

**CAFT 2017**

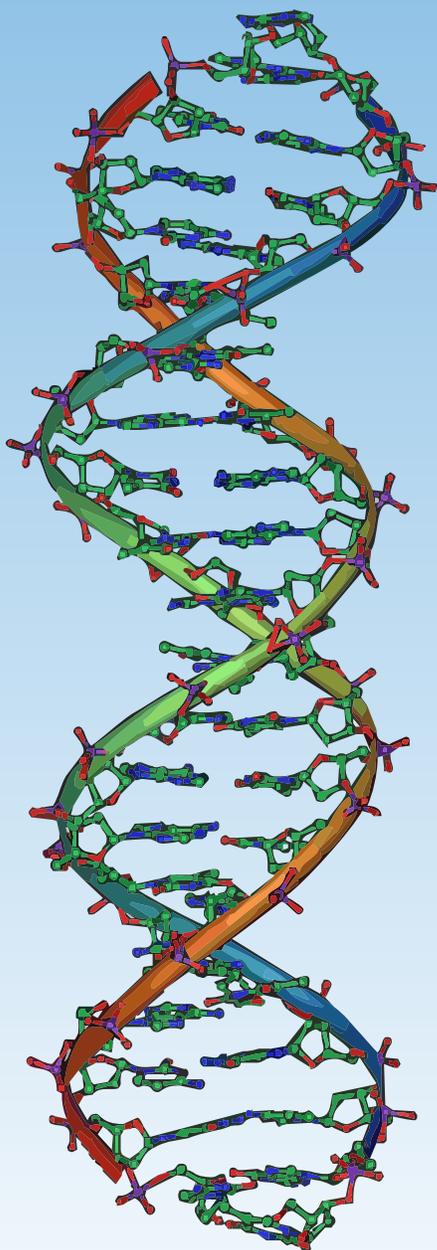
**Course Director**

Dr. Rashmi Aggarwal

**Course Coordinators**

Dr. A. Kumar

Dr. V.K. Baranwal



**Center for Advanced Faculty Training  
Programme**



**Whole genome sequencing  
of plant pathogens:  
Methods and Applications**

December 29, 2017 to January 18, 2018

**DIVISION OF PLANT PATHOLOGY  
ICAR-INDIAN AGRICULTURAL RESEARCH INSTITUTE  
PUSA CAMPUS, NEW DELHI**





Center for Advanced Faculty Training  
Programme  
on

## “Whole genome sequencing of plant pathogens: Methods and Applications”

December 29, 2017 to January 18, 2018

The Indian Agricultural Research Institute, New Delhi, invites applications from faculty members, and researchers of Indian universities/research institutions of National Agricultural Research System (NARS) for a 3-week training programme on “**Whole genome sequencing of plant pathogens: Methods and Applications**” sponsored by Center for Advanced Faculty Training (CAFT), Indian Council of Agricultural Research, New Delhi schedule from **December 29, 2017 to January 18, 2018**.

### Background

Global food production needs to keep pace with ever growing human population of 7 billion that is expected to touch 10 billion by 2050. With shrinking cultivable area and consequent ‘agricultural habitat loss’ for crop production, one of the approaches for ensuring, sustaining and enhancing the agricultural productivity and nutritional security is by reducing the losses due to biotic stress factors. Plant diseases are among the major negative factors that threaten global agriculture. In all major production epicenters located in tropical countries, the crop disease situation is compounded by climate related factors that has paved way for emergence of old pathogens with new virulence spectrum. All major staples and nutritional crops like rice, wheat, maize, pulses, oilseeds, fruits and vegetables are vulnerable for plant diseases caused by fungal, bacterial, viral and phytoplasma which necessitate development of alternative strategies for stress mitigation programmes.

In the past decades, Omics science has played pivotal role in understanding pathogen and their behavior on plant host and agricultural setting which paved way mapping all major pathogenic races in all major crops globally. With ever increasing international connectivity and trade, the global agriculture is facing the threat of emerging and reemerging diseases. Traditionally plant diseases are managed by deploying resistant cultivars and application of chemical molecules. These approaches, though very effective, not universally adopted in all crop diseases. While crop resistance is vulnerable for pathogen triggered break down, the chemicals are not a sustainable solution as a long term strategy. Therefore, novel and innovative approaches are, indeed, essential for mitigating the crop losses.

