



National Training Program on

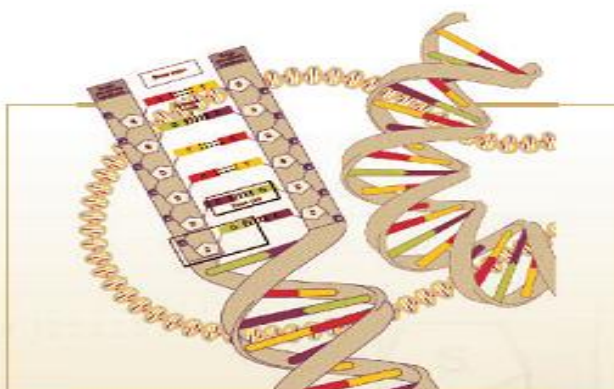
Molecular Techniques to Assess Microbial Community Structure and identification

January 2-9, 2017

Venue

National Bureau of Agriculturally Important Microorganisms

Kusmaur, Post Box No 6, P.O. Kaithauli
Mau Nath Bhanjan 275 101 U.P.



Organized by



National Bureau of Agriculturally Important Microorganisms

Mau Nath Bhanjan

INTRODUCTION

Microbes make up most of the biodiversity on Earth, and several of the processes which microorganisms perform are of critical importance for decomposing organic matter and recycling plant materials. Besides being important in biogeochemical cycling of nutrients, microbes play important role in maintenance of soil fertility and in crop protection. Therefore, knowledge of the phenotypic, genotypic and biological characters to identify a microorganism is essential for developing ecosystem services and to frame strategies for their efficient utilization in agriculture and allied sectors.

Microbial identification constitutes one of the main challenging areas in agricultural microbiology. Although there are numerous identification and typing methods, they all can be subdivided into phenotypic and genotypic methods. The best approach for microbial identification is to combine profiles or fingerprints generated by both phenotypic and genotypic techniques.

Traditional methods of identification rely on phenotypic identification of the microbes using gram staining, culture and biochemical methods. However, these methods of microbial identification suffer from two major drawbacks. First, they can be used only for organisms that can be cultivated *in vitro*. Second, some strains/isolates exhibit unique biochemical characteristics that do not fit into patterns that have been used as a characteristic of any known genus and species. Sophisticated instrumental techniques for the analysis and characterization of microorganisms are becoming more common. Although these newer, often experimental approaches will not replace traditional methods involving cultures, microscopy, and so forth in the immediate future, their development and use will continue to grow. Microorganisms can be identified by analyzing the fatty acid profiles of whole cells or cell membranes using gas-liquid chromatography or mass spectrometry. The data on the type, content, proportion and variation in the fatty acid profile are used to identify and characterize the genus and species by comparing it against the fatty acid profiles of known organisms.

Development of molecular methods has greatly improved the ability to rapidly detect, identify and classify microorganisms and also establish the taxonomic relationship among closely related genera and species. Identification, using molecular methods, relies on the comparison of the nucleic acid sequences (DNA and RNA) or protein profiles of a microorganism with documented data on known organisms. These include methods such as nucleic acid hybridization and polymerase chain reaction (PCR) technologies.

The training program will have the following theme areas to be addressed:

- Methods and guidelines for molecular identification of microorganisms
- Microbial community analysis through metagenomic approaches
- Bioinformatics-driven microbial identification system

The training programme includes both lectures and practical on the above theme areas. Several resource persons from different parts of the country will address the participants. The programme will consist of hands-on research experience, training and exposure to cutting edge research, acceptable scientific methodologies and techniques for polyphasic microbial identification.

Expected Benefits to the Participants

- Participants will get hands on research experience and training from bench to data analysis in the field of microbial identification
- Early- stage experimental researchers and anyone involved or embarking into this field will be benefited by getting exposure and know how to cutting edge research and better understanding of various techniques involved in microbial identification.
- Training will be beneficial to both experimental as well as computational researchers allowing biologists to gain confidence and research skills that would otherwise have little opportunity to develop.

Number of participants: Limited to 20

Eligibility: students/ researchers/scholars/Technicians/Faculty members/ scientists/ from ICAR/SAU/Universities/other Institutions/Private Industry

Training Fee: Rs. 2500 per trainee for students/scientists/ researchers/scholars from ICAR/SAU/Universities/other Institutions. Rs. 10000 per trainee for personnel from private Industry.

