4th Edition of

World Aquaculture and Fisheries Conference

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Thank You All...

Speakers

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Inoussa Compaore
Université Nazi BONI, Burkina Faso

Junngam Khiham
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Joseph Christopher C Rayos
National Fisheries Research and Development Institute, Philippines

Manjeet Kaur
Government College, India

Meenakshisundaram Ganesan
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Mukesh Bhendarkar
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Nondumiso Mfenyana
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Shifa Abubaker Bahaddad
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Srushti Sawant
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Subhas Das
The University of Burdwan, India

T V Anna Mercy
Kerala University of Fisheries and Ocean studies, India

Tzanakis Manolis
University of Crete, Greece

Yasmin Hamed Ali AL Alawi
Sultan Qaboos University, Oman

Thank You All...

Welcome Message

J. L. Giovanna Hesley

CropKing, Inc. Curriculum Development, United States

Dear Conference Attendees,

Exciting developments in aquaculture education will be highlighted at the upcoming conference as I address the aquaponics segment for the third time. The collaboration with The Ohio State University and CropKing, Inc. has significantly shaped the curriculum, offering valuable insights. The focus is on providing students with a comprehensive understanding of aquaculture and aquaponics through a curriculum that integrates theoretical knowledge with practical applications. This year's conference will emphasize the growing field of aquaponics within sustainable agriculture. My presentation will underscore the importance of educating students in aquaculture and discuss strategies for collectively working towards an educated workforce through certificates. I am eager to share our progress and collaborative efforts, confident that they will contribute to advancing aquaculture education.

Welcome Message

Marty Riche, Ph.D.

Florida Atlantic University, United States

Dear Conference Attendees,

It is a privilege to address such a June Congress. The demand for seafood continues to grow as our understanding of the health benefits that seafood provide. Coupled with increasing global population growth, there is a gicbal increase in annual per capita seafood consumption. Since the mid-1980's it has been recognized that capture fisheries are at its maximum capacity. To meet the increasing void between demand and production, aquaculture has increased substantially. To be closer to local markets and reduce the carbon footprint, there is growing interest in rearing marine fish in low-salinity recirculating systems. Advances gained in technologies over the last 20 years include life stages that range from egg to market, and areas of research that include production, novel engineering concepts, economics, marketing, physiology, larviculture, disease resistance, reproduction, energy utilization, nutrient dynamics, metabolism, internal and external microbiomes, genomics and transcriptome adaptation to low salinity.

Welcome Message

Leire Arantzamendi, Ph.D.

AZTI, Spain

Dear Conference Attendees,

It is an honor and great pleasure to write a few welcome notes for the session entitled Sustainable Aquaculture. As we are living in the plastic era, it becomes increasingly evident that the reduction of plastic usage in aquaculture is not merely a choice, but an imperative for the preservation of our oceans and the pursuit of sustainable development and decarbonization. Aquaculture stands at a pivotal juncture, faced with the formidable task of adopting practices that are not only environmentally responsible but also conducive to the well-being of our planet. Central to this endeavor is the urgent need to transition away from fossil-based plastics towards more sustainable alternatives, thereby mitigating the threat of marine litter and the proliferation of microplastics in our oceans. In the pursuit of this noble goal, a holistic and multidisciplinary approach is indispensable, one that encompasses the realms of production, socio-economic dynamics, environmental considerations, and policy frameworks. It is within this context that our session assumes paramount significance, offering research topics aimed at advancing the cause of sustainable aquaculture. These discussions promise to shed light on innovative solutions and best practices that hold the potential to transform the landscape of aquaculture. Let us seize upon this invaluable opportunity to immerse ourselves in the latest advancements and insights pertaining to the substitution of fossil-based plastics with more sustainable materials in aquaculture. Together, let us embark on a journey of discovery, collaboration, and collective action, propelled by a shared commitment to safeguarding our precious marine ecosystems for generations to come.

Welcome Message

Tamar Lotan

University of Haifa, Israel

Dear congress visitors,

It is an honor to welcome you to the meeting, where our shared passion for aquaculture and fisheries will provide a platform for the dynamic exchange of ideas, experiences, and cutting-edge research aimed at ensuring the future sustainability and prosperity of the industry. Ensuring the health and well-being of fish is paramount in the world of aquaculture and fisheries. Fish health is vital for the overall ecosystem's vitality, sustainability, and economic viability, with ongoing scientific research playing a pivotal role in identifying and addressing health issues in fish. Furthermore, addressing emerging challenges such as diseases and parasites requires a collaborative approach, involving industry experts, researchers, and policymakers. As we navigate the complex dynamics of aquaculture and fisheries, a strong emphasis on fish health ensures not only the resilience of aquatic ecosystems but also safeguards the global supply of aquatic food. Looking forward to hearing new ideas and wishing all of us a fruitful meeting.

Welcome Message

Virendra Goswami

Indian Institute of Technology (IIT), India

Dear Erudite Participants,

It's my privilege to welcome you all at´4th Edition of the World Aquaculture and Fisheries Conference (WAC-2024) during June 24-25, 2024, in Paris, France, in the honored capacity of Committee Member, Chair Session, and Keynote Speaker at the 'Oceanography and Limnology.' and 'Aquatic Pollution and Toxicology' Sessions, during UN-Decade of Ocean Science for Sustainable Development.

We as a scientific community are here not only to raise awareness of the truly global dimension of the ocean and set forth on a path towards a resilient planet but to learn Ocean Energetics, morphological and dynamical properties of Oceans and Cryosphere at Surface (S), Sub-Surface (SS), and Deep Surface (DS) level in order to develop 'Numerical Ocean Cryosphere- Energetics Model'(NOCEM), through the computational Correlational techniques by using High-Resolution Satellite imageries, data access, assimilation; HPC and cloud computing for real-time analysis and Artificial Intelligence to explore the deep seas. Next, the co-evolution of climate and marine life in the Arctic-Antarctic-Sea through the Correlation of Ocean-atmosphere-cryosphere interactions with Climate Variability i.e., to evaluate the correlation between the impacts of multiple stressors on the ocean and the associated risks of abrupt state shift, rising of sea level, melting of the glaciers, vis-à-vis climate change would be studied.

Also, through the process of Initialization, Computation, and Parameterization, within the (1 x 1) deg. grid-box by the computer algorithm, the Numerical Prediction Models for Ocean -Cryosphere Climate variability over Arctic & North Atlantic regions would be evolved by studying the kinematic features of the mesoscale convective systems over Arctic- North Atlantic Ocean regions.

Welcome Message

Nguyen Quang Linh

Hue University, Vietnam

Dear congress visitors,

Writing a few welcome notes is an honor and pleasure. Biotechnology today has made unprecedented progress since a few years ago with new Gene Editing and recombination methods for faster and more precise plant breeding. This opens new opportunities to adapt modern breeds to climate change, achieve higher productivity, and introduce intelligent, differentiated methods to work against crop pests and aquaculture infection. It is not a coincidence that most mass crops and animals in modern agriculture originate from ancestral species with natural monodominant stands. Organic farming and precision aquaculture, seemingly incompatible with those trends, open alternative farming systems with more respect to biological processes and environmental protection. Since gene transfer and natural mutation are based on similar functions, it is evident that both agricultural and aquaculture strategies could go together. Organo-transgenic agriculture and antibiotic resistance, based on Precision Agriculture, will be the future basis for success.

ABOUT
MAGNUS GROUP

Magnus Group, a distinguished scientific event organizer, has been at the forefront of fostering knowledge exchange and collaboration since its inception in 2015. With a steadfast commitment to the ethos of Share, receive, grow, Magnus Group has successfully organized over 200 conferences spanning diverse fields, including Healthcare, Medical, Pharmaceutics, Chemistry, Nursing, Agriculture, and Plant Sciences.

The core philosophy of Magnus Group revolves around creating dynamic platforms that facilitate the exchange of cutting-edge research, insights, and innovations within the global scientific community. By bringing together experts, scholars, and professionals from various disciplines, Magnus Group cultivates an environment conducive to intellectual discourse, networking, and interdisciplinary collaboration.

Magnus Group's unwavering dedication to organizing impactful scientific events has positioned it as a key player in the global scientific community. By adhering to the motto of Share, receive, grow, Magnus Group continues to contribute significantly to the advancement of knowledge and the development of innovative solutions in various scientific domains.

ABOUT
WAC 2024

Magnus Group warmly welcomes you to the **4th Edition of the World Aquaculture and Fisheries Conference** (WAC 2024). Scheduled for **June 24-26, 2024**, this event offers a Hybrid format, blending in-person experiences in the enchanting city of **Paris, France**, with the convenience of **virtual engagement** from anywhere in the world. The conference theme, "*Revolutionizing Aquaculture and Fisheries: A Novel Outlook*," highlights the potential and uniqueness of small-scale artisanal fisheries and aquaculture, emphasizing partnerships with fish farmers and workers in alignment with Sustainable Development Goals.

WAC 2024 serves as a hub for collaboration, bringing together researchers, scientists, academicians, marine biologists, aquaculturists, fish care experts, and industry representatives. This diverse group will exchange groundbreaking ideas, share expertise, and cultivate professional networks. The event promotes policy co-development and collaboration among small-scale fishermen, fish workers, fish farmers, and stakeholders. Attendees can look forward to keynote speeches, tech presentations, oral presentations, poster sessions, and panel discussions, all designed to support the role of small-scale and artisanal fisheries in global sustainable development.

Join us at WAC 2024 for a transformative experience where innovation meets collaboration, shaping the future of aquaculture and fisheries for a sustainable and thriving planet.

ABOUT
CPD Accreditation

Continuing Professional Development (CPD) credits are valuable for WAC 2024 attendees as they provide recognition and validation of their ongoing learning and professional development. The number of CPD credits that can be earned is typically based on the number of sessions attended. You have an opportunity to avail 1 CPD credit for each hour of Attendance. Some benefits of CPD credits include:

Career advancement: CPD credits demonstrate a commitment to ongoing learning and professional development, which can enhance one's reputation and increase chances of career advancement.

Maintenance of professional credentials: Many professions require a minimum number of CPD credits to maintain their certification or license.

Increased knowledge: Attending WAC 2024 and earning CPD credits can help attendees stay current with the latest developments and advancements in their field.

Networking opportunities: Aquaculture Conference provide opportunities for attendees to network with peers and experts, expanding their professional network and building relationships with potential collaborators.

Note: Each conference attendee will receive 14 CPD credits.

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KEYNOTE PRESENTATIONS

The Danube Delta, a potential new submerged Atlantis under a Black Sea impact scenario due to global sea level rise, raises questions about the fate of regional fish species

The Danube Delta is one of Earth's biodiversity hotspots and includes many endemic, rare, and important species of both major conservation and economic value. This unique complex of ecosystems also plays a key role for Danube River and Black Sea fish fauna through its role as a natural safe buffer, shelter, feeding, reproduction, and smooth transitional area for a large number of fish species. Climate change is inducing a progressive sea level rise in the Black Sea, a fact that is expected to impact the delta's key complex and dynamic habitats, biocoenoses, and associated biota, and last but not least the key taxonomic group, namely, fish. Around one-third of the fish species of this delta will be greatly affected, sometimes negatively, by this climate change scenario, another one-third to a lesser extent, and the final one-third not at all. The ecological positive feedback of fish can stimulate environmental change and is expected to be responsible for changes within Danube Delta ecosystems, and also for the near Danube River and Black Sea diverse matrix of aquatic and semi-aquatic ecosystems. Sea level rise in the Black Sea is considered to have been one of the main stress factors of the Danube Delta fish fauna in the past, and is likely to be the case in the future. In this spatio-temporal dynamic context, for the fish species under threat and risk, in situ-adapted management measures are highly required. The current work brings for the first time such a prospective knowledge about the potential impact on Danube River–Danube Delta–Black Sea coast fish diversity in the potential climate change–sea level rise scenario.

Doru Bnaduc

Lucian Blaga University of Sibiu, Romania

Biography

Doru Banaduc is an Associate Professor at the Lucian Blaga University of Sibiu in the Faculty of Sciences, Sibiu, Romania. His teaching activities include courses, laboratories, seminars, and field projects and activities in the fields of ecology, environmental protection, biology, anthropogenic systems and risk assessment, principles of taxonomy and systematic management of biological resources, ecological systems analysis, etc. His research activities include fundamental and applied ichthyology, fish ecology, taxonomy, and systematic aquatic systems assessment, monitoring, and management, ecological monitoring, water, sediment, macroinvertebrates, fish toxicology, etc. He has authored and co-authored over 200 publications and work in 18 countries.

Cultivating young minds for sustainable aquaculture careers: The impact of a five-shelf tower garden

Summary: Ms. Joni Lee Giovanna Hesley will discuss the captivating world of aquaculture and sustainable food systems through the innovative Five-Shelf Tower Garden. This interactive educational tool introduces young minds to the principles of aquaponics, blending fish farming with hydroponics in a closed-loop system. The tower's five tiers showcase the various stages and components of aquaponics, from the fish tank and deep water culture to nutrient film and sprouts shelves. Engaging workshops and hands-on experiences foster an appreciation for environmental stewardship and healthy eating habits. Moreover, this unique approach inspires young individuals to pursue rewarding careers in aquaculture, addressing global challenges and shaping a brighter future for sustainable agriculture. Join us in cultivating a generation of environmentally conscious enthusiasts, ready to make a positive impact in the world of aquaculture.

Introduction: The five-shelf tower garden, an interactive aquaponics setup, holds the potential to inspire young minds towards aquaculture and sustainable food systems. Engaging young people in this experience is crucial for fostering a new generation of environmentally conscious individuals and encouraging them to pursue rewarding careers in aquaculture.

The Five-Shelf Tower Garden: The tower garden is a dynamic educational tool that demonstrates the principles of aquaponics in five distinct tiers:

1. **Sump:** The tower's foundation, where water is collected for continuous nutrient circulation.
2. **Fish Tank:** Housing fish, this component showcases the importance of water quality and sustainable aquaculture practices.
3. **Deep Water Culture (DWC) Shelf:** Featuring plant roots suspended in nutrient-rich water, this shelf demonstrates the symbiotic relationship between fish and plants.
4. **Nutrient Film Technique (NFT) Shelf:** With nutrient-rich water flowing over plant roots, learners discover space-efficient hydroponic techniques.
5. **Sprouts Shelf:** The topmost level presents sprouts and young plants, highlighting the rewarding outcomes of sustainable farming.

