitable for large-scale hatchery applications.

Participants Overview



Total Registrations-499
 Attended Participants - 200
 (Male - 120; Female-80)