Accommodation: Accommodation shall be provided in NBAIM Guesthouse/transit on sharing basis

Course Coordinator:

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Co-Co-ordinators:

1. Dr. K Pandiyan
2. Dr. Kumar

Director:

Dr. Anil K. Saxena

ICAR-NBAIM

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Tentative Programme

Date	Program
2.01.2017	Registration, inauguration, course overview Lecture and Practical module on modern microbial identification tools Hands on training on isolation of nucleic acids
3.01.2017	Lecture and practical module on PCR amplification and Electrophoresis Hands on training module on 16S rDNA/ITS based identification of bacteria and fungi
4.01.2017	Lecture and practical module on PCR product purification and cycle sequencing PCR Hands on training on techniques: RAPD, PCR-RFLP, repetitive element based PCR)
5.01.2017	Lecture and practical module on different sequencing techniques and data analysis for identification and phylogeny Hands on training on sequencing on ABI Prism 3130XL sequencer
6.01.2017	Lecture on NGS platform for whole genome/metagenome/transcriptome sequencing 16 s RRNA (V1-V4)gene based community analysis
7.01.2017	Hands on training on assembly/annotation and pathway analysis from NGS data
8.01.2017	Educational trip/field visit
9.01.2017	qPCR amplification and quantitation of gene of interest Validictory function



NBAIM at a Glance

The mandate of the NBAIM is “To act as the nodal Institute at national level for acquisition and management of indigenous and exotic microbial genetic resources for food and agriculture, and to carry out related research and human resource development, for sustainable growth of agriculture”.

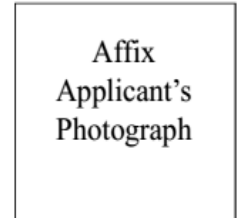
NBAIM functions under the administrative control of the Crop Sciences Division of the ICAR. The Bureau is headed by the Director, who draws guidelines from the Crop Sciences Division. The Bureau is one of its kind, not only in India but also in Asia as it is set up to focus on the identification, characterization, conservation and preservation of microbial diversity of AIMS. After the year 2002 this newly established Bureau has gained momentum in organizing its mandated activities mainly in areas of microbial exploration, evaluation, conservation, preservation and surveillance of indigenous/ exotic AIMS. New campus of NBAIM at Mau is having various buildings like administration and finance office, guest house, laboratories, hostel, residential quarters etc. for the need of the scientists and staff. A new laboratory wing was added to the Bureau in 2005-06 consisting state of the art facilities for biochemical and molecular diagnostics. The hostel facility at the Bureau is unique and has 118 rooms to house the Research fellows and the trainees.

A landmark development was the establishment of the National Agriculturally Important Microorganisms Culture Collection (NAIMCC) in the year 2004. The NAIMCC consists of storage facility of 10000 AIMS. From 2001 to 2012 various facilities like PCR, Gel electrophoresis unit, Gel Documentation system, Lyophilizer, Microscopes, fermentor, Capillary DNA Sequencer, Biolog identification system, TGGE apparatus, Gas chromatograph, Automatic N-analyzer, Ultracentrifuge, High speed centrifuge, Sonicator, Freeze drier, Bead beater, ELISA reader with washer, water purification system, PCR four block, RT-PCR, Next Generation Pyrosequencer, Bioanalyzer, High Throughput electrophoresis systems, robotic DNA Extractor, Scanning Electron Microscopes, Confocal laser microscope, FAME analyzer etc. were added through different research projects funded by ICAR, DBT, DST, NATP and NAIP. The Bureau has HRD component in which training programs are organized as per the mandated activities of NBAIM. NBAIM is “Nodal Centre” for the registration of AIMS. The internet facility through VSAT was established at the Bureau in the year 2006-07. The website (www.icar.org.in) of NBAIM was created and all the units of the NBAIM are linked with various ICAR research institutes.

The ongoing research programmes of the Bureau have been reoriented by the ICAR in the light of the thrust areas and priorities identified by bringing all the activities in a network project entitled “Application of Microorganisms in Agriculture and Allied Sectors” funded by ICAR. Six thematic areas are identified: Microbial Diversity and Identification; Nutrient Management, PGPR and Biocontrol; Agrowaste Management, Bioremediation and Microbes in Post Harvest Technology; Microbial Management of Abiotic Stress; Microbial Genomics and Human Resource Development. In a near future, the NBAIM will be one of the India’s largest holders of microbial germplasm and a readily available source of AIMS for the researchers and industry. The “National Gene Bank” facility could also be offered on regional scale to store germplasm of AIMS of South Asian countries. NBAIM would assume leadership to train the specialized manpower in the area of R&D activities at regional, national and international levels.

Application Proforma:

1. Title of the Training Programme:
2. Name and address of the sponsoring Institute:
3. Name and address of the nominee:
 - a. Name:
 - b. Designation:
 - c. Postal address:
 - d. Phone:
 - e. Email:
 - f. Fax:
 - g. Mobile:
4. Date of birth:
5. Educational qualifications:
6. Experience:
7. Particulars of Programme fee remitted:
 - a. No. and date of draft:
 - b. Name of the Bank on which draft is drawn:
 - c. Amount:
8. Nominating authority:



Name and Signature of the nominating authority/
any other person authorized on his/her behalf

Draft should be drawn in favour of ICAR Unit NBAIM payable at Maunath Bhanjan, Uttar Pradesh