Engaging the Youth: Engagement with young individuals is vital to promote their interest in aquaculture and encourage future careers in this field:

1. **Hands-On Experience:** Involving young learners in setting up and maintaining the tower garden provides practical knowledge and instills a sense of accomplishment.

J. L. Giovanna Hesley

CropKing, Inc. Curriculum Development, United States

Biography

Ms. Hesley studied Education at Arizona State University, USA, and graduated with a Master's of Education in 1997. She taught STEM to K-8 students. She received her Master of Science degree in 2015 at the University of Arizona in Agricultural and Biosystems Engineering. After three years of teaching engineering to young students, she became grant writer and curriculum developer for CropKing, Inc., which sells greenhouses, hydroponics, and aquaculture equipment. Ms. Hesley is now assisting in the development of an alternative high school graduation certificate for Ohio Board of Education. She has spoken internationally at conferences on the benefits of aquaponics in the classroom.

2. **Interactive Learning:** Through workshops and demonstrations, educators make aquaponics science accessible and fascinating to young minds.
3. **Steam Education:** The tower garden serves as a living laboratory for interdisciplinary learning, incorporating Science, Technology, Engineering, Arts, and Mathematics (STEAM) concepts.
4. **Environmental Awareness:** By showcasing the tower garden's closed-loop system, young learners develop a deeper understanding of sustainability and water conservation.
5. **Healthier Food Choices:** Observing the growth of fresh, nutritious produce encourages healthier eating habits and reinforces the link between food sources and a balanced diet.

Inspiring Aquaculture Careers: By engaging young minds in aquaponics and sustainable practices, we can cultivate a passion for aquaculture, leading to potential careers in the field:

1. **Early Exposure:** Introducing aquaculture concepts at a young age sparks curiosity and lays the foundation for future career interests.
2. **Promoting Innovation:** Encouraging creativity in sustainable farming methods can inspire young people to develop novel solutions for the industry.
3. **Addressing Global Challenges:** Young aquaculture professionals can contribute to solving food security and environmental issues through sustainable practices.
4. **Building Stewardship:** Engaging in aquaculture education fosters a sense of responsibility and environmental stewardship among young learners.
5. **Career Diversity:** Aquaculture offers a wide range of career paths, from aquaponics specialists to marine biologists and fish farm managers, providing diverse opportunities for young enthusiasts.

Utilizing the five-shelf tower garden as an educational tool is an effective way to ignite interest in aquaculture among young people. By fostering hands-on experiences, promoting environmental awareness, and inspiring careers in the field, we empower the next generation to become passionate advocates for sustainable aquaculture, shaping a brighter and more resilient future for our planet and its inhabitants.

Technical validation of biobased vs. Fossil-based ropes for offshore longline mussel (Mytilus Galloprovincialis) production

The expansion of offshore mussel aquaculture is intertwined with the rising demand for mussel grow-out ropes. Currently, these ropes are manufactured using fossil-based plastics. However, in response to concerns about plastic pollution and the need for more sustainable practices, biobased materials have emerged as more sustainable alternatives. Yet, the importance of the choice of raw materials, as well as the methods used in their production and sourcing, is key in determining the performance of materials in sea conditions within the context of aquaculture. This study evaluated the functionality of biobased ropes in terms of productivity and durability, comparing them to fossil-based counterparts during a one-year mussel culture in offshore conditions. Across one-year culture, noteworthy mussel losses were observed in the fossil-based (65%) ropes compared to the biobased B1 (53%) and B2 (18%) prototype ropes, B2 and B1 ropes yielding 85% and 23% more mussel (kg/m rope) than the fossil-based ropes. Moreover, the higher correlations of shell length and body weight over time suggesting that biobased ropes may be more suitable substrates for mussel growth compared to fossil-based ropes. The structural distinction between the round and more uniform fine multifilaments in biobased ropes, as opposed to the clustered structure of flat fibers in fossil-based ropes, may have contributed to a more effective surface area for the initial attachment and growth of seeded mussels, avoiding subsequent losses. The use of biobased ropes contributed positively to the interplay between substrate structure, biofouling, and mussel attachment, which may be used for guiding further designs of aquaculture biobased gears. Despite seasonal variations, the final condition, proximate and fatty acid composition of mussel indicated their marketability and high nutritional quality. Higher shell length and mussel yields observed, indicating a potential for mussels cultivated on biobased ropes, especially in B2, to reach a higher market value. Regarding durability, linear density of biobased ropes remained unaltered after one-year offshore mussel culture. The biobased B2 rope prototype showed the highest ratio between the retention of mechanical properties (Load at Break and elongation) and the total mussel weight held for one year. The findings of this study validate the biobased B2 prototype as the most promising alternative to fossil-based ropes. It significantly boosted production yields of high-quality mussels while maintaining rope durability throughout one year in offshore culture. These results hold promise for reducing the reliance on fossil-based plastic ropes in mussel aquaculture, thereby contributing to decarbonization efforts.

Leire Arantzamendi[1]*, Marga Andres[1], M Jose Suarez[2], Lien van Der Schueren[3], Mikel Aguinaga[4]

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Biography

Dr. Leire Arantzamendi has worked at AZTI in marine research Since 2010, carrying out research projects in aquaculture. Throughout these years he has worked on lines of circular economy generation in aquaculture related to the use of alternative ingredients to fishmeal from food industry byproducts in sole grow out and mussel hatchery diets. Since 2019, as coordinator of the EU_BIOGEARS project, she has been working on the implementation of biobased and biodegradable offshore

Audience Take Away Notes

- Biogears aims to provide the European aquaculture sector with innovative biobased ropes that are durable, marketable and fit-for-purpose, and that contribute to a more sustainable and eco-friendlier aquaculture sector
- The consortium has worked together to develop prototypes of biogears (biobased ropes) for use in mussel and seaweed culture, including an Integrated Multi-Tropic Aquaculture (IMTA) approach. These biogears have been tested for mussel suspended production at sea, using longline and raft systems in different environmental conditions (offshore-longline and sheltered-raft). Technical, environmental and economic sustainability assessment of the biogears have been carried out, including its biodegradability at sea and the composting conditions
- In the submitted study, the results of the technical validation at sea testing of biobased ropes as alternatives for conventional fossil-based ropes used in mussel offshore aquaculture productions (longline) are presented
- By the validation of biobased mussel aquaculture ropes, referred as to biogears, which is the aim of the submitted abstract, the impacts of BIOGEARS are threefold. BIOGEARS will have a positive impact on sustainability of the aquaculture industry by developing more eco-friendly ropes and aquaculture systems. Through the development of new biobased products and value chains it will have a positive economic impact on aquaculture by supporting a circular bioeconomy. A 'Blue Lab' with a collaborative multidisciplinary partnership has been developed to track innovation related to new biobased materials to develop local aquaculture and to support the replication of research and its implementation in other European Regions. Finally, BIOGEARS is also addressing key societal impacts by supporting public policies to reduce plastic littering at sea, but also by fostering new employment, quality products and responsible production and consumption

mussel cultivation ropes with the aim of reducing the carbon footprint of mussel aquaculture along the entire value chain, while than to generate a circular economy.

Real time detection of free-swimming sea lice with high resolution optical sensor

Since 1980, the production of Norwegian farmed salmon has increased from ca. 4,000 tonnes to ca. 1.2 million tonnes. This means that the industry produces on average about 14 million salmon meals every day, throughout the year. Norway experienced an exceptional growth in salmon production, of around 10% annually, in the 20-year period leading up to 2013. Production has since stagnated due to sea lice (Lepeophtheirus salmonis) infestation and its consequences. Industrial development cannot occur until environmental challenges, such as sea lice infestations are addressed and effectively managed. Further, it is recognized that by 2030, salmon must be farmed using technologies that eliminate the problems of sea lice. Within this context, we acquired funding from the Norwegian Seafood Research Fund (2023-2024) to develop a technological approach for real time detection of free-swimming sea lice with the ultimate goal to support decision making by stake holders to implement mitigation measures. To develop such an early warning system for sea lice, we are using an advanced high resolution plankton camera, the Underwater Vision Profiler version 6 (Hydroptic). Further, we developed algorithms using artificial intelligence-based systems for classifying detected organisms, especially the copepodite stage. The UVP6 is mounted on a smart profiling buoy for data collection across depth with additional parameters (salinity, temperature, light etc). Last, a digital dashboard has been developed to report data for stakeholders in a cloud based data portal "Blue Insight" (Kongsberg). We aim to use this advanced imaging sensor and our AI-based data processing drive for real-time detection and classification of free-living early developmental stages of sea lice as an early-warning system of potential infestations in order to implement mitigating measures. Our approach is to ensure that our proposed solution is non-proprietary, applicable in the field with a broad industrial utility and with an easy upscaling potential. In our presentation, we will describe our approach, completed work and results.

Audience Take Away Notes

- This project illustrates that today technology (hardware, firmware and AI) allow real time detection and quatification of the small free swimming stage of a salmon parasite
- This new technology can be of interest by the salmon farming industry or the authorities to detect and quantify the presence of the free swimming lice
- The project allows to gain knowledge on the ecology of the salmon lice in its environment and within the associated plankton community. The technology generates new data which can be of interest for plankton ecologists and for teaching (plankton ecology, sensors, AI)

Lionel Camus[1]*, Ragnhild Pettersen[1], Kanchana Bandara[1], Virginie Ramasco[1], Morten Thortensen[1], Marta Moyano[2], Sigmund Sevatdal[3], Leif Byldøy[4], Tormod Skalsvik[5], Marc Picheral[6], Jerome Coindat[7]

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Biography

Lionel Camus holds a PhD in marine biology from the University of Plymouth (UK) since 2002. He currently is the Manager for Digital Solutions at Akvaplan-niva (Tromsø, Norway). His role is to develop basic and applied research and monitoring activities using digital technologies such as robotics, advanced sensors, cloud-based solutions, AI, digital models etc. Today, Camus manages a fleet of multiple autonomous vehicles (surface and underwater), numerous sensors and advanced sensors and the Blue Insight cloud based data portal.

Culture of the marine Florida pompano, Trachinotus Carolinus, in low salinity environments: A 20-year retrospective

Marine finfish species are highly prized and sought after in the United States. The coastline of the United States has been estimated as 153,646 kilometers, which includes the Hawaiian Islands and Alaska. Despite the large area and expansive Exclusive Economic Zone (EEZ), the United States still continues to import 70-85% of its seafood leading to a seafood trade deficit reported in 2020 to be $17 billion. Utilization of inland low-salinity areas for the production of euryhaline species would help alleviate this deficit.

In 2001, The U.S. Department of Agriculture's Agricultural Research Service initiated a program to develop technologies for rearing marine finfish in inland low-salinity environments. A number of species were investigated. In 2004, the program refocused on evaluating Florida pompano, Trachinotus carolinus, a high-value species. The work reported here embodies 20 years of research in low-salinity production of the marine euryhaline Florida pompano.

It was anticipated these technologies could find application for rearing euryhaline marine fish throughout approximately 2/3 of the United States where low salinity groundwater is available. This approach was anticipated to reduce the need to be located near expensive coastal land, reduce the volume of saltwater effluent, and reduce the carbon footprint of marine finfish production.

The advances gained over the last 20 years include life stages that range from egg to market, and areas of research that include production, novel engineering concepts, economics, marketing, physiology, larviculture, disease resistance, reproduction, energy utilization, nutrient dynamics, metabolism, internal and external microbiomes, genomics and transcriptome adaptation to low salinity.

M. Riche*, E. Allmon, D. J. Bradshaw II, M. S. Davis, L. E. King, N. T. Kirchhoff, S. Mejri, J. F. Paredes, C. S. Perricone, T. J. Pfeiffer, K. L. Riley, M. S. Sepulveda, C. R. Weirich, P. S. Wills

Center for Marine and Warm Water Aquaculture, Harbor Branch Oceanographic Institute, Florida Atlantic University, Fort Pierce, Florida, United States

Biography

Dr. Riche has more than 30 years national and international aquaculture experience in the private, public, and academic sectors. He served two years as a Peace Corps volunteer training host Nationals at the National Fingerling Production Center in Sierra Leone, West Africa. He is a Director for Aquaculture without Frontiers – USA currently working on development activities in Liberia, Kenya, and Malawi. He is a Research Professor at Florida Atlantic University (FAU) working on marine fish seedstock production. He is a Co-PI on a collaborative project investigating larval and post-larval fish nutrition, broodstock selection and nutrition to improve larval quality.

Cloning and characterization of the LvCTL genes encoding C-type lectin from white-leg shrimp (Litopenaeus Vannamei)

Tran Vinh Phuong[1], Nguyen Ngoc Phuoc[2], Tran Nguyen Ngoc[2], Hoang Dinh Trung[3], Ngueyn Xuan Huy[1], Nguyen Quang Linh[4]*

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Background: Lectins are carbohydrate-binding protein domains. The C-type designates a requirement and aquaculture for binding. Proteins contain C-type lectin domains with diverse functions, including cell-cell adhesion, immune response to pathogens, and apoptosis. This study aimed to investigate the characters of LvCTL encoding genes from white-leg shrimp (Litopenaeus vannamei) in Central Vietnam.

Methods: Two PCR products (LvCTL3 and LvCTL4) were cloned and sequenced. The structure and characterization of LvCTL proteins were predicted using bioinformatics tools.

Results: The results showed that the LvCTL3 gene was 444 long and 98.87% similar to the published LvCTL3 gene (accession number: KF156943). The polypeptide sequence had 147 amino acids, which were 97.28% identical to the reference sequence (AGV68681) and the LvCTL4 gene had a length of 417 nucleotides and homology of 99.52% compared to the published gene (KM387560). The deduced polypeptide sequence had 138 amino acids and was 100% similar to the reference sequence (AKA64754). The LvCTL3 had a molecular weight of 16.91 kDa and an isoelectric point (pI) of 4.66, while LvCTL4 had 15.75 and 4.58 kDa, respectively. The structure prediction results showed that LvCTL3 and LvCTL4 had one domain (CTLD), LvCTL3 had two α helices and nine β sheets, and LvCTL4 had two α helices and eight β sheets.

Conclusions: Our results provide essential information for C-type lectins' heterologous expression and biosynthesis production.

