Dr. Harisingh Gour Vishwavidyalaya
(A Central University)
Sagar (M.P.)

GIAN
GLOBAL INITIATIVE OF ACADEMIC NETWORKS

Ministry of Human Resource Development
Government of India

GLOBAL INITIATIVE OF ACADEMIC NETWORKS

STATEMENT OF GRADE / MARKS

Report of the GIAN Programme

Molecular beneficial Plant-Microbe Interactions and Functional Microbiome

(Sponsored by MHRD Scheme on Global Initiative on Academic Network, GIAN)

Department of Microbiology

Dr. Harisingh Gour Vishwavidyalaya, Sagar

(26-31 July 2017)

Overview

Agriculture depends upon large-scale cultivation of crops in field conditions. It has long been known that microbial communities in soil contribute valuable nutrients to crop plants (*e.g.* Rhizobia, and Azolla-associated cyanobacteria provide nitrogen to legumes and to rice, respectively). The impact of microbes on assimilation and turnover of ammonia, nitrates, phosphates, iron, manganese and other nutrients and micronutrients has been extensively documented. Beneficial microbes can also protect plants from disease, as evidenced by the recognized "suppressive soil" effect. Yet relatively little is known about the diversity of microbes that associate with plants *i.e.* the microbiome, and their combinatorial interactions and effects on performance and crop yields. A comprehensive understanding of the effects of the microbiome on crop plants will enable the development of agricultural technologies that exploit the natural alliances among microbes and plants, and provide new avenues to increase yields beyond conventional plant genetics and breeding. In above purview, the role of academia becomes more important, which can contribute by spreading knowledge about use of benign microbes for crop productivity to the society and most importantly by developing new methods in sustaining agricultural practices. Organization of MHRD-GIAN program at Department of Microbiology, Dr. Hari Singh Gour Vishwavidyalaya, Sagar (MP) would be of great importance to the researchers in the area and to initiate new avenues of research investigating beneficial plant microbe interactions.

Inaugural Programme

The event was inaugurated by Hon'ble Vice Chancellor, Prof. R. P. Tiwari, Dr. HSGVV, Sagar on 26 July 2017 in the forenoon. He highlighted the importance of GIAN programmes for the transmission of knowledge across the globe. He also emphasized on the importance of biological interventions for improvement of the agriculture.

Inaugural function of the GIAN Programme (26 July 2017)

Foreign Expert:
Prof. Harsh Bais, University of Delaware, USA

Dr. Harsh Bais is alum of Dr. HS Gour University, wherein he did his master's degree in Applied Microbiology in 1994. Dr. Bais went on to get his Masters of Engineering from BITS, Pilani in 1996 and then finished his Ph.D from CFTRI, Mysore in 2000. Dr. Bais moved to Colorado State University, USA to do his postdoc on rhizosphere biology and then moved to an independent faculty position in 2005 at University of Delaware. He is now an associate professor of plant and soil interface at University of Delaware. He has been actively involved in studying root secretome profiling and elucidation of rhizospheric plant microbe interactions. Dr. Bais's research work utilizes a multifaceted approach, integrating classical plant physiology, biochemistry and molecular biology to investigate the role of root derived secondary metabolites in agriculture and human health. The expertise of Prof. Bais in rhizosphere biology are highly applicable and can be well utilized in research and teaching programs. Dr. Bais has published over 143 peer-reviewed research papers and 10 international patents. Some of the patents of Dr. Bais' is now commercialized technologies and been adapted by various agricultural companies. Dr. Bais' work is cited over 12000 times per google scholar (H^{index} 46 and $i10^{index}$ 91).

Course Coordinator:
Prof. Naveen Kango, Professor and Head, Department of Microbiology, Dr. Harisingh Gour Vishwavidyalaya, Sagar

He is currently Professor and Head, Dept of Microbiology, Dr. Harisingh Gour University, Sagar and has teaching experience of more than 20 years. Dr. Kango did his M.Sc. (Gold Medal) and qualified CSIR-UGC NET and GATE in the year 1996. He has worked on the biotechnical application and characterization of thermophilic fungal xylanases for his Ph.D. (2004). He has worked as post doctoral fellow in Durban university of technology, South Africa and Dept of Microbioloy, University of Helsinki, Finland. His research interests include Lignocellulose biotechnology, Biomass Conversion, Microbial Enzymes (Glycosidases: Inulinases, Xylanases, Mannanases), Industrial Microbiology (Strain Selection, Characterization and Improvement), Fungal Taxonomy, Prebiotics. He has completed 05 Major research projects and has supervised six Ph.D. students. He has 30 publications, 1 textbook and 1 patent to his credit.

Following Lectures were held during the GIAN course

Date	Module	Topic
26 July 2017 (Wednesday)	**Lecture 1**	Rhizosphere biology and functional food, involvement of microbes in our agricultural practices.
	Tutorial 1	Microbe Isolation techniques; establishing plant microbe interaction using model plant system *Arabidopsis thaliana*.
27 July 2017 (Thursday)	**Lecture 2**	Molecular mechanism involved in beneficial plant-microbe interaction.
	Lecture 3	Biological Control using benign rhizospheric microbes.
	Tutorial 2	Preparation of samples for establishing colonization of beneficial microbes on Arabidopsis roots. Microscopy techniques to establish colonization.
28 July 2017 (Friday)	**Lecture 4**	Plant microbiome and feed the world.
	Lecture 5	Not just sweet talkers: How roots stimulate their colonization by beneficial bacteria
	Tutorial 3	Rhizospheric sampling; Preparation of samples of rhizospheric community for diversity and abundance analysis.
29 July 2017 (Saturday)	**Lecture 6**	Human pathogen plant interactions
	Lecture 7	Rhizospheric microbes and plant immunity
	Tutorial 4	Analyses of results from day 1-3, discussion and establishment of high-throughput sequencing techniques for microbiome analysis.
30 July 2017 (Sunday)	**Lecture 8**	Root microbiome is moderated by plant host factors.
	Lecture 9	Functional plant microbiome and its implications for the next green revolution.
	Tutorial 4	Brief presentations from participants and/or short quiz-type examination. Brainstorming with graduate students and postdocs to work and devise efficient strategies for
31 July 2017 (Monday)	**Examination**	Examination
	Discussion	Discussion and problem solving
		Feed back and certificate distribution

Nubmer of Participants: Twenty eight

Valedictory Function of the GIAN programme (31 July 2017)