







Regional Capacity Building Programme

on

Biotechnological Tools in Aquatic Genetic Resource Management and Ex Situ Conservation



Organized by

Indian Council of Agricultural Research (ICAR)

Asia-Pacific Association of Agricultural Research Institutions (APAARI)

Asia-Pacific Consortium on Agricultural Biotechnology and Bioresources (APCoAB)

Training Institute

ICAR-National Bureau of Fish Genetic Resources (NBFGR)
Canal Ring Road, PO Dilkusha, Lucknow -226002, Uttar Pradesh, India











The Indian Council of Agricultural Research (ICAR) and the Asia-Pacific Association of Agricultural Research Institutions (APAARI) under a programme on Asia-Pacific Consortium on Agricultural Biotechnology and Bioresources (APCoAB), announce to organize a Regional Capacity Building Programme on "Biotechnological Tools in Aquatic Genetic Resource Management and *Ex Situ* Conservation". The programme will be conducted at ICAR-National Bureau of Fish Genetic Resources, Lucknow, India, during December 07- 18, 2020, through virtual mode.

Need for Aquatic Genetic Resource (AqGR) Management

Genetic resources are receiving considerable attention world over, from the perspective of sustainable utilization, to alleviate the threats of food shortage. Conserving and managing the natural aquatic genetic resources (AqGR) are important, as nearly half of the fish production is still shared by the wild. Today, the foremost objective of the fish sector is to develop strategies to increase productivity from aquaculture, while sustaining natural resources such as wild relatives. Such balancing efforts, that enhance conservation and allow effective utilization of diversity, need knowledge - and technology - based strategies.

Global developments, in line with biodiversity regulations and intellectual property regimes, have enhanced the need for research on AqGR documentation, *ex situ* conservation and sustainable utilization. Convention of Biological Diversity (CBD) addresses the biodiversity concerns as well as sovereign rights of nations. The scientific knowledge, information systems and *ex situ* germplasm repositories developed at national, regional or global level can help to maintain the IPR stake in AqGR at national level. CBD and Global Taxonomy Initiative (GTI) make it obligatory for the countries to develop and document knowledge on genetic diversity, they possess. The implementation of CBD is accomplished through several relevant frameworks, such as Nagoya protocol, Aichi's biodiversity targets and sustainable development goals, which are to be achieved through national actions. FAO's Commission on Genetic Resources for Food and Agriculture (CGRFA) has prepared reports on the Status of World Genetic Resources for plants, animals, microbes, forestry, aquatic and agro-biodiversity with inputs from various nations. Global Plan of Action also assists countries in developing national strategies for sustainable utilization of genetic resources.

The AqGR is continuously facing severe threats. Many of the threatened species may become extinct, unless species conservation programmes are put in place. Most importantly some species can even undergo unrecognized extinction, unless they are documented at a faster pace than before. During last several years, over 350 finfish species (at an average) are being discovered every year, which are new to science. In such a scenario, molecular tools are effective means to complement taxonomy in such species and therefore, research capacity on integrated taxonomy is becoming critical need for accurate management planning of AqGR.

At present, inadequate knowledge on genetic stocks of fish species of cultivable and conservation value, is a major constraint. The genetic stocks are the local evolutionary significant units evolved through adaptations to selective forces, such as changing climate, reproductive isolation etc. In this context, knowledge of genetic and genomic diversity at the stock and strain levels will help to safeguard the wild relatives of cultivable species.

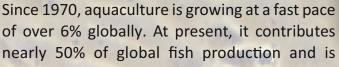








Genetic erosion through inbreeding in farmed stocks is an immediate concern, as it adversely affects performance of the seed, the most critical input for aquaculture. The mitigation strategies require expertise of biotechnological tools and *ex situ* conservation technologies, such as live germplasm resource centres with certified broodstock of known origin and cryofrozen sperm/cells.





expected to support the additional demand of 40 million tons by 2030. Asia contributes about 90% of global production and also has enormous potential. The above perspective holds immense significance for Asia for the two important reasons. Firstly, these nations are endowed with diverse genetic resources, adapted to diverse climatic regimes. South and Southeast Asia has four mega biodiversity hotspots with 50-60% endemism. While this genetic diversity, between and within species, is an opportunity for diversification and productivity improvement, and knowledge generation and conservation of genetic diversity are some of the challenges. Secondly, the lack of scientific capacity available with many countries in the various research areas of AqGR management is a serious bottleneck for planning conservation and sustainable aquaculture. Therefore, the nations need to strengthen the research capacity on various dimensions of AqGR management including deployment of biotechnological and *ex situ* conservation tools.