Biography

Prof. Dr. Linh studied Animal Sciences and Veterinary Medicine and aquaculture at Wageningen University, Utrecht University, The Netherlands, and Humboldt University, Germany, and graduated with an MSc in 1996, a PhD in 2001 and a Postdoc in 2003. He then joined the Faculty of Animal Sciences and Faculty of Fisheries in Vietnam, under-supported by FAO, WB/ACP, ADB, ACIAR, JEBIC, and other funds; he led many groups and projects for International and national forums. He has published over 50 research articles in WoS/Scopus indexing and 70 research articles in national journals belonging to National science and technology. He has 4 GenBank notations (2019 -2022) and ten patents (2009 – 2023).

Myxozoans simple but sophisticated parasites

With over 2200 species, myxozoans are microscopic obligate spore-forming parasites affecting marine and freshwater fish worldwide. They have complex life cycles requiring alternate vertebrate (mostly fish) and invertebrate (mostly worms) hosts. Myxozoans can cause emerging diseases in many commercial fish species, including tilapia, catfish, carp, trout and salmonids, inflicting economic and environmental damage. Myxozoans belong to the phylum Cnidaria, alongside free-living corals, sea anemones and jellyfish. Although they are highly reduced compared to free-living cnidarians, myxozoans have retained the phylum-defining stinging organelles, known as nematocysts, which are essential for initiating fish infection. To explore the adaptation of myxozoan nematocysts to parasitic life and their role in host infection, we studied their structure, firing process and protein content. High-speed imaging revealed that activation of myxozoan nematocyst results in anchoring to the host body and injection of parasite content. To understand fish-parasite interaction, we used the newly discovered myxozoan Myxobolus bejeranoi, which infects gills of hybrid tilapia at more than 80% prevalence, leading to high mortality rates. We characterized the temporal progression of M. bejeranoi infection and the immune response of the host fish by performing transcriptomic analyses of both the sporulation site and the immune organs. We found that the parasite employs an immune evasion strategy of a thorough shutdown of the immune response, including deactivation of secreted cytokines and of a transcription factor responsible for T helper cell differentiation. The consequence is an immune-deprived fish, which is expected to be highly susceptible to other opportunistic pathogens. These findings suggest that M. bejeranoi is a highly efficient parasite that can disable the defense mechanisms of its fish host. Lastly, I will discuss the specificity of myxozoans as well as their global distribution, including concerns about fish stock import and the efficiency of health testing of imported livestock.

Tamar Lotan

Marine Biology Department, The Leon H. Charney School of Marine Sciences, University of Haifa, Haifa, Israel

Biography

Prof. Lotan is a co-founder of The Marine Biology Department, at the Leon Charney School of Marine Sciences, University of Haifa, serving as Head of the department at 2018-2022. Within the field of fish parasitology, her main interests are parasite-host interaction, focusing on myxozoan development, evolution and adaption to the changing environment. She founded two companies in the fields of health care and drug delivery, both based on cnidarian biology. In 2009, she joined the Leon H. Charney School of Marine Sciences to lay the foundations of the evolving Marine Biology Department. Between 2008 and 2020, she was a board member at the Kinneret College on the Sea of Galilee and, currently, she serves as a member of the General Assembly of the College. In 2011-2015, she was a board member at The Israeli Association of Aquatic Studies (IAAS) and in 2015-2022, she was a board member at The Interuniversity Institute for Marine Sciences in Eilat (IUI). She holds a BSc and an MSc in biology from the Hebrew University of Jerusalem, and a PhD in genetics from the Weizmann Institute of Science, Israel.

Application of Artificial Intelligence and Remote Sensing (AIRS) to study the correlation of climate change with ocean energetics (OSIRIS) to develop 'Numerical Ocean Cryosphere- Energetics Model'(NOCEM)

By making use of Artificial Intelligence and Remote Sensing (AIRS), the present study aims to understand Ocean Energetics by studying the morphological and dynamical properties of Oceans at Sea-Surface(SS), Sub-Sea-Surface(SSS), and Deep-Sea Surface(DSS) levels e.g., Sea Surface Temperatures (SSTs), Sub-Sea Surface Temperatures (SSSTs), Deep-Sea Surface Temperatures (SSTs), Salinity, Marine Pollution due to toxic gases, Ocean Systems Interactions, Risks, Instabilities, and Synergies (OSIRIS) to develop first 'Numerical Ocean Energetics Model(NOEM)'.

Next, the aforesaid studies are to be conducted at Cryosphere Surfaces (CS), Cryosphere (CSS), and Deep-Cryosphere Surface (DCS), by studying the morphological and dynamical characteristics e.g., melting of the glaciers, ice sheet stability, ice and bedrock coring, ice sheet modelling, and ice sheet processes over the Cryosphere, in order to substantiate the developed 'Numerical Ocean Energetics Model (NOEM)'into 'Numerical Ocean Cryosphere- Energetics Model'(NOCEM)',through the computational Correlational techniques by using High-Resolution Satellite imageries, data access, assimilation; HPC and cloud computing for real-time analysis and Artificial Intelligence to explore the deep seas.

Seminal scientific research is needed to develop Numerical Ocean Cryosphere- Energetics Model (NOCEM), over the North Atlantic-Arctic Sector, to understand the major Atmospheric challenges due to extreme weather events caused due to mesoscale convective systems, Global Carbon Cycle, dynamical and morphological properties, along with sub-mesoscale dynamics of Arctic ice sheet stability, Cryosphere (Arctic), Oceanic Atmospheric regions.

Hence, efforts art on the Co-evolution of climate and marine life in the Arctic-Antarctic-Sea through the Correlation of Ocean-atmosphere-cryosphere interactions with Climate Variability i.e., to evaluate the correlation between the impacts of multiple stressors on the ocean and the associated risks of abrupt state shift, rising of sea level, melting of the glaciers, vis-a-vis climate change.

Next, through the process of Initialization, Computation, Parameterization, within the (1 x 1) deg. grid-box by the computer algorithm, the Numerical Prediction Models for Ocean -Cryosphere Climate variability over Arctic & North Atlantic regions would be evolved by studying the kinematic features of the mesoscale convective systems over Arctic- North Atlantic Ocean regions and, be correlated with ocean-cryosphere Climate variability on time & Space Scales; at the local,

Virendra Kumar Goswami

Indian Institute of Technology (IIT) & Environment and Peace Foundation, India

Biography

Dr. Virendra Goswami, Ph. D Indian Institute of Technology (IIT), Kharagpur, MS from the University of Wisconsin, USA. Post Doctorate Fellow (PDF) at the University of Illinois, Chicago, USA. 'Visiting Scientist' to UNIDO, ICTP, Italy &International Civil Aviation Organization (ICAO), Canada. Founder President 'Environment & Peace Foundation, and Wing Commander (Retd), with 550 hours of flying as a supernumerary Aircrew. Dr. Virendra Goswami worked at Space Science Engineering Centre, NOAA(NASA) at the University of Wisconsin, USA. Former Vice-Chancellor (Rector): Sangam & Sunrise Universities. Had been Director General /Director of Management /Engineering Institutes. More than 44 years of teaching, research, and administrative experience at Home and abroad. Member: American Geophysical Union, American and Indian Meteorological Societies. Special Invitee by the World Meteorological Organization (WMO) in 2001& 2016. Invited Speaker in Apr'15 at NPW: NSF, NCAR, USA, Meteo-France, WMO, CLIVAR, and Lomonosov Moscow State University,'

regional and global levels through the extracted Sea and Cryosphere Surface Temperature over the grid box(10-10), attributing the regional change to natural and anthropogenic radiative forcing agents to bring out the few optimum values of the (OSIRIS) to develop 'Numerical Ocean Cryosphere- Energetics Model'(NOCEM).

Keywords: Ocean and Cryosphere Energetics, Toxins, Climate Change, Ocean Systems Interactions, Risks, Instabilities, and Synergies (OSIRIS), Ice Sheet Stability, Ice and Bedrock Coring, Ice Sheet Modelling, 'Numerical Ocean Cryosphere- Energetics Model' (NOCEM),

Audience Take Away Notes

- The audience would not only learn Ocean Energetics (Sea Surfaces and Cryosphere Surfaces) comprising morphological and dynamical properties of Oceans and Cryosphere at Surface (S), Sub-Surface (SS), and Deep Surface (DS) levels e.g., but, also about the changes in Temperatures, Salinity, Marine Pollution, Ocean Systems Interactions, Risks Instabilities, and Synergies (OSIRIS), ice sheet stability, ice and bedrock coring, and ice sheet processes over the Cryosphere, in order to develop 'Numerical Ocean Cryosphere-Energetics Model'(NOCEM)

Globalistic-17', 'Globalistic-20 TROPMET-20, Euro-Marine2021, WAC2022 and WAC2023, Tokyo. Reviewer /Member of Editorial Board of Royal Meteorological Society Atmospheric Science Letters (R. Met. SAL) as well as Prof. Emeritus: Sharda Univ., and GNEC, Medical College, New Delhi. Presented Papers in the field of Chemical Technology, Atmospheric, Marine, Oceanic, Space, Medicinal, and Lunar Sciences. Satellite Application, Climate Variability, Control of Global Warming & Quality Higher Education at International and National Conferences held in India, USA, UK Latin America, South Africa, Canada, and Europe (more than 32 countries of all the Continents) in the capacity of 'Visiting Scientist'. Besides, headed various delegations at the National & International Levels.

BOOK OF ABSTRACTS

JUNE

24-25

4th Edition of

World Aquaculture and Fisheries Conference

SPEAKERS

Alessio Alesci[1]*, Sebastian Marino[1], Letterio Giuffre[1], Anthea Miller[2], Gabriele Rigano[1], Serena Savoca[1], Gioele Capillo[1]

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The internal defence system in Actinia Equina (Linnaeus, 1758): The role of mucus and goblet cells

Mucus is a link between the organism and its environment, with unique and multifunctional properties in all metazoan classes. In metazoans it is secreted by highly specialized cells, the goblet cells, which are mainly scattered in the epithelia in contact with the external environment. Goblet cells also play a role in maintaining the health of the organism by acting as sentinels. Recent studies in vertebrates have suggested that some goblet cells may also be involved in antigen presentation to dendritic cells by activating Toll Like Receptor (TLR) signals, thereby contributing to the defense response by increasing mucus production. In aquatic organisms in particular, mucus is involved in several essential biological processes, including feeding, movement, reproduction, osmoregulation, defense against pathogens, xenobiotics and a variety of environmental stressors. The capability to create a functional layer of mucus is a significant evolutionary step that first emerged in cnidarians. Actinia equina (Linnaeus, 1758), is an anthozoan cnidarian of the family Actiniidae, which has a complex and unresolved taxonomic history. What was once thought to be a single polymorphic species with a wide geographical range is now defined as a species complex. The sea anemone lives in intertidal and subtidal rocky areas down to 20 meters depth. It is characterized by a highly variable coloration, with simple tentacles and a smooth or mottled column, ranging from red, brown and orange to green. The aim of this study was to investigate the role of goblet cells in the integument of A. equina and to provide further data on the internal defense system of this anthozoan from an evolutionary perspective. Our results on integument samples show scattered amoebocytes and goblet cells immunoreactive for TLR2, an evolutionarily conserved receptor that plays a key role in modulating the defense mechanisms of the body. Goblet cells also appear to be immunopositive for mucin2, a protein involved in the composition and formation of a layer of mucus that modulates external exchange and may prevent microbial invasion. Interestingly, the colocalization of both antibodies on goblet cells suggests that these cells function as sentinels and that their secretion, mucus, assists the body in protective mechanisms by mediating contact with the external environment. However, these data may also provide additional information to better understand and study the taxonomy of these cnidarians and how they interact and defend themselves against environmental insults.

Audience Take Away Notes

- This study could be used by other researchers to extend their research
- It provides additional knowledge about the internal defense system of anthozoans
- The data obtained could be used to improve the taxonomic knowledge of cnidarians
- This presentation provide additional information about cnidarian mucus and its biological activities

Biography

Dr. Alesci studied Biological Sciences at the University of Messina, Italy and graduated in 2008. He received his PhD degree in 2012 at the same institution. From 2023 he is Junior Researcher in Zoology at the Department of Chemical, Biological, Pharmaceutical, and Environmental Sciences of the University of Messina, Italy. He participates in several national and international research group with a line of research on the internal defense system and evolution of metazoans. He has published more than 50 research articles in SCI(E) journals. He also collaborates with several journals as member of the Editorial Board.

A. Da Fonseca Ferreira*, C. Le Bris, T. Grard, R. Roquigny

University Littoral Cote d'Opale, UMRt 1158 BioEcoAgro, USC ANSES, INRAe, University Artois, University Lille, University Picardie Jules Verne, University Liege, Junia, F 62200 Boulogne sur Mer, France

'Welcome to the hotel microbialifornia' - A six months spatial and temporal study of sea bass aquaculture tank bacterial communities

Within the realm of seafood production, aquaculture is a pivotal domain, where the intricate dynamics of microbial communities bear significant ramifications for fish health and production efficiency. In aquaculture, particularly in the context of sea bass (Dicentrarchus labrax) farming, Vibrio harveyi has gained notoriety as a significant pathogen responsible for causing vibriosis. This bacterial disease can have devastating consequences for farmed fish populations. Understanding the interactions between V. harveyi and the microbial communities within sea bass aquaculture systems is critical for developing effective disease management strategies. Our study aimed to explore the spatial heterogeneity of microbial populations across the water column within a 4-meter-deep aquaculture tank housing sea bass over a six-month timeframe while monitoring the abiotic parameters. Utilizing Next Generation Sequencing with a specific focus on the V4-V5 region of the 16S rRNA gene, we aimed to comprehensively unravel the intricate details of microbial communities across depths and sample types.

To achieve this, we collected samples at three different depths within the tank: the top, middle, and bottom. These samples encompassed two sample types: water samples to investigate planktonic microorganisms and concrete block samples to delve into the microbial biofilm communities.

Our results not only revealed substantial variations in microbial populations between the two sample categories but also unveiled pronounced differences among the various depths. Notably, the Vibrionaceae family emerged as one of the most abundant among all families in the samples, and it remained consistently present throughout the entire sampling campaign. This underscores the pivotal influence of both sampling strategies and spatial factors on the complex microbial dynamics within the aquaculture system.