During the last decade, the exponential growth of genome related information on plant pathogen and the associated “Omics tools” provided an opportunity for the plant pathologists to understand the population genetics of plant pathogens and their host interactions at finer scale. A total of **278522** whole genome sequencing projects encompassing most of the plant pathogens are underway throughout the world that includes **249671 Prokaryotes**, **2410 Archaea**, **18138 Eukaryotes**, and **8256 viruses** as on 23 August 2017 (<https://gold.jgi.doe.gov/>). In order to harness the potential of the genome information, we need to create appropriate infrastructure facilities and human resources to face the challenges in the coming decades.



The **Division of Plant Pathology** at ICAR-IARI, New Delhi has made significant contributions in developing crop protection technologies for all major crops in India. Not only is the division housing Indian Type Culture Collection and the Herbariums of yesteryears but also Plant Virology Unit. The Division has core strength in the area of molecular plant pathology and modern research facilities for conducting advanced pathogenomics work. Very recently the division has published whole genome sequences of nationally important plant pathogens like ***Magnaporthe oryzae* inciting blast in rice, *Tilletia indica* causing Karnal Bunt, *Puccinia striiformis* causing yellow rust of wheat, *Fusarium fujikuroi* inciting bakanae disease of rice, *Ralstonia solanacearum* causing wilt, and several plant viruses**. Besides, metagenome analysis leading to plant microbiomes of major crops is also generated and published. With this background the **CAFT** of the **Division of Plant Pathology** is organizing a 3-weeks training programme on “**Whole genome sequencing of plant pathogens: Methods and Applications**”

## Who can apply?

Regular teachers and researchers employed in State Agricultural Universities, ICAR institutes and other research establishments not below the rank of Assistant Professor or equivalent in the concerned subject are eligible to apply. The number of participants will be limited to twenty five.

## Duration

Twenty one days: December 29, 2017 to January 18, 2018

## Venue

Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, Pusa Campus, New Delhi-110012.

## Travel

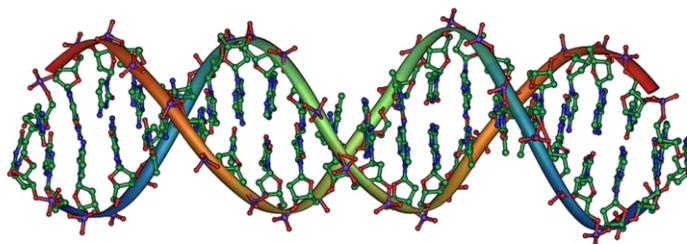
Travelling allowance will be met by the organizers depending on the availability of funds. Reimbursement will be restricted to II or III tier AC train ticket for shortest route from the place of current posting to Delhi

## Food & Accommodation

Food and accommodation will be arranged at the ICAR-IARI campus only for the participants and expenditure will be met from the training budget

## How to apply?

Complete application form in the prescribed format should reach the Director, CAFT in Plant Pathology on or before **31 October 2017** through proper channel. Teachers and scientists posted in North Eastern states, Jammu & Kashmir, Andaman & Nicobar and Lakshadweep Islands can send their application so as to reach on or before **10<sup>th</sup> November 2017**.