Genesis

The concept of this capacity building programme is inspired from recommendations of the "Regional Workshop on Fish and Marine Genetic Resources and its Amelioration" held during July 10-12, 2019, organized by APAARI in collaboration with Sri Lanka Council of Agricultural Research and Policy (SLCARP) and National Aquatic Resources Agency (NARA) in Sri Lanka, whereby it was expected by the participating countries to organize similar capacity building programmes at regional level.

Purpose

This programme aims to utilize the specialized experience of ICAR-NBFGR scientists to develop comprehensive training course, on AqGR management. It envisages to develop nucleus of technical expertise within the participating countries, which will conduct research programmes and also help to establish linkages and partnerships with researchers from participating nations to develop and implement the collaborative programmes in future.















Objectives

- 1. To create awareness among country participants on AqGR management and associated global frameworks such as CBD, GTI and CGRFA etc.
- 2. To build capacity for utilization of molecular tools in genetic diversity analysis and their applications in AqGR management.
- 3. To enhance capacity and capability for ex situ conservation tools.

Principal components of the programme

The course will have a mix of lectures and online demonstrations of lab techniques. The total duration of the course will be 12 days, with 10 working days.

Concept building

- I. About AqGR, importance of AqGR in production system and livelihood security: overview of global initiatives.
- ii. Concepts and tools in genetic diversity analysis
- iii. Aquaculture genetics, selective breeding, inbreeding and broodstock management
- iv. Ex situ conservation tools; Sperm cryopreservation, cell culture and applications
- v. Diseases and genetic resource management

Online demonstration modules

- I. Molecular tools in characterization and genetic diversity research. This module will involve methodologies including nucleic acid extraction, quality check, primer designing, PCR and sequencing including Sanger's and NGS, with the following perspectives:
 - a. Molecular marker development
 - b. Species discrimination with molecular markers and complimenting conventional taxonomy
 - c. Polymorphism in molecular markers (nuclear/mtDNA) and population genetics
 - d. Statistical methods in molecular marker data analysis
 - e. Analysis of genetic variability and diversity
- ii. Exsitu conservation tools
 - a. Sperm cryopreservation: freezing, thawing and fertilization
 - b. Cell culture: development, characterization and preservation
- iii. Diagnostic tools
 - a. Molecular Detection of pathogen using molecular techniques
 - b. Virus isolation using cell lines

Organization and participation

Organizers: Indian Council of Agricultural Research (ICAR), New Delhi, India; Asia-Pacific Association of Agricultural Research Institutions (APAARI); Asia-Pacific Consortium on Agricultural Biotechnology and Bioresources (APCoAB), Bangkok, Thailand

Training Institute: ICAR-National Bureau of Fish Genetic Resources, Lucknow, Uttar Pradesh, India

Dates: December 7 - 18, 2020











Participants: Participants will be selected through open circulation and nominations from APAARI member countries. In addition, 10 candidates from Indian institutes will be accepted.

Experts and Resource Persons

The resource persons and faculty will be:

- 1. The researchers from ICAR-NBFGR, Lucknow, India
- 2. Invited from other Indian organizations
- 3. International subject matter experts, officials from FAO or other international agencies

Coordination of the programme

The international programme will be coordinated by

Patron: Dr. Trilochan Mohapatra

Secretary (DARE) & Director General (ICAR), India

International Coordination: Dr. J K Jena

Deputy Director General (Fisheries Science), ICAR, India

Dr. Rishi Tyagi

Coordinator, APCoAB, APAARI, Thailand

Course Director: Dr. Kuldeep K Lal

Director, ICAR-NBFGR, India

Course Coordinators: Dr. Vindhya Mohindra

Principal Scientist & HoD Fish Conservation, ICAR-NBFGR, India

Dr. Neeraj Sood

Principal Scientist, ICAR-NBFGR, India

Dr. Rajeev K Singh

Principal Scientist, ICAR-NBFGR, India











Regional Capacity Building Programme on

Biotechnological Tools in Aquatic Genetic Resource Management and *Ex Situ* Conservation

APPLICATION FORM				
Title (Dr/Mr/Ms/Mrs) First Name		Ge	nder (Male/Female)	•
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Degree	Year	Subject(s)	University/Institute	









low did you came to know about the training?	? (Restrict to 100 words)	
Describe your duty and job description (Restrict	to 300 words)	
How will this training help you? (Restrict to 300	words)	
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