This research significantly enhances our comprehension of the intricate relationships between microbial communities, aquaculture conditions, and environmental factors within sea bass aquaculture settings. It is essential to highlight that the emergence of vibriosis does not appear to be solely connected to the resurgence of Vibrio bacteria from other bacterial groups. Instead, it can result from a combination of the interactions of these microbial communities. This complex emergence may also be linked to abiotic parameters, emphasizing the multifaceted nature of the factors contributing to the development of vibriosis. Therefore, it becomes essential to underscore the need for an additional study, that we are currently conducting, explores the underlying factors that contribute to the virulence of this bacterium. Conducting such complementary research is crucial in achieving a comprehensive grasp of these microbial dynamics and in advancing sea bass aquaculture practices.

Audience Take Away Notes

- Our research reveals that vibriosis development is influenced by a complex interplay of bacteria and abiotic factors, dispelling the notion that Vibrio species alone drive the disease. This insight has wide-ranging applications for researchers, aquaculture professionals, and educators. It enables them to

improve disease management in sea bass aquaculture, enhancing fish health and production efficiency. Moreover, it offers a valuable resource for researchers in microbial communities and aquaculture, fostering a deeper understanding of these fields. This knowledge contributes to the sustainability of sea bass farming and underscores the significance of environmental factors in aquaculture.

Biography

Alix Da Fonseca Ferreira completed her biology studies at the University of Strasbourg, France, obtaining her Master of Science (MS) degree in Biomedicine in 2021. During her academic journey, she developed a strong interest in microbiology, which motivated her to join the research group of Professor Grard at the University of the Littoral Opal Coast, France. She is currently in her third year of her Ph.D. program, working within the BioEcoAgro Joint Cross-Border Research Unit located in Boulogne-sur-Mer, France.

Abraham Sarker[1], Amie Sarker[2]*, John Hatton[3]

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Sustainable, efficient alternatives to pond culture technology for finfish

The South Asia Fisheries Research Project (SAFRP) finfish production program was designed to explore the cost-effective production of fish in a land-based facility using advanced technology. The project was designed to

1. Maximize land and water use and use local materials and personnel to reduce costs and.
2. Simplify operating requirements to reduce training costs and enhance predictability and stability of outcomes over time.

The technology of choice was Biofloc that can be loosely defined as managing two diLerent crops simultaneously in the same tank, fish and plankton. Biofloc Technology (BFT) eliminates the need for separate systems for nitrification, growout and degassing reducing the infrastructure complexity compared to Recirculating Aquaculture Systems (RAS) and their inherent cost.

Methodology: BFT requires extensive mixing and aeration of the water to facilitate adequate oxygen levels and nitrification of fish waste products. The current SAFRP design requires tanks in order to optimize this water movement and eliminate issues normally related with pond sediment.

A group of 50-m^3 tanks were stocked with sex reversed tilapia to evaluate land-based finfish production using biofloc technology. The tanks used aeration nozzles to simultaneously mix and aerate the water. The nozzles also facilitate efficient self-cleaning and concentration of waste products in conjunction with a dual drain tank configuration.

Nitrification was accomplished using bioflocs in the water maintaining acceptable ammonia and nitrite levels throughout the growout period. The nitrate levels and Total Suspended Solids (TSS) were controlled through limited water exchange and solids removal. The tank design includes an additional 3m^3 sediment tank that receives 15% of the water flow from the main tank center drain. The waste produced is processed and composted and used as soil amendments.

BFT requires maintaining an adequate carbon/nitrogen (C/N) ratio in the water to eLiciently grow bioflocs. This normally requires additional carbon, like rice flour or molasses, to be added in addition to fish feed. The C/N ratio, size and age of the bioflocs is controlled by managing the waste flow and carbon additions.

Results: After ten years of research and development, the SAFRP tanks are uniquely designed to eLiciently facilitate waste removal and minimize water losses while mixing and aerating the water. This includes the development of a patent-pending nozzle which reduces energy production costs significantly.

A pond is usually limited to about 5000kg/ha, whereas the current operation of 60 tanks produces 10 times as much product in the same space and allows mixing of age and species cohorts during the production cycle. The larger tank base also allows the evaluation of a production scale BFT facility with a range of operational issues related to specie variation, production logistics, bio security, and water quality.

Annually, the SAFRP tanks produce 230,000 kg of fish. Fish quality has been significantly enhanced with reduction of oL-flavors, and FCR has been decreased by 10-20% through the biofloc technology. Additionally, the SAFRP hatchery produces 100 million fingerlings each year that supply both SAFRP's own grow out tanks and are sold to local fishermen for pond and other uses.

Audience Take Away Notes

- How to implement Biofloc in a difficult environment
- Biofloc cultivation
- Infrastructure build/maintain
- Applying a unique design to finfish production
- Nozzles
- Twin drains
- Tank advantages
- Bio security
- Production logistics
- Water management – Mature water/immature water/water exchange

Biography

Dr. Amie Sarker is the Co-founder of the South Asia Fisheries Research Project (SAFRP) and Co-founder of Fresh Aquaculture, LLC. Dr. Sarker completed bachelors and masters degrees from Texas universities in the USA, and a PhD from the University of North Texas. She has been conducting research in South Asia for over 12 years and has published several articles in peer-reviewed journals. Dr. Sarker has served on the faculty of the University of Dallas since 2014.

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[3]Acuacultura, Centro de Investigaciones Biológicas del Noroeste, La Paz, Baja California Sur, México

Bioactive compounds in plants: Can replace antibiotics in aquaculture?

Aquaculture supplies more than half of food production in the fishing sector, which is why it has become one of the most important practices for the food industry worldwide. Management, health, water quality and pathogen control are determining factors for the success of aquaculture.The need to produce food under strict quality standards and reduce the impact on the environment, leads to development of food industry, particularly aquaculture practices. Minimizing the impact of this industry, implies the use of non-chemical antimicrobials and better practices for a sustainable management. Search for alternatives for crop improvement and protection against pathogens is of utmost importance to avoid production losses and dispense with the use of antibiotics. In traditional medicine, plants have been used ancestrally for therapeutic purposes, which is why their antimicrobial potential is well recognized. Medicinal plants offer a natural and sustainable alternative with high antimicrobial capacities, particularly if native species are used. Its use and administration in aquaculture systems must be evaluated for effective use. Meditinal plants as basil, Ocimum basilicum L. and oregano, Origanum vulgare, are plants with a wide distribution in Mexico, both are able to inhibit the growth of Vibrio parahaemolyticus, an important pathogen in aquaculture practice. For this work, an exhaustive search was carried out for studies that evaluate the use of medicinal plant extracts in aquaculture, including research of our own authorship. According to this research, the antimicrobial potential, in addition to antioxidant, that medicinal plants can contribute to aquaculture practice is emphasized, which implies the elimination of harmful antibiotics from the environment and contributes to the improvement of aquaculture practice and the reduction of its impact. It is necessary to evaluate the mode of administration of medicinal plant extracts to better take advantage of the bioactive compounds.

Audience Take Away Notes

- This research can be replicated with other medicinal plants native to the different regions producing marine farming organisms.
- This research provides a practical solution to viral and bacterial pathogens, avoiding the use of antibiotics, providing an efficient but more environmentally friendly solution
- A strategy is proposed to improve the administration method of natural antimicrobials to minimize losses due to pathogens in aquaculture

Biography

Dra. Ana Claudia studied Marine Biology at UABCS, La Paz, BCS, México and graduated as master in science in 2009 and doctor in science in 2015 in the area of marine biotechnology. She then joined at 2017 to the University of Guadalajara as professor and researcher in marine, aquaculture and food biotechnology. She has published her work in international journals and leads a research proyect that involves doctoral students. Conducts collaborative research for the development of the aquaculture industry with another leading researchers.

Daniel Russek

CEO & Founder, Atarraya Inc. Atarraya Inc., 530 Massachusetts Ave, Indianapolis, IN 46204, United States

Revolutionizing aquaculture: Sustainable shrimp farming through technology and collaboration

Sustainable. Local. Fresh. These are not the typical attributes associated with shrimp in today's aquaculture industry. Shrimp, a globally beloved protein, faces significant environmental and labor challenges. The conventional shrimp farming industry disrupts marine ecosystems, wastes resources, and often relies on subpar labor conditions. These are just a few of the factors that make shrimp an unlikely candidate for the future of sustainable protein.

However, there's hope on the horizon. Technological advances have the potential to transform shrimp farming into a sustainable, local, and environmentally friendly industry. This presentation will explore how innovative solutions, driven by biotechnology and artificial intelligence, can make shrimp the sustainable protein of choice. By harnessing AI and self-contained environments, we can create ideal breeding conditions for shrimp without the need for antibiotics or harmful chemicals.

But the story doesn't end there. Sustainable shrimp farming also offers new opportunities for farmers, allowing them to transition from conventional livestock to this eco-friendly industry. The transition is not only beneficial for the environment but also offers a fresh, local, affordable, and delicious alternative to imported shrimp products.

Join us in this session to discover how technology and collaboration can revolutionize the shrimp industry. Learn how these innovations can benefit not only the environment but also the livelihoods of those who work in the industry. The future of sustainable protein is within our grasp, and we have the tools to make it a reality.

Audience Take Away Notes

- How technology and collaboration can make shrimp farming sustainable and eco-friendly
- The potential for shrimp to become a fresh, local, and affordable protein source
- The symbiotic relationship between innovative technologies and the workers who can use them to thrive in the aquaculture industry

Biography

Daniel Russek is the CEO and Founder of Atarraya Inc., a company dedicated to revolutionizing the aquaculture industry. With a background in economics and a profound attachment to coastal communities in Mexico, Russek's journey began with a mission to improve the lives of small fishermen and revitalize the aquaculture sector. His career spans consulting, business analytics, and sustainable aquaculture. At Atarraya, he leads the development of biotechnology and AI-driven solutions that are reshaping seafood production and distribution. Daniel Russek's vision is clear: to make sustainable shrimp farming a reality and ensure it benefits both the environment and communities worldwide.

Dean Giosio[1]*, Ryder Jamson[1], Alan Henderson[1], Greg Smith[2]

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Development of a computer vision-based device for continuous larval monitoring in commercial-scale crustacean aquaculture

This study presents the development of a novel computer vision-based device for larval monitoring in large-scale crustacean aquaculture. The device utilizes computer vision algorithms to identify and count larvae within a grow-out tank, providing continuous and real-time data for estimating the total tank population.

During a larval grow-out trial, the device underwent thorough testing to validate its functionality. Short-term sampling revealed distinctive larval behaviours triggered by environmental conditions such as lighting variation, or the presence of feed, as well as circadian patterns. Furthermore, longer-term measurements demonstrated the device's ability to accurately track population levels over time

The implementation of this device holds significant commercial potential in the field of crustacean aquaculture. The continuous and real-time data stream generated by the device enables improved run management, reduced labour requirements, optimized feeding practices, and precise scheduling of downstream operations based on up-to-date projections of batch output.

Through real-time larval monitoring capabilities, the developed device offers valuable insights into larval population dynamics, enabling aquaculture managers to make informed decisions, enhancing overall production outcomes and profitability.

Audience Take Away Notes

- How the automation of manual processes using computer vision and machine learning can improve operational efficiencies and reducing labor costs
- How real-time data provided by the presented device enables data-driven decision making for optimizing feeding practices, scheduling operations, and improving run management
- How the device streamlines data collection, offering cost-effective insights that would be time-consuming and costly to obtain manually
- The presentation showcases the potential and benefits of automation in the crustacean aquaculture industry, and the aquaculture industry at large, emphasizing streamlined processes, data-driven decision making, and technology adoption for improved operational outcomes

Biography

Dr. Dean Giosio graduated with a combined BEng(Hons, 1st class)/BSc(Chem) from the University of Tasmania in 2009. Following a PhD in fluid dynamics from the same institution, he then held the position of postdoctoral research fellow at the Australian Maritime College Cavitation Research Laboratory. Here Dr. Giosio worked on a collaborative project with the United States Office of Naval Research investigating microbubble populations and cavitating flows about hydrofoils. Since 2018 Dr. Giosio has been working to scale-up systems and commercialize technology developed at the IMAS ARC Industrial Transformation Research Hub for Sustainable Onshore Lobster Aquaculture.

Gopa Mitra*, S.T, Patnaik, C.S.K.Mishra

Department of Zoology, College of Basic Science and Humanities, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, India

Interactions of Carotenoids with different nutrients in aquatic organisms

Carotenoids play key role in colouration, growth, metabolism, health and reproduction, other than having provitamin A and antioxidant activity in different animals including aquatic organisms. Although some bacteria, algae, fungi and plants can biosynthesize them, animals cannot synthesize denovo. Consequently, they must obtain them from their dietary sources. However, carotenoids bioavailability from food is modulated by several factors like food matrix, interactions with different nutrients, composition of carotenoids, food preparation procedures, metabolic activity of different organisms etc.In this review,the interactions of carotenoids with various factors in respect of aquatic organisms' health, and physiology have been discussed.

Audience Take Away Notes:

- Health and physiology and colouration of Aquatic Organism. Carotenoids have beneficial effects on growth and physiology of Aquatic organisms. Through aquatic food chain, different organisms specifically ornamental fish can obtain them for vibrant skin colouration, food fish and prawn for flesh colouration. Again through aquatic food chain of edible fish and prawn and other aquatic organisms, the consumers can get various beneficial effects of natural carotenoids on physiology and good health. Because carotenoids not only have advantageous effect as antioxidant, anticancer and provitaminA mediator, it lowers the risk of cardiovascular and degenerative disease, perk up cognitive and neuromotor health.
- Bioavailability of Carotenoids and increasing the efficiency of carotenoid activity. However, their bioavailability differs and modulated by several factors which are discussed in this review.
- This will help the faculty members, researcher and fish culturist during farm made feed preparation for aquatic organisms giving due attention to the factors interfere with bioavailability of carotenoids. It will help to explore different carotenoid resources and do work on application of different carotenoids as food additive and neutraceuticals.

Biography

Dr. Gopa Mitra is teaching Higher Secondary, Undergraduate and Post Graduate Zoology students in the Department of Zoology, College of Basic Science and Humanities, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, India. She was also teaching Zoology in R. D. Women's Universty and MSc. Fisheries and Aquaculture in Department of Zoology, Utkal Universty, and Bhubaneswar. Earlier she was working as Senior Research Fellow, Research Associate and DST Women Scientist A in the ICAR- Central Institute of Freshwater Aquaculture, Kausalyaganga,Bhubaneswar,with Dr.P.K. Mukhopadhyay, Dr S.Ayyappan, Dr. J. K. Jena and Dr. P.Jayasankar.