## Course Overview and key topics

- **Lectures on genomics applications in Plant Pathology :** The lectures on basics of molecular tools currently in use for characterization and identification of plant pathogens will be delivered in the forenoon during the training period. Evolution of various pre- and post- genomic era techniques used in plant pathology will be discussed. Molecular taxonomic markers used for authentic identification of plant pathogens and their variants and improvised genomic tools such as Multilocus Sequence Typing (MLST) and Multispacer Sequence Typing (MSST) for strain level identification of pathogens will be covered by prominent speakers. Basic knowledge on oligo primers, criteria for primer designing and their utility in structural and functional genomics aspects in plant pathology will be imparted. **Theoretical account on biological sample preparation for genome sequencing by various sequencing chemistries, nucleic acid isolation, quality checks, library preparation, sequencing and sequence data generation will be delivered by experts representing public and private players in the field of genomics.** Lectures on data handling, genome assembly and *in silico* annotation leading to gene prediction using advanced bioinformatic tools are scheduled. Whole Genome Databases and their utility for pathogen characterization, speciality databases for virulence factors of plant pathogens, genome browsers of plant pathogens etc will also be covered.
- **Demonstration and visits:** Video demonstrations on genomic library preparation for whole genome sequencing and genome assembly will be made syncing with class room lectures. Exposure to facilities like Transmission Electron Microscope, Scanning Electron Microscope and Confocal Laser Scanning Microscope, Genome sequencers, Bioinformatic data center, Microarray facility, Containment facility, Real-time PCR will be made during the course of training. Various other practical demonstrations on qPCR application for plant disease research, cloning of genes governing virulence and pathogenicity and their characterization are incorporated in the programme.
- **Group activities:** Trainees will be divided into three groups. Each group will spend 7 days with expert team, and will be allotted a set of plant pathogens to characterize using genomic tools. Primarily strategies for whole genome sequencing of the specific pathogens will be discussed. The focal point would be on utilization of genomic resources (Omics data and Omics tools) for characterization of the pathogens. Nationally significant plant pathogens included in the group activities are 1. *Magnaporthe oryzae*; 2. *Ralstonia solanacearum*; 3. *Tilletia indica*; 4. *Puccinia striiformis* and Plant viruses. Trainees are advised to bring their own laptop computer for performing day to day *in silico* practicals.
- **Interactive Sessions:** Each trainee is expected to make a short presentation of their present work and future work plan on pathogenomics programme of their choice plant pathogen(s). Presentation will be facilitated by coordinators during evening hours on all days during the three weeks of CAFT.

### Training organizers

#### COURSE DIRECTOR

**Dr. Rashmi Aggarwal**, Head, Division of Plant Pathology,  
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#### COURSE COORDINATORS

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Application form for training programme on  
**“Whole genome sequencing of plant pathogens: Methods and Applications”**  
 December 29, 2017 to January 18, 2018.

<b>1. Name</b>		:			
<b>2. Gender (Male or Female or others)</b>		:			
<b>3. Present position</b>		:			
<b>4. Age and date of birth</b>		:			
<b>5. Communication address</b>		:			
<b>6. Phone</b>		<b>Office</b>	<b>Residence</b>	<b>Mobile</b>	
<b>7. Fax (if any)</b>		:			
<b>8. E-mail (Official)</b>		:			
<b>Email (Personal)</b>		:			
<b>9. Permanent address (For use in case of emergency)</b>		:			
<b>10. Educational qualifications (From Graduation onwards)</b>					
<b>Degree</b>	<b>Subject</b>	<b>Year</b>	<b>Percentage of marks/Division</b>	<b>Name of the University</b>	
<b>i.</b>					
<b>ii.</b>					
<b>iii.</b>					
<b>iv.</b>					
<b>v.</b>					
<b>11. Research experience</b>					
<b>a. Area of research</b>		:			
<b>b. Publications during last five years (Please Attach List)</b>		:			
<b>c. Indicate the future plans on utilizing the technical expertise gained from the training programme in your research (Attach Separate Sheet if necessary)</b>		:			
<b>d. Indicate whether you have attended for summer/winter school / training programme earlier</b>		:			
<b>12. Write in brief (not exceeding 100 words) about the expected benefits of this training.</b>					
<b>13. Food preference (Veg/Non Veg)</b>		:			
<b>14. Arrival information</b>		<b>Train No</b>	<b>From</b>	<b>Date</b>	<b>Time</b>
<b>15. Departure information</b>		<b>Train No</b>	<b>To</b>	<b>Date</b>	<b>Time</b>

Signature of the Applicant

Endorsement & Seal of the Head of Department/Head of the Institution