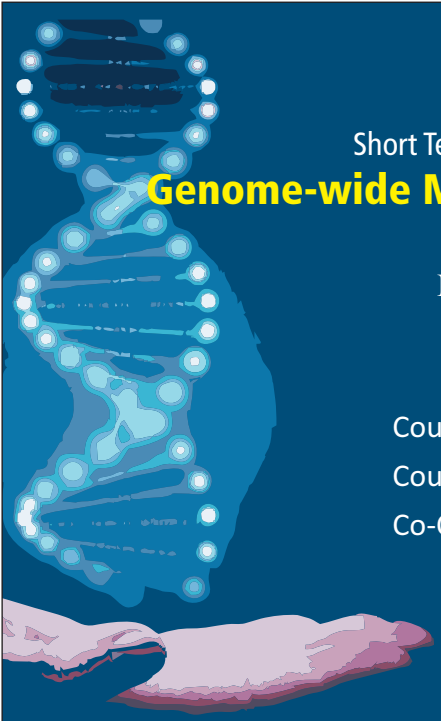

Short Term Agricultural Training under Indo-Africa Forum Summit III – 2018-19

Genome-wide Molecular Markers and their Application in Fish Breeding

ICAR-Central Institute of Fisheries Education, Mumbai

Funded by: Ministry of External Affairs, Government of India

9th to 18th December 2019

Course Director: Dr. Gopal Krishna

Course Coordinator: Dr. Aparna Chaudhari

Co-Coordinators: Dr. Shrinivas Jahageerdar, Dr. Gireesh Babu P., Dr. A. Pavan Kumar and Dr. Mujahid K. Pathan

About the Training

The importance of genetic selection for increased profitability and sustainability of agricultural production systems is well recognized. In aquaculture, the current genetic improvement programs focus on selecting superior broodstock and using better induced breeding practices. These programs have already led to more efficient, productive and profitable aquaculture systems. However, the science of genetics is undergoing explosive growth by incorporating deeper molecular understanding. Molecular markers are being increasingly developed for application to genetic selection of fish and shellfish. These along with efficient computational tools for statistical analysis have revolutionized the analytical power necessary to explore genetic diversity and develop markers for selection. New knowledge is also being applied to estimation of breeding values of the individuals in order to increase the accuracy of prediction. Further, advances in whole genotyping and sequencing technologies facilitate handling thousands of SNPs from hundreds of samples. This enables genomic prediction of breeding values for economically important traits in aquaculture species. Since the start of 21st century, statistical methods for quantitative trait locus (QTL) analysis are being refined and added to at an astonishing rate. The estimation of Genetic-EBV is being employed on large scale to preselect the animals resulting in reduced generation interval and thus helping to realize genetic gain at a faster rate. This short term agricultural training program being conducted under Indo-Africa Forum Summit III focuses on imparting hands-on training on development of genome wide molecular markers and their application in fish breeding with an ultimate goal of developing core expertise in this area in Africa. This program is expected to fulfill India's commitment to global food security.

Course Contents

- Genetic Selection Programs in Aquaculture
- Designing Stock Evaluation Experiments
- Application of Linear and Mixed Model Equations in Fish Genetic Data Analysis
- Development and Applications of Molecular Markers
- Analysis of Molecular Genetic Data
- NGS Data Analysis

List of Participants

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Tentative Program Schedule

Day	Time	Topic	Resource person
Day 1	10:00 – 11:00	Inaugural Session	
	11:30 - 13:00	Genetic Selection Programs in Fisheries – A Global Overview (T)	Dr. Gopal Krishna
	14:00 – 15:15	Traditional Genetic Selection Methods	Dr. S. Jahageerdar
	15:30 – 16:30	Genomic DNA Isolation – Part I (T & P)	Dr. Gireesh Babu P.
	16:30 – 17:00	Visit to other labs	
Day 2	10:00 - 13:00	Overview of DNA Polymorphism, Molecular Markers : Types and Applications (T)	Dr. A. Chaudhari
	14:00 - 17:00	Genomic DNA Isolation and quantification (P)	Dr. Gireesh Babu P.
Day 3	10:00 - 11:15	Polymerase Chain Reaction (PCR) and Primer designing (T & P))	Dr. Mujahid
	11:30-13:00	Strategies for Development of Microsatellite Markers (T)	Dr. Gireesh Babu P.
	14:00 – 17:00	Partial digestion of genomic DNA, adaptor ligation for library preparation and bulk PCR (P)	Dr. Gireesh Babu P.
Day 4	10:00 - 13:00	Size fractionation by gel elution (P)	Dr. Gireesh Babu P.
	14:00 - 17:00	Dyna bead preparation, probe hybridization and ligation (P)	
Day 5	10:00 - 10:45	Evolution of sequencing technologies (T)	Dr. Aparna Chaudhari
	10:45 – 11:30	An overview of fish whole genome projects (Estimation of genome size and whole genome sequencing and annotation)	Dr. N. S. Nagpure
	11:45 – 13:00	Identification of candidate genes by proteomics (T)	Dr. M. Goswami
	14:00 - 17:00	Competent cell preparation Transformation and plating (T&P)	Dr. Gireesh Babu P.
Day 6	10:00 - 13:00	Library screening and sequence analysis for microsatellites (T&P)	Dr. Gireesh Babu P.
	14:00 - 17:00	Genotyping by microsatellite markers and data analysis (T & P)	Dr. A. Pavan Kumar
	10:00 - 13:00	Genotyping by microsatellite markers and data analysis (Cont….)	Dr. A. Pavan Kumar
	14:00 - 15:15	Genome-wide SNP mining from high-throughput sequence data	Dr. Aparna Chaudhari
	15:30 – 16:30	SNP validation (Sanger & HRM) (T)	Dr. Gireesh Babu P.
	16:30 – 17:30	Sequence data analysis for SNPs (P) and SNP data deposition	Dr. Pavan Kumar
Day 7	10:00 - 17:00	Field Visit	Dr. Mujahid
Day 8	10:30 - 11:15	Strategies for Genomic Selection (T)	Dr. Aparna Chaudhari
	11:30 - 13:00	Strategies for High throughput Genotyping (Illumina)	Technical person from Illumina
	14:00 - 15:30	Genomic Databases (Ensembl)	Dr. Mujahid
	16:00 - 17:00	Development of Web Resources	Dr. Vasu Arora
Day 9	10:00 – 17:00	Magur Selective Breeding Program and Genetic Data Analysis	Dr. S. Jahageerdar
Day 10	10:00 – 13:00	Magur Selective Breeding Program and Genetic Data Analysis	Dr. S. Jahageerdar
	14:00 – 16:00	Post training evaluation and discussion	
	16:00 – 17:00	Valedictory Program	

Contact

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Contact for Arrival and Departure of Participants

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