

The Indian Agricultural Research Institute, New Delhi, invites applications from MSc and PhD students of **State Agriculture Universities and research institutes** for a short training course on **"Genomics of agriculturally important insects"** sponsored by **NAHEP-Centre for Advanced Agricultural Science and Technology (CAAST)**, Indian Council of Agricultural Research, New Delhi.

#### WHO CAN PARTICIPATE

**MSc and PhD students of ICAR-Deemed to be Universities/SAUs/CAUs/CUs/other UGC recognized Universities and research institutes** are eligible to apply. The number of participants will be limited to **twenty five ONLY**

**REGISTRATION FEES:** No registration fee is to be paid; the programme is fully sponsored by NAHEP-CAAST

#### HOW TO APPLY

Complete application form in the prescribed format forwarded by chairperson should reach the **Course Coordinator, Division of Entomology, ICAR-IARI, New Delhi** on or before **31<sup>st</sup> July 2019**; application form can be downloaded from [www.iari.res.in](http://www.iari.res.in)

#### TRAVEL

Travelling allowance will be provided by the organizers as per the norms. Students are expected to make their own arrangement to reach the training venue at 9:30am on all working days

#### FOOD and ACCOMMODATION

Food and accommodation will be provided for outside students. Tea and snacks will be served during the programme and expenditure will be met from the training budget.

#### DURATION

**September 18 -28, 2019**

#### Venue:

**Lectures: Virology Auditorium, Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, Pusa Campus, New Delhi-110012.**

**Practicals: PG laboratory, Division of Entomology/Plant Pathology, ICAR-Indian Agricultural Research Institute, Pusa Campus, New Delhi-110012.**

#### Organizers

##### Course Director

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**National Agricultural Higher Education Project (NAHEP)**

**Sponsored**

**Short Training Course  
on**

**Genomics of Agriculturally  
important Insects**

**September 18 -28, 2019**

**at**

**Division of Entomology,  
ICAR-IARI, Pusa Campus, New Delhi**

**Organized by**

**Center for Advanced Agricultural Science  
and Technology (CAAST)**



**ICAR-Indian Agricultural Research  
Institute, New Delhi-110 012**

## About NAHEP-CAAST

**Centre for Advanced Agricultural Science and Technology (CAAST)** is a new initiative and student centric sub-component of **World Bank** sponsored **National Agricultural Higher Education Project (NAHEP)** granted to IARI to provide a platform for strengthening educational and research activities of post graduate and doctoral students. CAAST theme for IARI is **Genomic assisted crop improvement and resource management** that specifically aims at inculcating genomics literacy and skills among the student of IARI/NARS System

## Background

Molecular biological tools have redefined the contours of entomological research worldwide in the recent years. Several global research initiatives like, 'Centre for functional and Comparative Insect Genomics' of Copenhagen University (focusing on genomics of 24 insect species of agricultural and medical importance), Insect Genomics centre of Purdue University, U.S, Manhattan Project on Entomology - ISK (an attempt to cover genomics of 5000 insects) have given new impetus to insect genomics considering the impact of insect pests in agriculture and public health which have a direct bearing on the welfare of mankind.

The emerging problems of invasive pests, resurgence of sucking pest complex in various field crops, xenobiotic resistance in crop pests to insecticides and biotoxins, vector transmission of plant pathogens could be better tackled by focusing research thrust on insect molecular biology. Insect molecular biological approaches offer better understanding of molecular basis of insect nutrition, host defense and behavioural physiology of pests and natural enemies.

Insect molecular biological studies would offer strategic research support to the existing entomological research programmes to resolve conflicts in taxonomic identity of crop pests, to tackle xenobiotic resistance in transgenic crop systems, to design molecular marker probes for detecting insecticide resistance in field storage pests, to assess sensitivity of natural enemies to insecticides and to develop novel pest management strategies by deploying RNA interference technology.

As insects are the largest group of animals replete with genomics databases, molecular approaches coupled with bioinformatics analyses offer scope for gene mining the data bases for identifying novel target sites for next generation insecticides and biorational pesticides. Genomics of agriculturally important organisms and vector insect pests would go a long way in ensuring food security and better health care to our country.

A number of online portals and Genomic databases on insects are available worldwide, like Fly Base, InsectBase etc., which intend to provide a comprehensive platform for researchers who have interests in analyzing insect genomes. As on date whole genome data is available for 138 insects, transcriptomes of 116 insects, gene sets of 61 insects, 36 gene families of 60 insects, 7,544 miRNAs of 69 insects, 96,925 piRNAs from two insects, 22,536 pathways of 78 insects, 679,881 untranslated regions (UTR) of 84 insects and 160,905 coding sequences (CDS) of 74 insects. Unravelling such a big data of genomic information of inputs require sophisticated bioinformatic analytics. Hence, capacity building of entomological students is required essentially to make them updated on insect genomics.

## Insect Genomic initiatives at IARI

ICAR- IARI has made significant contributions in the field of insect genomics and molecular biology. Pioneering efforts by Dr. N. Ramakrishnan on genomic mapping of baculoviruses of insect pests during 1980s laid strong foundation for insect molecular biological research in the Division of Entomology, IARI, New Delhi. Genetic engineering of baculoviruses through deletion of EGT gene, characterization of 20 hydroxy ecdysoles of insect pests, baseline studies on Bt resistance, molecular basis of xenobiotic resistance in crop pests, elucidation of Bt resistance genes in bollworm pests. Barcoding of insects are done in a big way to augment the digital database of National Pusa Collections, one of the oldest insect collections in this country. Presently research efforts are underway on metagenomics of insect pests, RNA interference strategies for pest management and molecular characterization of insecticide/fumigant resistance in insects utilizing genomic tools. Courses like Insect Genetics and Molecular Biology offered for the Post Graduate students enable the capacity building of students on cutting edge molecular biological and genomic techniques. Students are exposed to molecular biological and genomic tools to enhance their research outputs.

## COURSE OUTLINE

The short course will focus on the following aspects:

Molecular barcoding of insects; Genomic sequencing ; strategies and approaches; Introduction to Insect Genomic resources; Metagenomic approaches; Handling of basic Bioinformatic tools for insect genomics ; Principles and practices of Molecular phylogeny of insects; Introduction to Transcriptome sequencing strategies and their utility ; Designing and Validation of housekeeping genes with respect of Insect Transcriptomics -Principles and practices - Designing of RNAi constructs and utility of RNAi approaches for pest management; Gene finding strategies and *in - silico* validation and an overview of Insect Metabolomics; An update on Nematode genomics and deployment of genomic approaches for pest and nematode management

Hands on training will be imparted on basic molecular biological techniques such as DNA isolation from insects, PCR primer designing and validation; PCR techniques; RNA and cDNA synthesis for expression analysis. Generating barcodes for insects and Genotyping of insecticide resistance

Demonstrations and interactive discussion will be held on handling of raw sequencing, curation, and assembly; Gene annotation and preparation of data for accessioning; Molecular phylogeny.

Visits will be undertaken to Sequencing and Computing facilities, Phenomics facility at IARI/IASRI/NIPGR/NRCPB, New Delhi



**Application deadline: 31<sup>st</sup> July 2019**