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Spiny lobster aquaculture – from aspiration to production

There are several high value marine species that until recently have only been available for harvest as a fishery product. A growing world middle-class is driving increased demand for premium seafood products. To meet market demand an integrated multidisciplinary approach is required to translate aquaculture aspiration into production in difficult to culture marine species. A typical example of singular research vs a coordinated multidisciplinary approach is evident with a longitudinal examination of spiny lobster propagation research. The development of commercial spiny lobster propagation commenced in 1898 in Japan, over the proceeding century rudimentary benchtop culture was established for several species, this was achieved by several institutes across the world, particularly in Japan. The research primarily had a singular focus on particular aspects of culture, such as nutrition, health or biology. However, this approach failed to take spiny lobster culture to a commercial phase. In Australia, over the past two decades a coordinated approach to spiny lobster propagation has been undertaken, firstly through a grouping of research institutes focused on spiny lobster research, and then later expanding the capacity at the University of Tasmania's, Institute for Marine and Antarctic Studies (IMAS). This has resulted in spiny lobster aquaculture moving to a pre-commercial footing. This transition has been achieved through an integrated approach to spiny lobster biology, physiology, behaviour, husbandry and nutritional requirements, examination of the environment of their aquatic systems and factors that assist to integrate these such as advanced engineering, AI and genetics. When developing a new aquaculture species, factors such as industry input, operating at commercial scale, sustainability and social science are of equal importance to achieving successful outcomes (Fig. 1). The research was driven through a large multidisciplinary research program that integrated findings simultaneously achieving outcomes by coordination and implementation of findings in a team environment with a singular focus.

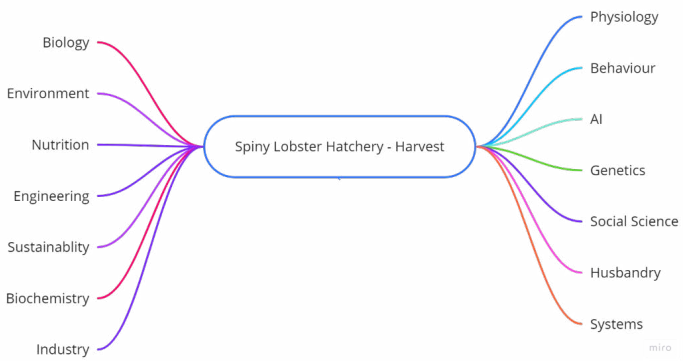


Figure 1.

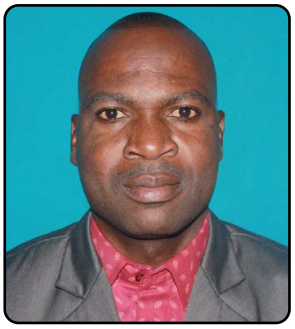
Factors that contribute to the successful implementation of new species aquaculture.

Audience Take Away Notes

- The development of spiny lobster aquaculture as a new industry
- The benefits of diverse research teams to solve complex problems
- Potential for some of the technology to be used for other difficult to rear species
- Ability for AI to be used in the aquaculture of high value species
- The commercial challenges of developing a new aquaculture species
- Consider better ways to collaborate to achieve a common goal
- Establish new collaborations and partnerships
- This project has established a crustacean transcriptome database (Crusty base) to assist in assessing gene function, freely accessible, more material added by users
- The use of Crusty base dramatically reduces time spent on looking at gene functions in crustaceans

Biography

Professor Smith has a commercial background working in the shrimp industry before studying a degree in Applied Science in 1996 at the University of Tasmania. In 2004 Professor Smith received his PhD studying spiny lobster larval competency. He undertook a two-year postdoc at the Tasmanian Aquaculture and Fisheries Institutes, followed by four years at the Australian Institute of Marine Science in Queensland specialising in spiny lobster larval propagation research. In 2010 he moved to the University of Tasmania's, Institute for Marine and Antarctic Studies, to take up a position in larval system design for spiny lobsters. Professor Smith is the current Director of the Australian Research Council Industrial Transformation program for Sustainable Onshore Lobster Aquaculture, based at the University of Tasmania, Australia. He has published more than 70 spiny lobster related research articles in A1 ranked journals.



Inoussa Compaore[1]*, Sourabie Cheick Idriss[1], Kondombo Cyrille[2]

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Maggot meal (Musca Domestica), an alternative to fish meal in small and medium-sized fish farms in Burkina Faso

The availability in quantity and quality of animal protein sources of local origin is a concern of stakeholders in the aquaculture sector in Burkina Faso. This study consisted of finding the optimal conditions for intensive production of maggots in fish farms. It was conducted at the Lassalien Center for Introduction to Agricultural Professions in Bérégadougou from December to June 2022. The maggot production device contained 3 metal frames each topped with 4 strainers. To determine the effect of the attractants, we had 4 treatments distributed in each strainer, T0 (raw substrate), T1 (Substrate + Soumbala), T2 (Substrate + Animal blood) and T3 (Substrate + Fish viscera). To test the effect of temperature on maggot production, frame 1 was placed in the sun all day, frame 2 was placed for 6 hours in the sun and 6 hours in the shade and frame 3 was placed permanently in the shade for 4 days. As for the effect of humidity on maggot production, 4 treatments were also created. T0 was not watered, T1 received 2 liters of water on the first day, T2 received 2 liters for 2 days and T3 received 2 liters of water for 3 days. The results showed that with a temperature of 27.9 to 31.14 °C there was a high production of maggots (1541g/m^2) unlike a temperature of 30.07 to 33.37 °C (402.25g/m^2). The variation in the humidity level of the substrate made it possible to increase the production of maggots (1227g/m^2 at frame n°2). Tests have shown that the best substrate is fish viscera (1541g/m2 for frame n°3).

Audience Take Away Notes

- The public will be able to use the method used in this study for the intensive production of maggots
- This work will help fish farmers reduce fish production costs
- Other professors can use the method to expand their research or teaching
- The results of this study constitute a practical solution to the high cost of fish meal
- It can be a source of job creation and income

Biography

Inoussa Compaore studied at the Polytechnic University of Bobo-Dioulasso, now Nazi BONI University, and I obtained a degree in rural development engineering with an option: Water and Forests in 2008. I continued my Master's studies of research in genetics and plant biotechnology at the University of Ouagadougou in 2010. The same year, I continued my doctoral studies at Nazi BONI University where I defended my unique doctoral thesis in rural development in 2018 (specialty: fish production). Seconded to this university, I continued my career as a teacher-researcher. Today I am a lecturer in fisheries sciences with a total of around twenty research articles.

Junngam Khiham* and J. A. Johnson

Department of Habitat ecology, Wildlife Institute of India, Dehradun, Uttrakhand, India

Revisiting the ichthyological research and species checklist in the lotic systems of Arunachal Pradesh, Eastern Himalaya- A systematic review

Arunachal Pradesh, being the largest state in North-east India covers 60.93% of the eastern Himalayan hotspot. It is endowed with rich networks of drainage systems with enormous fish diversity and endemicity. However, most ichthyological research on most of the river systems are sporadic or incomplete and a comprehensive compilation of the state's species checklist is still lacking. In view of this a systematic review according to preferred reporting items for systematic review and meta-analysis protocols (PRISMA-2020) guidelines was performed by searching for articles on Scopus and Google Scholar using appropriate keywords and suitable inclusion and exclusion criteria. Records identified from other sources such as citations and websites were also included. The search yield 194 results in total from both databases and other sources after screening and eventually about 70 articles were included in this paper for further review and analysis after quality assessment. Amongst these majority of the literature focused on taxonomical studies and new discoveries and new reports from the state. Only a handful of literatures focused on ecological aspect of this fauna including their feeding habits and habitat associations. Around 300 fish species from different river systems has been compiled here augmenting the previously reported count of 259 by Gurugram et al.,(2016). More than 30 new species have been reported thereafter signifying the diverse habitats. Limited and available literature skewed predominantly around taxonomical studies or species inventory in the state, signifies a pressing need to shift focus towards fish ecology to address the urgent requirements for further conservation efforts with increasing anthropogenic activities and environmental changes.

Audience Take Away Notes

- This systematic literature review method offers a robust and reliable approach that addresses the shortcomings of traditional literature review studies. Unlike the traditional method, it employs systematic and explicit techniques to identify, select and critically evaluate relevant research, ensuring objective and reproducible results. By utilizing this method, data can be collected and analyzed in a comprehensive manner, enhancing the rigor and validity of the review process.
- This presentation points out the updated fish species checklist of one of the most unexplored states of Arunachal Pradesh in India exhibiting immense potential of high diversity and endemism being a part of biodiversity hotspot.
- The present investigation also establishes the market potential of certain indigenous ornamental fish. These aquatic resources can be further sustainably utilized as an organized trade commodity so that the livelihood pattern of local population may be uplifted economically.
- This presentation shed light on the limited literatures regarding the ecology of ichthyofauna in the area. Also, the existing studies are outdated or insufficient to provide a comprehensive understanding of the fish species and their interactions within the ecosystem.

- The lack of recent research indicates a gap in knowledge and necessitates the need for further exploration to provide valuable insights into the ecological dynamics of the ichthyofauna, contributing to the overall understanding of aquatic ecosystems in the area.
- This presentation also emphasizes that investigating the fish species, their interactions and their dependence on the ecosystem is crucial for conservation and sustainable management.

Biography

Miss Junngam Khiham is currently enrolled as a Ph.D. Scholar at Wildlife Institute of India. She is a CSIR-UGC Junior Research Fellow (JRF) and is also affiliated with the research program on Long Term Ecological Observatories (LTEO) initiated by Ministry of Environment, Forest and Climate Change (MoEFCC) of India. She is actively engaged in monitoring fish population in Eastern Himalaya Landscape. In 2017, she completed her graduation with honours in Zoology and in 2019, she successfully obtained her post-graduation degree in Zoology with a specialization in Ecology and Wildlife Science. She is a passionate nature enthusiast and conservationist. She is an intrepid explorer who derives immense joy from venturing into uncharted territories, embracing noval experiences and immersing herself in diverse natural environments and cultures.

Manjeet Kaur
Department of Zoology, Govt. College Safidon 126112 (Jind) Haryana, India

Genotoxic effect of rice agrochemical on channa punctatus using MN assay and alkaline single cell gel electrophoresis

Rice cum fish culture is a cost effective practice for marginal and poor farmers but the major constraint of this aspect is continous and roughly use of agrochemical according to farmers on fish, Channa punctatus reared in rice fields. Present studies were therefore conducted to evaluate the induced genotoxicity (DNA damage) due to commonly used rice agrochemicals (Pretilachlor, Chlorpyriphos, Cartap hydrochloride, Lambdacychalothrin, Imidacloprid) in erythrocytes of fresh water fish Channa punctatus using Micronucleus assay (MN assay) and Single Cell Gel Electrophoresis (SCGE)/ Comet assay. Fingerlings of Channa punctatus an air breathing candidate species for rice fish co culture was stocked in rice fields. Five treatments were maintained in triplicates. In treatment 1 no fish, no pesticide were used; treatment 2, fish in rice fields without agrochemical spray; treatment 3, fish and agrochemical exposure as per recommended doses; treatment 4, fish and agrochemical exposure according to farmers; fingerlings of Channa punctaus with mean body weight of 15.44±0.12 were stocked in rice fields @ 1 fish per 3 sq. m after 10-15 days of seedling transplantation in rice fields. The mean per cent frequency of MN in treatment T2 (0.53±0.06), treatment T3 (0.94±0.09) and in treatment T4 (2.6±0.12) showed significant ($P<0.05$) differences with respect to treatments. The mean frequencies of tail DNA (%) was observed maximum in erythrocytes of fish reared in T4 (15.57±2.76) as compared to T3 (8.30±1.76) and T2 (2.82±0.32). It was observed that the genotoxic effect is more visible in fishes stocked in treatment T4 (Fish in rice fields with pesticide exposure whatever the dose used by farmers) in comparison to treatments 3 and treatment 2. Keeping in view the low genotoxic effects, treatment T3 (with recommended doses of pesticides) may be disseminated to farmers.

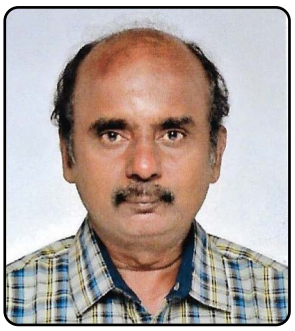
Key words: DNA Damage, Micronucleus Assay, Agrochemicals, Genotoxicity, Rice Fields.

Audience Take Away Notes

- I will explain how the marginal farmers will be benefited from double cropping method
- I will emphasis the hazardous effect of agrochemicals
- I will elucidate the micronucleus assay and Single cell gel electrophoresis method/ Comet Assay

Biography

Dr. Manjeet Kaur graduated from C.M.K National Girls College, Sirsa (Haryana) India, post graduated as M.Sc in Zoology (2006-2008) at Kurkshetra University Kurukshetra (India). I did my M.Phil with specialization in Cytogenetics and fish and fisheries from Kurukshetra University, Kurukshetra (India). After that I joined the training programme held in NBFGR (National Bureau of Fish Genetic sources, Lucknow, India. I received my PhD degree in 2017 at the same institution. Now I am working in Govt. College Safidon (India). I have National and International publications in various research journals.



M. Ganesan

Senior Principal Scientist (Superannuated) CSIR-Central Salt & Marine Chemicals Research Institute, Marine Algal Research Station, Mandapam- 623 519, Tamil Nadu, India

Commercial production of elite seedlings of Kappaphcus Alvarezii using novel micropropagation technique

Kappaphycus alvarezii yields multiple products like carrageenan, biostimulant, potassium rich salt and biofilm. Commercial cultivation of K.alvarezii has been initiated along the South East Indian coast two decades ago. Initial cultivation experiments were done with perforated polythene bags, fishnet bags, open culture and finally bamboo raft culture and long line rope culture method. Bamboo raft culture is being adopted at commercial scale along the Southeast Indian coast while long line rope method is more suitable for the condition prevailed in Northwest Indian coast. Seaweed cultivation became very lucrative business for the fisher folk and earning an average of US$ 600 per month. However sudden eruption of ice ice disease in 2013 killed several thousand tonnes of seaweed. K.alvarezii cultivation has not reached to its fullest capacity even after 10 years, due to lack of seed material.

