



**ICAR Winter School**

**Advance Microbial Technologies to  
improve Nutrient use Efficiency and  
Mitigation of Greenhouse Gas  
Emission from Agriculture**

**September 4-24, 2018**

**Course Directors : S R Mohanty, K Bharati, J K Thakur**

**ICAR - Indian Institute of Soil Science, Bhopal**  
[www.iiss.nic.in](http://www.iiss.nic.in)

Climate change has adversely affected agricultural production and is predicted to do so in the coming decades. Increase in the atmospheric concentrations of Greenhouse Gases (GHGs) is considered to be the main cause of climate change. The three major GHGs are CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. However, CH<sub>4</sub> and N<sub>2</sub>O are the more important greenhouse gases than CO<sub>2</sub> because of their greater global warming potential. Soil microorganisms like methanogens, methanotrophs, nitrifiers and denitrifiers play key role regulating flux and feedback of GHGs. Soil microbes also cycle macro and micro elements important for primary productivity. The intensive agricultural practices and climate change has altered the structure and function of soil microorganisms posing a serious threat to the sustainability of agriculture and environment. At ICAR Indian Institute of Soil Science, we have identified many microbial strains and processes which can be explored to resolve these challenges. This training program aims to decipher crucial information on the advanced microbiological techniques to enhance nutrient cycling and mitigation of GHG emission with the following objectives: (1) advanced soil microbiological inoculation techniques to improve nutrient use efficiency (2) fundamentals of C sequestration and microbial approaches to improve soil carbon, and (3) techniques to measure GHG flux and feedback response of soil. This 21 days training program is designed with cross disciplinary lectures and practical classes which will add a new dimension to the participants' professional experiences.

### Course Outline

The course is divided into five modules, which are further divided into topics of study:

Module I : Nutrient cycling and structure and function of soil microbes

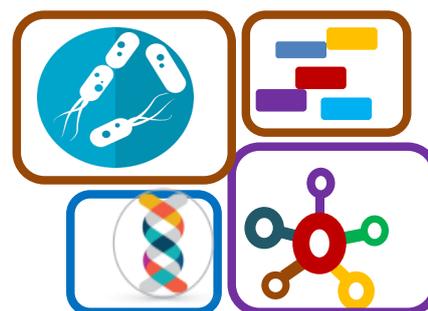
Module II: Exploration of soil microorganisms improving nutrient use efficiency

Module III : Carbon sequestration, prospect of enhancing soil C by microbial resources

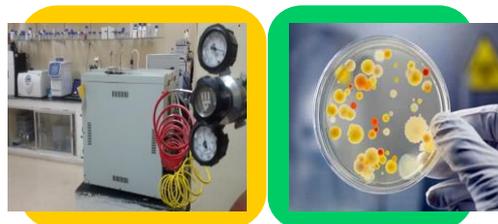
Module IV: Fundamentals of climate change, Greenhouse gas (GHG) source and sink

Module V : Microbiological approaches to improve nutrient use efficiency and mitigate GHG

**Demonstration/hands-on-experience, visits and audio-visuals** : Hands-on laboratory experience on advance microbiological technologies, molecular techniques, greenhouse gas sampling, analysis of GHG using analytical instruments, field visits and multimedia audio-video demonstration of agronomic practices to minimize GHG emission.



**Who Can Apply** : The Winter School is open for participants from ICAR Institutes/State AUs/CAU/ Agricultural faculty of AMU, BHU, Vishwa Bharti and Nagaland University in the cadre of Assistant Professors or equivalent and above. Master degree holders in the discipline of Agriculture/ Soil science/ Agriculture Microbiology/ Microbiology/ Agronomy/ Environmental science/ Forestry/ Horticulture and related discipline are eligible to apply for this course. Participants will be selected on the basis of their ability to benefit from the program. As per the ICAR policy, a few participants from the basic sciences may also be selected. The total no. of seats in the Winter School will be 25 (Twenty five).



**How To Apply** : Eligible and interested participants are requested to apply through CBP portal (<https://cbp.icar.gov.in/>). Print the Advance Application form, with signature from competent authority. Upload the signed Advance Application form to the portal. Send a copy of the same to the Course Director along with non-refundable Postal Order of Rs. 50/- as Registration Fee in favor of the ICAR-IISS Unit, Bhopal payable at Bhopal post office. It should reach the Course Director before the last date by post. The participants will be selected on the basis of their qualification and interest relevant to the training course.



**TA/DA, Boarding and Lodging** : The costs of traveling, boarding and lodging etc. of the selected participants will be met out of the ICAR winter school grant by the organizing institute. All participants will be reimbursed to and fro travel fare for the journey to Bhopal by rail or bus through shortest route. The Payment will be made as per the entitlement class of travel, but restricted to the maximum AC-II tier train/bus fare. As regards Daily Allowance (DA), any participants refusing to avail of free board and lodging facilities will not be given any cash payment in lieu thereof. Participants are requested not to bring family members with them, as the institute has limited hostel facilities.

**Important Dates** : Last date for receipt of application -July 5, 2018; Confirmation of participation - July 10, 2018. All correspondence should be addressed to the Course Director.

Course Director  
Dr. S R Mohanty  
ICAR-Indian Institute of Soil Science (IISS)  
Berasia Road, Nabibagh, Bhopal, Madhya  
Pradesh 462038  
Email : [santosh.mohanty@icar.gov.in](mailto:santosh.mohanty@icar.gov.in)  
Ph : 0755-2730970 ext 319, Fax : 07552733310  
Mobile : 08982697699

Course Co-Directors :  
Dr. K Bharati, Principal Scientist, IISS, Bhopal  
Dr J K Thakur, Scientist, IISS, Bhopal  
  
Dr A K Patra  
Director  
ICAR-Indian Institute of Soil Science, Bhopal