Therefore, it is highly imperative now to introduce new techniques in K.alvarezii cultivation to produce virulent strains continuously for sustainable commercial cultivation. Tissue culture/Micropropagation technique has produced virulent strains of K.alvarezii The technology involves the following steps

1. Collection of the parent plant
2. Preparation of the explants
3. Tissue (shoot) initiation in the explants
4. Culture of the tissue culture explants in the laboratory
5. Hardening of the tissue culture plantlets in the Outdoor tanks
6. Acclimatization of the plantlets in the sea and
7. Commercial seedling production and multiplication
8. Supply of tissue culture seedlings to the seaweed farmers.

The most successful achievement of the technique is 250- 300 number of seedlings (each seedling @ 50 g fresh wt) were produced from a single mother plant of 100 g fresh wt. in 120 days. Totally 13,700 seedlings (@50g fresh wt). were produced and supplied to the cultivators covering Ramanathapuram District, Pudukkottai District and Tuticorin District.

Tissue cultured seedlings produced by this technique has 20 -30% higher growth as compared to conventional plant. This means farmers earning 20 -30% higher income.

We estimated and compared Refined carrageenan from tissue cultured and conventional plant. We observed tissue cultured K.alvarezii has significantly higher carrageenan yield and quality.

Biography

Dr. M. Ganesan is Ex Senior Principal Scientist at Marine Algal Research Station, Mandpam, Tamil Nadu, India an extension centre of CSIR- Central Salt & Marine Chemicals Research Institute. His expertise is commercial scale production of Kappaphycus alvarezii seedlings through tissue culture and agarophytes seedling production through spore culture. He is currently engaged in seaweed products development at commercial scale. He published 80 research papers in reputed SCI journals with high impact factor; 1 patent and guided 2 Ph.D students.

Mukesh Bhendarkar[1]*, Naiara Rodriguez Ezpeleta[2]

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How can environmental DNA transform Indian fisheries management?

India is a significant player in global fisheries and aquaculture industries, contributing to food security and economic development. However, this vital and diverse resource faces management limitations, due to an obsolete monitoring system, which, coupled with climate change impacts, challenges sustainable exploitation of resources. To address this issue, emerging monitoring approaches such as those based on environmental DNA (eDNA) – i.e. DNA collected form environmental samples without the need of sampling or observing the target species, appear as promising solutions to transform fisheries management in India. As a non-invasive, logistically easy and cost-effective biodiversity monitoring approach, eDNA which ensures spatio-temporal coverage of a variety of ecosystems, providing fisheries management relevant information such as species distribution, abundance, behaviour and connectivity. Yet, despite its proven efficacy in different fields related to fisheries globally, the adoption of eDNA analyses remains limited in the Indian context. Here, through compelling narratives and other set examples, and making emphasis on the specific challenges that must be addressed to make it practically operational, I will outlook the potential of new opportunities brought by eDNA to promote significant changes in fisheries research and biodiversity management in India.

Audience Take Away Notes

- The audience will gain insight into how eDNA analysis can revolutionize fisheries management by offering non-invasive tools for species detection, biodiversity assessment, and ecosystem monitoring
- The integration of eDNA analysis offers a practical solution to complex fisheries management challenges by providing snapshot about the species presence, biodiversity, and ecosystem health

Biography

Mukesh Bhendarkar beginning his fisheries journey with a Bachelor of Fisheries Science at the Maharashtra Animal and Fisheries Science University and Master's in Fisheries Resource Management at Dr. BSKKV, India. His professional journey began as a Lecturer at VNJC, then as a Fisheries Project Consultant for the Adani Foundation, Gujarat, India. He then transitioned to the role of Assistant Fisheries Development Officer for the Government of Maharashtra, India. Transitioning to research, he became a Scientist at ICAR-Central Institute of Freshwater Aquaculture, Odisha. Currently, at ICAR-National Institute of Abiotic Stress Management, Maharashtra, India. Currently, he is pursuing his PhD at AZTI, Spain, focusing on innovative eDNA applications in fisheries ecology.

Mfenyana, N.*, Sojola, S., Smith-Godfrey, S.
South African International Maritime Institute, PO Box 395, Port Elizabeth, South Africa

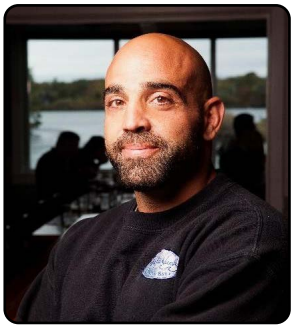
Bridging the gap: Metadata analysis and infrastructure evaluation in aquaculture research and training facilities

Aquaculture education, research and training facilities play a pivotal role in fostering innovation, advancing knowledge, and supporting industry growth. This paper presents a comprehensive approach to evaluating and improving Aquaculture infrastructure by amalgamating findings from the 2018 Department of Forestry Fisheries and Environment (DFFE) audit of Agricultural tertiary institutions with contemporary analysis methods. The methodology integrates desk-top assessments and on-site audits to identify existing research institutions with Aquaculture facilities, evaluate the status of their resources and pinpoint areas for enhancement. The study reviewed the DFFE audit to ensure alignment and updates to existing knowledge and structures in South Africa. A baseline desktop analysis was conducted to identify research institutions with Aquaculture facilities, followed by compiling a detailed inventory of available Aquaculture resources including location and contact information. Subsequently, a rigorous infrastructure audit was undertaken, employing a checklist to assess the type and condition of the facilities at each institution identified. Furthermore, the research identified gaps and opportunities within existing Aquaculture infrastructure and areas of collaborations to maximise utilisation of available resources. Institutions lacking requisite facilities were identified, while stakeholder engagement was facilitated to explore collaboration opportunities between institutions and the Aquaculture industry at large. A narrative for an "Ideal" facility was developed, encompassing various dimensions including infrastructure availability, curriculum, and research networks. A scorecard, derived from this ideal state, is utilized to rank existing facilities and determine necessary resource allocations for improvement. The paper concludes by proposing a strategy to bridge the gap between actual and ideal states of Aquaculture infrastructure available in the South African institutions. This strategy outlines funding, resource, and infrastructure requirements, alongside timelines for implementation. The study systematically evaluated existing facilities and creating alignment toward enhancement. This research aimed to catalyse the development of robust Aquaculture research and training infrastructure, thereby fostering innovation and sustainable industry growth.

Biography

Nondumiso previously worked as Manager: Centre for Fishing at South African Maritime Safety Authority (SAMSA) where she was responsible for the management in ensuring safety of commercial Fishing industry at sea and Maritime Industry Development programmes in South Africa. She served in several stakeholder platforms in ensuring a sustainable Maritime industry. She served as chairperson of the National Fishing Industry (NFF), member of the Operation Phakisa: Marine Transport Manufacturing task team for the initiative 14.5 – Fishing Vessel Recapitalisation. She served in the Nelson Mandela Bay Maritime Cluster and as secretariat of the Bunkering Stakeholder Forum. Nondumiso Mfenyana is currently in a short-term contract at the South African International Maritime Institute (SAIMI) responsible for the Operation Phakisa programmes on Skills, Education and Training for Oceans Economy development. This position enables her to implement skills development programmes across all the key focus areas, which made her to sit on several Maritime forums. Nondumiso also serve an Executive Secretary General member of the Maritime Business Chamber (MBC), an organisation that support SME's in the Maritime Industry. Nondumiso started her career with the National Department of Environment Forestry and Fisheries (DFFE) as an Oceanographic Research Scientist. She was later promoted to Deputy Director: Fisheries Resource Manager. One of the highlights in her profession is being

nominated one of the Delegated Authorities by the then Minister of Fisheries, for the 2005/2006 Long Term Fishing Rights Allocation Process. During her tenure at DFFE she served and chaired some of the Fishing Industry Association working groups, including Aquaculture. She is an Environmental Scientist by profession; she accomplished her undergraduate and honors qualifications from the University of the Western Cape. Furthermore, she obtained her Master of Philosophy in Fisheries Management at the University of Bergen, in Norway. Her Masters research covered Aquaculture technology transfer. Furthermore, she completed her Master of Business Administration (MBA) from Rhodes University and currently studying towards her PhD with the Nelson Mandela University (NMU). Nondumiso carry leadership qualities, assertive, proactive, highly motivated and result orientated person, who has a sense of urgency to get things done, with high degree of integrity and perseverance, and the ability to motivate others and transfer skills.



Perry Raso
Matunuck Oyster Farm South Kingstown, Rhode Island, United States

Mitigating challenges facing a growing industry: A review of current techniques and trials to improve growth, survival and public acceptance of the shellfish aquaculture industry in New England, United States of America

Increasing demand for sustainable seafood with a plateauing supply available from wild stocks has created a widening gap between supply and demand. Shellfish aquaculture has tremendous potential to help fill that gap by producing nutritious seafood while providing ecosystem services such increasing dissolved oxygen, increasing biodiversity, reducing erosion and stock enhancement.

The shellfish aquaculture industry faces challenges in the hatchery/nursery phase due to ocean acidification, bacteria and algae production for shellfish larvae food, all of which contribute to a shortage in shellfish seed. While shellfish aquaculture is widely recognized to be sustainable agriculture, it does face challenging societal issues in the grow out phase increasing user group conflicts due to industry expansion, as well as human health concerns due to harmful algal blooms; which are often times difficult to detect. These challenges must be addressed both on a societal and biological standpoint to allow the shellfish aquaculture industry to continue to grow.

This presentation will describe a combination of hatchery techniques being used to increase stocking densities, control bacteria and counteract lower Ph in hatchery water in order to increase larvae survival, and ways to more efficiently produce and deliver algae to larva and post larvae shellfish. Methods being used and developed to detect harmful algae blooms and mitigate user group conflicts in the Northeast USA will also be reviewed.

Biography

Perry started digging littlenecks in Point Judith Pond when he was 12 years old. He grew up harvesting shellfish, eel trapping, bull-raking clams, and scuba diving for steamers. Graduating from URI with a bachelors and master's degree, Raso studied aquaculture and fisheries technology. In 2002 he founded Matunuck Oyster Farm, a wading depth aquaculture farm, on Potter Pond in East Matunuck (Wakefield), RI. He opened the restaurant in 2009 to provide a place for work boats to access the farm, and a place to sell fresh oysters. He has since established Matunuck Shellfish Hatchery Research and Innovation Center, and most recently a retail market. He has been doing educational oyster farm tours since 2002 and has traveled to several developing countries to consult on various aquaculture operations. Education and giving back has always been at the core of the business.

Rendani Winnie Luthada Raswiswi[1]*, Gordon O'Brien[1,2], Samson Mukaratirwa[3,4]

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[2]School of Biology and Environmental Sciences, Mpumalanga University, Mbombela 1200, South Africa
[3]School of Life Sciences, College of Agriculture, Engineering and Science, Westville University of KwaZulu-Natal, Durban 4001, South Africa
[4]One Health Center for Zoonoses and Tropical and Veterinary Medicine, Ross University School of Veterinary Medicine, Basseterre KN0101, Saint Kitts and Nevis

The potential of crocodylus niloticus meat meal as an animal protein source replacing fishmeal in diets of Oreochromis Mossambicus of different size groups

Fish are generally known to change their nutritional requirements depending on their life stage and formulating feeds for different size groups to meet their dietary needs is essential. This study aimed to assess the potential of Crocodylus niloticus meat meal as an animal protein source replacing fishmeal in Oreochromis mossambicus diets. Ten fry (0.07 g fish–1) were randomly assigned to three formulated diets (0% (D1), 50% (D2), and 100% (D3)), and each diet had three replicates.

The fry were fed 10% Body Weight per day (BWd–1) for 30 days. New diets (0% (D4), 50% (D5), and 100% (D6)) were introduced, and the feeding rate was reduced to 5% BWd–1 for 48 days. After that, the fish were fed 2% BWd–1 for 78 days, the same diets used for fingerlings. All size groups were fed two portions of their daily ration at 10:30 h and 15:30 h. Our results point to the suggestion that Crocodylus niloticus meat meal may replace fishmeal for Oreochromis mossambicus, as there were no significant differences in Weight Gain (G), Specific Growth Rates (SGR), Gross Feed Conversion Ratios (GFCR), or Protein Efficiency Ratios (PER) for fry fed different diets. Furthermore, there were similarities in Gs, SGRs, GFCRs, and PER in fingerlings and sub adult to adult fish fed D4 and D5.

The cost analysis of ingredients used in diets with 50% and 100% Crocodylus niloticus meat meal indicated that it was profitable to use this meat meal in diets of O. mossambicus of all groups. The profit index of 0.3 for fry, 0.8 for fingerlings, and 1.9 for subadults to adults for 100% fishmeal diets were lower than 0.4 and 0.5 for fry, 0.9 and 1.1 for fingerlings, and 2.3 and 2.9 for sub adult to adult fish fed diets with 50% and 100% crocodile meat meal, respectively.

Audience Take Away Notes

- Audience will get information on how to produce high quality fish, reducing the cost of feed and minimizing the use of forage fish species in fish meal production
- This research can be used by others researchers or teachers, fish farmers, crocodile farmers, and animal feed manufacturers
- The study has practical solutions to problem such as feed costs, overfishing, and waste management.
- Crocodile farmers will benefit through the new information on how to process crocodile meat into fish meal. While fish farmers are reducing the cost of feeds and producing quality fish

Biography

Dr. Rendani is a Principal Technician in School of Life Sciences, University of KwaZulu Natal and a part-time Aquaculture Trainer at Universite Nationale d'Agriculture (UNA), Ketou, Benin. She received her PhD in Ecological Sciences in 2022 at the University Of KwaZulu Natal. She acquired experiences in aquaculture facilities management, artificial breeding of catfish, feeding management, live feeds production, water quality management, laboratory and equipment's maintenance at the University of Zululand, Department of Zoology, where she obtained her Master of Science in Zoology while working as a Senior Technician for nine years. She has four publications with 89 citations so far.

Saad Zah[1,2]*, Eric Bendiksen[1], Andre Madsen[1], Ioannis Vatsos[2], Kjetil Korsnes[1,2]

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[2]Faculty of Biosciences and Aquaculture, Nord University, Norway

It's in the blood: Examination of point-of-care blood testing systems for rapid analysis of biomarker profile in Atlantic salmon (Salmo Salar)

Objectives: To examine the performance of two readily available and affordable blood testing systems, Seamaty SMT-120VP and Mnchip Pointcare V2/V3, in analyzing blood-based biomarkers in Atlantic salmon and to determine the performance of whole blood versus plasma analysis.

Methods: The study evaluated the performance of two Point-of-Care Testing (POCT) systems, Seamaty and Mnchip, by comparing them to the Vetscan V2 analyzer for common analytes. The study also included a repeatability assessment to determine the internal measurement variation. To compare the systems, plasma samples from 60 Atlantic salmon with an average weight of 3,500 g were analyzed simultaneously on all three POCT systems using different analytical rotors. In addition, internal measurement variation was assessed by conducting ten repeated measurements on the same plasma sample. Lastly, a whole blood and plasma comparison was conducted on 35 samples from Atlantic salmon smolt. Whole blood samples were run on Seamaty and Mnchip instruments, followed by centrifugation and rerun on plasma.

Results: After conducting a benchmarking test on the Seamaty SMT-120VP and Mnchip Pointcare V2/V3 against the Vetscan VS2, it was found that there were significant differences and low correlation levels for nearly all analytes across the different systems. However, the internal measurement variation was acceptable for most analytes, except for aspartate aminotransferase (Pointcare V2/3), alanine transaminase (Pointcare V2/3), blood urea nitrogen (Pointcare V2/3), and creatinine (both systems). Furthermore, the comparison of whole blood versus plasma analysis showed high concordance between whole blood and plasma for most analytes on both Seamaty SMT-120VP and Mnchip Pointcare systems. However, there were exceptions for sodium, total bilirubin, and tCO2.

Conclusion: The benchmark study has demonstrated that the three POCT systems are not interchangeable and that reference values must be established for each system before clinical assessments. The analysis of blood versus plasma has shown that whole blood can be used to determine analytes in Atlantic salmon on Seamaty SMT-120VP and Mnchip Pointcare. This study suggests that POCT systems like these could be utilized for rapid and comprehensive blood testing of Atlantic salmon.

Keywords: Point-of-Care, Seamaty SMT-120VP, Mnchip V2/V3, Vetscan VS2, Atlantic Salmon, Whole Blood, Plasma.

Biography

Saad Zah studied Fisheries and Aquaculture Engineering at Hassan II Institute of Agronomic and Veterinary studies and graduated in 2019. He then moved to Norway to pursue a MSC in Aquaculture at Nord University where he worked as an engineer for two years before starting an industrial PhD with Aquapredict AS. His focus is smoltification in Atlantic salmon and the use of blood biomarkers to optimize the transfer to sea.

Shifa A. Bahaddad[1]*, Othman A. Alghamdi[1], Muhammad Yasir[2], Esam I. Azhar[2], Hichem Chouayekh[1]

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Bacillus species as direct-fed microbial antibiotic alternatives for aquaculture development and sustainability

Aquaculture is a rapidly expanding farming industry owing to the augmenting demand for food and the notable shortage in natural fish stocks. The aquaculture sector is providing more than 50% of the world's fish and seafood needs for the continuously growing human population. Nevertheless, intensive aquaculture heightened the menace of pathogenic disease occurrence in the farmed fish species, leading to a massive mortality. To control these devastating diseases, broad-spectrum antibiotics have been extensively applied. In addition to antibiotic accumulation in edible fish products, these practices led to spreading of hazardous antibiotic-resistant pathogenic bacteria in culturing aquatic environment, causing a failure of antibiotic treatments, and increasing the risks of the production losses through zoonotic infections. Consequently, developing ecofriendly substitutes to antibiotics that have several health-promoting properties for fish is a promising strategy for aquaculture development and sustainability. Main antibiotic substitutes are probiotics, feed enzymes, prebiotics, para-probiotics, postbiotics and medicinal plants.

Recently, probiotics or Direct-Fed Microbials (DFM) supplementation in aquaculture industry has gained considerable attention. The use of DFM has proven strong potential for improving aquaculture sustainability by disease control and enhancement of water quality, growth, immunity, and stress resistance of cultured aquatic animal species.

Among probiotic candidates, Bacillus species that are Generally Recognized As Safe (GRAS) have the advantage to produce spores. This increases their shelf life, viability and survival in extreme pH and temperature conditions. In addition, they can colonize host tissues where they secrete beneficial enzymatic activities such as phytases, xylanases and β-glucanases. These enzymes can help in neutralizing anti-nutritional factors and improve feed conversion rates. In addition to the secretion of extracellular digestive enzymes, Bacillus strains are widely applied in aquaculture industry as DFM due to their ability to produce various factors that improve digestion, nutrient absorption, pathogens' inhibition, immune response to infections, gut integrity preservation, and thus the fish growth performance. A proper selection of the Bacillus probiotic strains is required in order to confer optimal beneficial effects on the aquatic animal host. The present communication focuses on the general functional, safety and technological screening criteria for selection of ideal Bacillus probiotics as feed supplements as well as their mechanism of action and beneficial effects on fish species for improving production performance and health status.

Audience Take Away Notes

- The audience will learn from the presentation the beneficial effects of using Bacillus probiotics as Direct-Fed Microbials (DFM) in aquaculture industry
- The audience will be able to use Bacillus probiotics DFM for improving aquaculture sustainability
- Use Bacillus probiotics DFM will help the audience for improving aquaculture sustainability by disease control and enhancement of water quality, growth, immunity, and stress resistance of cultured aquatic animal species

- Yes, marine faculty and research center can use thus research to expand their research and teaching
- Yes, this provides a practical solution to control devastating diseases disease and enhance growth, water quality, immunity, and stress resistance of cultured aquatic animal species
- Possible benefits are already mentioned

Biography

Shifa A. Bahaddad have studied Microbiology at the King Abdulaziz University, Saudi Arabia, Jeddah and graduated as MS in 2017. He joined the research group of Prof. Esam Azhar at King Fahad Medical Research Center to carry out PhD research under the scientific supervision of Prof. Hichem CHOUAYEKH. He received his PhD degree in 2023 at the University of Jeddah. He obtained the position in food safety department in Ministry of Environment, Water and Agriculture.

Srushti Sawant
Humpty Doo Barramundi, Australia

An insight into the culture of yellowtail kingfish (Seriola Lalandi) & barramundi (Lates Calcarifer) in Australia

The wild fish catch is effectively capped, leaving growth in sustainable aquaculture as the only way to meet rising global demand. The wild-caught industry faces several challenges, including losing access to key fishing grounds. Farmed finfish convert feed into body mass 7 times more efficiently than cattle and sheep, while producing less than 1/10 the Co2 per kg of cattle and sheep. Fish is an increasingly important source of animal protein, having grown rapidly to around 16% of all global animal protein consumption.

Clean Seas' Spencer Gulf Kingfish sells at a premium to wild caught Kingfish and manages its farming operations using global best practice methods to grow world-class, high-quality Yellowtail Kingfish. A big decline in Japan's wild catch-based kingfish industry has opened the door for Australia's Clean Seas Seafood to increase sales into North America and Asia. Clean Seas is a global leader in the full-cycle breeding, production and sale of Yellowtail Kingfish and the largest producer of aquaculture Yellowtail Kingfish outside Japan. Humpty Doo Barramundi is a 100% Australian family owned and operated Barramundi farm in the Northern Territory. The fish are grown within a saltwater wetland system where the water is cleaned using saltwater grasses and recirculating again and again. The award-winning system helps us manage the quality of our water and the eating quality of the fish. The Humpty Doo Barramundi farm, located near Darwin, has expanded in recent years, and now employs around 150 people who look after millions of fish across 200 hectares of ponds. The presentation will draw emphasis on live feed & broodstock management, larval and nursery rearing. Monitoring fish health (the identification of fish diseases, toxins, and environmental threats) and any necessary treatments, egg production and collection. Effective monitoring of Recirculating Aquaculture System (RAS) with application of ozone. Pond management and filtration systems used in both companies.

Audience Take Away Notes

- A closer look into a working hatchery & nursery of Yellowtail Kingfish & Barramundi
- Biofiltration system used in both companies
- Application of ozone in the RAS
- Better understanding of pond management
- Insight into the diseases, their preventive measures & solutions

Biography

Srushti has a working experience in the aquaculture industry working for Clean Seas Seafood Limited for 3 years as a hatchery technician responsible for culture of live feed, broodstock & nursery management of Yellowtail Kingfish. She has practical knowledge in the operation of Recirculating aquaculture systems She acquired her master's in marine biology from James Cook University during which she gained experience in Australian Crayfish Hatchery working with red claw crayfish based in Townsville. In India she completed her bachelors in Fisheries Science. Currently she is employed at Humpty Doo Barramundi as an aquaculture supervisor.

Subhas Das

Eco-toxicology Laboratory, Department of Environmental Science, The University of Burdwan, West Bengal, India

Histotechnological technique for prediction of digestibility and liver function under choline chloride exposure: A role model on fish

A prediction experiment on digestibility and Liver Function Test (LFT) was carried out on four teleostean fish [two Indian Major Carps: Catla catla (Catla), Labeo rohita (Rahu), and two air-breathing fish: Clarias batrachus (Magur), Anabas testudineus (Koi)] maintaining a cultured ratio of 2:5:1:1 :: Catla:Rahu:Magur:Koi for a period of 90-d under choline chloride exposure during dry and breeding seasons. Histological (H-E) observations of the stomach under choline exposure during Dry (TD) and Breeding (TB) seasons displayed a well-compacted mucosa with prominent mucosal folds comprising Columnar Epithelial Cells (CECs) with prominent nucleus, submucosa made up of connective tissues and well-articulated gastric glands, thick muscularies layer and serosa with blood capillaries. Secretion of profuse mucus was evident from the epithelial cells through exocytosis in the breeding season due to stress and higher rate of digestibility. Histochemical (PAS-AB) analysis displayed the prominent PAS sensitivity due to the presence of protein, whereas, the gastric gland, lamina propria and the CECs indicated very low reactivity towards PAS and negative to AB. Liver under choline exposure depicted well-articulated hepatic cords with hexagonal and/or polygonal hepatocytes showing deeply stained centrally placed nucleus and granular cytoplasm, well-articulated central veins, regular hepatopancreas, organized with compact acinar cells containing zymogen granules and sufficient colloidal mass. Histochemical (PAS-AB) analysis showed PAS positivity due to the presence of glycogen and/or mucopolysaccharides droplets in hepatopancreas, but without fatty as well as non-alcoholic steatohepatitis liver compared to control conditions. Therefore, it can be inferred that fish may be used as a role model for digestibility and LFT.

Keywords: Digestibility, Liver Function Test (LFT), Histological (H-E) Observations, Histochemical Reaction (PAS-AB), Stomach, Liver, Choline Chloride.

Audience Take Away Notes

- The concept of using the choline like lipotropic factor can used for lipid metabolism
- The aquaculture entrepreneur can enhance the growth of fishes by using this choline
- Moreover, by adopting the process of engulfing the choline (Fish as model of this experiment), liver and stomach can be free from any abnormalities

Biography

Dr. Subhas Das is a fisheries professional and working in the Department of Fisheries, Government of West Bengal since last almost seventeen years. He has acquired Bachelor of Fishery Science (B.F.Sc.) from the West Bengal University of Animal and Fishery Sciences, West Bengal, India; M.Sc. in Environmental Science from Vidyasagar University, West Bengal, and Ph.D. in Environmental Science from the University of Burdwan, West Bengal. Presently he is a registered candidate of Doctor of Science under the Department of Environmental Science, the University of Burdwan, West Bengal, India. His field of specialization under the broad subject area is Fisheries, Aquaculture, Environment and Ecology, while his major research interest under the thrust area is fish nutrition, fish immunology, eco-toxicology, biochemistry, histology, histochemistry, scanning-electron microscopy, immune-histochemistry, enzyme-histochemistry, haematology, metagenomics, amino acid profiling. Interestingly, he has taken the research problem under the

doctoral programme based on the inconveniences as well as the incapability of the poor fish farmers to apply high-valued fish feed for getting higher yield from their culture ponds; instead of administrating high-cost fish-feed, he has applied 'farm-made-aqua-feed' developed at 'Farm level' with the locally available low-cost resources and low-cost synthetic feed-grade (98% pure) choline chloride into the pond water directly which finally fetched low-economic expenses but a higher yield. Actually, his contribution is a 'directive' of application of low-cost farm-prepared farm-made-aqua-feed with the introduction of choline directly into the pond water in both the breeding and dry seasons in the semi-intensive fish culture system as a 'cost-benefit method' instead of the traditional method of using choline chloride, the novelty of his work can be glanced through 'Google' by typing 'choline in pisciculture' or 'choline in pond'. Presently, the Doctor of Science programme embodied the most generous work serving the society at large by imparting insightful experimentation on the immune potency of choline, a lipotropic agent and rediscovered Vit. B4 ("assessment of efficacy of choline chloride exposure to Indian major carps and air-breathing teleost's under a semi-intensive culture system: An introspection based on cellular, Biochemical, Haematological, Microbiological and Metagenomic assay") on freshwater economically viable fish species for augmenting the fish as the huge source of protein which can offer a better socio-economic status for the core group of people of the society. Actually, he has tried to merge the field-based problem with the lab-based research which resulted in a bottom-up transmission of the 'research problem' to the laboratory (land to lab), and then to top-down leaching of solutions to land from the laboratory (lab. to land). Thus finally, his excellence in research insight and reputation has been recognized in several International Journals of repute, viz. Elsevier, American Chemical Society (ACS), etc. endorsing the different Sustainable Development Goals (SDGs), e.g., SDG 6 and SDG 14, helping to tackle some of the world's greatest challenges. Besides fulfilling various social as well as administrative responsibilities through the present occupation, e.g., imparting training on recent trends in scientific aquaculture to the fish farmers, fish retailers, and fishermen; to make hands-on expertise regarding new species culture through the installation of different Demonstration Centre in different ponds under various geographical areas, etc., Dr. Das has to look after a proper administrative response as well as he has to maintain a good liaison with the Fisheries Department of the Government of West Bengal regarding the needs of the fish farmers as a 'bottom-up- method'. To date he has published fifteen research articles in various higher impact factor peer-reviewed Journals, three book chapters and he is one of the Editors of two books having impactful ISBN. Recently, he has been able to standardize one product for the sake of poor fish farmers which is a resultant of since last five years constant research. The outcome has come to a renowned journal. (Journal of cleaner production; Humifloc™: An improved solid waste responsible for sustainable aquaculture. doi 10.1016/j.jclepro.2023.139459. Journal I.F.: 11.10; Cite Score: 18.50). The product is now being launched successfully by 'Brickcells Technologies Pvt. Ltd.', Kalyani, Nadia, WB, India and the fish farmers are also getting immense benefits by applying this eco-friendly growth progenitor. Lastly, Dr. Das is very keen on 'Collaborative Work' and will be happy as well as pleased if any interested Professionals/Scientists/Academicians are interested in working with him in the present days as well as in future.

T.V. Anna Mercy
Professor (Rtd, KUFOS) Director, Department of Aquaculture Sacred Heart College, Thevera, Kerala, India

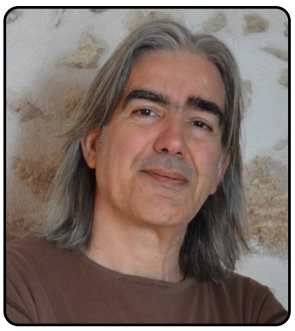
Ornamental fish culture and aquarium keeping – A small scale livelihood option in India

Aquarium keeping is the second largest hobby in the world and is becoming a stress relieving hobby. About 7.2 million houses in the USA and 3.2 million in the European Union keep an aquarium at their houses. The number is increasing day by day. Most of the ornamental fishes are tropical fishes and about 65% of them comes from Asia. In India, as per the estimate of Marine Products Export Development Authority (MPEDA) there are about one million aquarium hobbyists. Indian market can be categorized into domestic market and export market. The export market is dominated by indigenous ornamental fishes of India and the domestic market is contributed by the exotic fishes. The domestic market is estimated to be about $3.26 and the export market is about $ 0.38. the annual growth rate is about 14%.

In India, especially in Kerala, more than a hobby, ornamental fish culture has become a livelihood option. Because of the adequate climatic conditions, availability of water and unemployed youth most of the tropical fishes are bred and cultured in Kerala. Many of the scientific institutions and government are promoting this by giving training and financial support. In the present paper a case study is presented. The rural people Kumbalam village, a village in the Ernakulam district of Kerala, were trained for the culture of ornamental fish farming, including glass tank construction, fish breeding, larval rearing, live feed culture, aquatic plant culture, aquarium set up and fish feed preparation. They started doing either of these activities at their homes and started earning small income which helped them to improve their socioeconomic status. The details are presented in the paper.

Biography

Dr. T.V. Anna Mercy studied Marine Biology and graduated as M.Sc. in 1976. She joined the Department of Aquatic Biology and Fisheries, Kerala University, Trivandrum under the guidance of Dr. N. Krishna Pillai. Her Ph. D work was on a unique fish, the Indian blind clariid fish Horaglanis krishnai Menon that dwells in the subterranean wells at Kottayam, Kerala and received her Ph.D in 1982. She progressed to become the Junior Assistant Professor in Aquaculture at the College of Fisheries, Kerala Agricultural University, Panangad during the year 1984. In 2002 she became Professor. She pioneered research on Indigenous fresh water Ornamental Fishes of the Western Ghats of India and developed captive breeding technology for 15 prioritized fresh water species including Sahyadria denisonii popularly known as Miss Kerala, first of its kind in India. Sahyadria denisonii is a much sought after ornamental fish in the international market. She was instrumental in conducting innumerable training programmes on ornamental fish culture for the rural people at state level and national level. Based on her experience, she is by default a valued resource person on ornamental fish culture at the state, national and international levels. She has published about 100 research papers including 50 in peer reviewed journals. She has authored/co authored the many books/chapters; Presented research papers on different aspects of ornamental fishes in several international conferences at Brazil, Oregon, USA, China, South Africa, Ethiopia, Iceland, Netherland, China, Srilanka, Singapore, Malaysia, Indonesia and Australia. She was instrumental in developing Kumblm Panchayt (where KUFOS is situated) in to an ornamental fish village where 300 families were trained for ornamental fish culture. For this work she received the International Award as one of the Eleven laureates of Women's World Summit Foundation (WWSF) Geneva, Switzerland 2010for the Women's creativity in rural life. The award consists of US$ 1000 and a certificate. She retired from service of Kerala University of Fisheries and Ocean studies, Cochin after 32 years of teaching, research and extension activities. At present she is the Director of the Department of Aquaculture, Sacred Heart College (Autonomous), Mahatma Gandhi University, Thevera, Cochin, Kerala.



Tzanakis Manolis
Department of Psychology, University of Crete, Greece

Take only photos, leave only bubbles. Transformation of environmental ethics and scuba diving practices in Greece

This presentation provides a historical-sociological analysis of the practices of recreational scuba diving and its relationship with fishing. Beginning with a national case study, Greece, the presentation analyzes the gradually evolving global institutional regulations of this form of underwater recreational activities and its gradual detachment from fishing. Based on historical and sociological research on diving in Greece, the presentation examines the stages of institutionalizing diving as a recreational practice on a global scale, from the end of World War II to the present day, and how these are reflected in Greece. The research is based on two traditions: the phenomenological approach to underwater multisensory embodied experience and tourism studies. The three main research questions that the presentation answers are:

a) How scuba diving historically evolved as a leisure activity, distinct from similar practices of amateur or professional fishing.

b) How the underwater experience was conceptually formed as a leisure activity, functioning as a moral component of the relationship with the underwater self and with the underwater nature.

c) How a morality of non-fishing developed for recreational scuba diving, within the context of an increasingly intensifying sensitivity towards nature.

d) The process of initially turning it into a sport and subsequently into a tourist attraction created a moral dynamic that devalued the perception of underwater life as an edible resource and transformed it into a moral mirror of the c ontemporary ecological crisis.

Biography

Dr. Manolis Tzanakis is an Associate Professor in the Department of Psychology at the University of Crete. He holds a background in journalism from Athens and a degree in sociology from the University of Crete. He is received his doctorate from the Department of Sociology of the University of Crete. His academic pursuits focus on the sociology of mental health and sea leisure, primarily through qualitative research methods. Dr. Tzanakis has published extensively in Greek, French, and English and has been an active participant in international conferences. Additionally, he has served as a reviewer for various journals and conferences and has edited four collective volumes on diverse subjects ranging from the interplay of art and psychiatry to the ethical dimensions of medical practices and the lived experiences in leisure and tourism. He is also the author of three monographs, including a recent English publication titled Scuba Diving Practices in Greece: A Historical Ethnography of Technology, Self, Body, and Nature, by Palgrave Macmillan.

AL Alawi Yasmin[1]*, AL Habsi Nasser[2], Pathare Pankaj[3]

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[3]Sultan Qaboos University, College of Agricultural and Marine Science, Department of Soils, Water & Agricultural Engineering, Sultanate of Oman

Assessing the changes in the fish's quality and freshness during packaging using an electronic nose, microbial growth, and a texture profile analyzer

Aside from the sharp drop in the aquatic food supply, post-harvest fish losses are a serious concern in most fish distribution networks worldwide. Over the years, several processes have been applied to prolong aquatic food shelf life and minimize its loss by preventing spoilage microorganisms from growing. Aquatic food nutritional assessment can be carried out using modern technology, which can reduce costs and time. In post-harvest fish storage, the use of customized sensors may present a promising solution for reducing fish loss and ensuring product quality, as well as detecting food product degradation quickly and easily. The purpose of this study is to explore an alternative approach to traditional fish quality detection methods by relying primarily on the electronic nose, which has the advantage of providing fast and efficient results. As part of the preservation process, selective media are used to monitor microbial growth that contributes to fish spoilage. The results of this analysis allow the selection of optimal storage conditions for specific fish species, the optimization of preservation procedures, and the preservation of product quality. In addition, texture properties such as firmness, springiness, cohesiveness, and chewiness are measured by a texture profile analyzer. As a result of these measurements, a quantitative assessment of the attributes of fish quality can be made by analyzing changes in fish texture over time. This research presents an unusual approach to fish quality evaluation, shifting away from conventional methods and focusing on the utilization of an electronic nose. If successful, this approach has the potential to revolutionize the fish preservation industry by providing a rapid and efficient means of assessing fish quality, leading to improved decision-making and reduced waste.

Keywords: Electronic Nose, Fish Quality, Fish Preservation.

Biography

Yasmin Hamed Ali AL Alawi Ph.D student at Sultan Qaboos University, Department of Marine and Fisheries Scinces) Initially, He headed the aquaculture monitoring department from 2012 to 2019, and then he joined the commercial aquaculture department in 2019. Having served on the main committees dealing with aquaculture and the Oman Vision 2040 since 2017. My role has included carrying out feasibility studies and environmental assessments for aquaculture projects.

BOOK OF ABSTRACTS

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POSTERS

Angkasa Putra*, Sarifah Aini

Department of Marine Biology, Pukyong National University, Busan, Republic of Korea

The current records on taxonomic status and advancements in molecular studies of endemic freshwater species identified from Sulawesi Island, Indonesia

The Sulawesi island in Indonesia has gained prominence as the largest island in the Wallacea region, which is a biogeographic transition zone between Indomalaya and Australasia. Its high level of endemism, particularly in freshwater species, renders it a compelling subject of research. In this study, we present the latest findings regarding the number of endemic freshwater species from Sulawesi, totaling 110 species, including fish and shrimp. Fish contribute 66% of the total, while shrimp contribute 34%. These species represent 8 families within 6 different orders. These families include Anguillidae (1 species, 1 genus), Atherinidae (6 species, 2 genera), Telmatherinidae (11 species, 2 genera), Adrianichthyidae (21 species, 2 genera), Zenarchopteridae (17 species, 3 genera), Terapontidae (1 species, 1 genus), Gobiidae (16 species, 6 genera), and Atyidae (37 species, 3 genera). Approximately 65% of these endemic freshwater species inhabit lake waters. Evaluation using the IUCN Red List assessment indicates that 13% of species are Not Evaluated (NE), 10% are Data Deficient (DD), 7% are Least Concern (LC), 26% are Near Threatened (NT), 13% are Vulnerable (VU), 12% are Endangered (EN), and 19% are Critically Endangered (CR). Besides documenting the latest number of endemic freshwater species on this island, another objective of this study is to evaluate the implementation level of molecular studies, particularly in the utilization of partial fragments of the cytochrome c oxidase subunit 1 (COI), cytochrome b (cytb), and complete mitochondrial genomes, across all presented species. Approximately 40% of the total species have been subject to COI, 31% to cytb, and only 4% to the complete mitochondrial genome. Phylogenetic analysis using the COI target gene is also employed to understand the evolution of these endemic species, which is crucial for establishing effective conservation measures. Nevertheless, the implementation of molecular studies at the observed locations has not fully encompassed the entire diversity of species present. Therefore, we recommend further research intensification in the utilization of molecular approaches to explore the diversity of species that have not been thoroughly investigated. Genetic data integration with morphological and ecological data is also necessary for a more comprehensive understanding of the studied endemic species. Additionally, management strategies should be implemented to preserve the populations of endemic species and their ecosystems as a whole.

Audience Take Away Notes

- A study on the taxonomic status and the extent of molecular study implementation on endemic freshwater species in Sulawesi, Indonesia
- This study has the potential to support conservation efforts and serve as a scientific foundation for decision-making regarding policies on endemic freshwater species in Sulawesi, enhancing capacity in applying molecular research techniques for endemic species studies, and enriching teaching programs or curricula introducing students to topics related to molecular studies and endemic species
- Additionally, this study may open new opportunities for collaboration between scientists and policymakers, enrich scientific literature on the biology and conservation of endemic species, and attract global interest and attention to the biodiversity of Sulawesi

Biography

Angkasa Putra, B App Fish., IPP., CPGAM., a graduate of SUPM Bone (2012-2015) and Jakarta Technical University of Fisheries (2015-2019). He also obtained two professional degrees in 2022: Insinyur Profesional Pratama from Institution of Engineers Indonesia and Certified Professional General Affair Management from Revolution Mind Indonesia. In 2023, he pursued his master's studies at Pukyong National University. He has received various scholarships and work experience in research and educational institutions under Indonesia's Ministry of Marine Affairs and Fisheries. By the end of March 2024, he authored 122 publications in the form of books, journals, proceedings, posters, magazines, and newspapers.

Joseph Christopher C. Rayos*, Niko A. Macaraeg, Lilian C. Garcia
National Fisheries Research and Development Institute, Quezon City, Philippines 1103

Strengthening oyster aquaculture in the Philippines through the bamboo raft technology

Traditionally, oyster farming in Pangasinan involved a time-consuming process in shallow estuarine waters, resulting in relatively small harvests of 12-15 kg per square meter after seven to eight months. In a bid to enhance local oyster production and uplift the livelihoods of fisherfolk, the NFRDI introduced the innovative bamboo raft technology to fisherfolk associations across five Pangasinan municipalities. The bamboo raft technology, incorporating plastic drums as floaters and plastic straps for oyster spat attachment, offers numerous advantages. It was observed that the elevated placement of oysters above the water bottom prevents sand accumulation in the shells, ensuring cleaner produce. Moreover, the mobile structure and optimized nutrient intake result in quicker growth, reducing the cultivation period to five to six months and significantly boosting the oyster size to 22-24 kg per square meter. Testimonials from beneficiaries affirm the impact of this initiative. It was noted the superior quality of oysters from these rafts, providing better returns. One beneficiary also detailed a considerable increase in income and return on investment compared to traditional methods. The success of this venture has primarily benefited local traders and community events, but there's a growing ambition to expand markets beyond Pangasinan. With aspirations to venture into regional markets, the associations seek sustained growth and economic stability. The introduction of the floating bamboo raft technology not only helped economic improvements for local fisherfolk but also improved the oyster culture process, marking a promising path for a sustainable and profitable oyster production in the region.

Keywords: oyster, bamboo raft technology, aquaculture

Audience Take Away Notes

- They will learn new oyster aquaculture technique that yields more in terms of production and increase in income of farmers
- It give our audience new technique in culturing oyster using a more environment-friendly design that yield more than traditional methods of culturing oyster
- We the new innovation for the oyster bamboo raft technique, it gives us solution to recurring issue of siltation and sanitation in traditional oyster bed farms (stake method)
- Produce more than the traditional method
- Environment-friendly aquaculture design

Biography

Joseph Christopher C. Rayos obtained his PhD in Aquaculture in 2017 in Central Luzon State University under the DOST-Accelerated Science and Technology Human Resource Development Program. The Fisheries and Aquaculture Research works and initiatives of our speaker link the Government, private sector, and other stakeholders in accelerating the transfer of technology in the Country to improve the aquaculture productivity of farms and households towards a food secure Philippines. He stepped up the public service professional ladder and now the Chief Science Research Specialist of the Aquaculture Research and Development Division of the National Fisheries Research and Development Institute.

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