



# Signalling Cross-talk During Plant Abiotic Stress Phenomena and Ameliorative Potential Through Priming Technologies

Department of Biotechnology,  
Motilal Nehru National Institute of Technology Allahabad  
Prayagraj, Uttar Pradesh – 211004 (India)

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## Course overview

Drought, salinity and heat are among the most devastating abiotic stresses for crop yield and their impacts are exacerbated due to anthropogenic contribution and climate change, thus, generating a major threat to global food security. Simultaneously, agriculture is one of the top water-consuming sectors worldwide and agricultural intensification is expected to increase the demand for water worldwide. A pronounced decrease in precipitation, especially during the warm season, and a greater occurrence of extremely high temperature events are expected in the near future. Consequently, novel water management and conservation strategies should be developed in agriculture.

Different methodologies have been employed for enhancing climate change-related stress tolerance in plants. Priming is a rapidly emerging field in plant stress physiology and crop stress management. Plants treated with certain natural or synthetic compounds (i.e. chemical agents) and/or biological agents (such as PGPB and AMF) prior stress events show enhanced tolerance when exposed to sub-optimal abiotic conditions (e.g. drought, heat, salinity, heavy metals). Stress impacts on plant growth and yield in primed plants are remarkably reduced in comparison with non-primed plants. However, further research is needed to better understand how plants respond to environmental constraints but also adapt after priming and establish stress management practices based on biological and chemical priming.

The proposed course aims to examine in depth the effect in plants of various abiotic stress factors of agricultural importance mainly related to modern climate change scenario, focusing on the identification of signalling pathways and their putative cross-talk towards establishment of tolerance. Similarly, defense mechanisms and the involvement of signal molecules will be identified under chemical and biological priming approaches, with the ultimate goal to promote knowledge and skills in early stage researchers involved in research and agricultural sector.

## Objectives

- ❖ The course aims to develop students' critical thinking by exposing them to the fundamentals of plant stress physiology, with a focus on the interplay of signaling pathways involved in abiotic stress responses as well as following defense priming approaches.
- ❖ Furthermore, it aims to combine students' knowledge in multiple fields of agronomic science, such as plant physiology, experimentation, plant improvement and microbiology, while providing exposure to practical problems and their solutions through case studies.

## Course modules

Plant abiotic stress- Overview, Amelioration of plant abiotic stress using nanomaterials, Molecular Responses under stress, Heavy metal stress responses in plants, Priming technologies to improve plant growth, Role of signalling molecules in plant under abiotic stress.

## Registration Fee

Foreign Participants	\$300
Industry/Research Organizations	Rs. 5,000/-
Academic Institutions (Faculty)	Rs. 3,000/-
Academic Institutions (Students/Research Scholars)	Rs. 1,000/-

- ❖ The above fee includes all instructional materials, computer use for tutorials & assignments (if any).
- ❖ Minimum 90% attendance necessary to be eligible for certificate of participation/attendance.
- ❖ Appearing for evaluations/examinations during the course is necessary for certificate of grades in the course.
- ❖ Accommodation in the campus can be provided subject to availability. The accommodation will be on payment and 'first come first served' basis

## Who can attend

This course is designed for participants from various backgrounds including students, researchers, faculty and scientists working in the field of biotechnology, microbiology, biochemistry, life sciences, botany, environmental sciences, agriculture etc. Executives, agronomists and researchers from agricultural and government organizations including R&D laboratories can also attend the course. The proposed course is interactive and includes a combination of lectures, discussions, class group assignments, tutorials, and tests.

### How to apply:

One-Time GIAN Registration: Please visit <http://www.gian.iitkgp.ac.in/GREGN/> and register by paying Rs. 500/- (those who have already been paid, need not pay again). Then proceed for course registration on GIAN website.

## Teaching faculty



Dr. Vasileios Fotopoulos is presently working as Associate Professor in Structural & Functional Plant Biology, Department of Agricultural Sciences, Biotechnology & Food Science, Cyprus University of Technology, Lemesos, Cyprus. His research focuses on the study of nitro-oxidative signalling cascades involved in the plant's response to stress factors, while emphasis

is being given in the development of chemical and biological priming technologies towards the amelioration of abiotic stress factors and promotion of plant growth. In addition, he is involved in research studying plant secondary metabolism and antioxidant responses in fruit crops during ripening. Dr. Fotopoulos is the author of various scientific papers published in peer-reviewed journals as well as book chapters. He currently serves as Editorial Board member in Journal of Experimental Botany, Plant Physiology and Biochemistry, BMC Plant Biology, Gene, Frontiers in Plant Science and other reputed journals. At present, Dr. Vasileios is serving as an Editor-in-Chief of Plant Stress [Elsevier Journal]. He has also evaluated competitive research proposals including EU proposals from different countries viz., France, Belgium, Poland, Chile, Latvia, Greece, Italy, Portugal, Israel, Qatar, Austria, Cyprus, and Denmark. He has mentored many post docs, technicians and graduate and undergraduate students. Beside from being an innovator and research enthusiast, Dr. Fotopoulos still enjoys teaching and providing mentorship to many students. He continues to amaze the scientific world with his motivation and dedication in developing the cutting-edge research in plant biotechnology.

## Host Faculty and Principal Coordinator

Dr. Shivesh Sharma is presently serving as a Professor in the Department of Biotechnology at Motilal Nehru National Institute of Technology (MNNIT) Allahabad, Uttar Pradesh, India. His research interests include environmental biotechnology, plant-microbe interactions, and plant nano biology. His teaching interest includes microbiology, environment biotechnology, food technology and IPR. He has published more than 150 papers, supervised many post graduate as well as doctoral students and executed research projects sponsored by various govt. funding agencies viz., DBT, CSIR, UGC and MHRD. In addition, he has transferred two technologies to industry, one patent to his credit and six patents have also been filed. He is Associate Editor of Plant Nano Biology [Elsevier Journal] and Environmental Sustainability [Springer Journal].



## Coordinator



Dr. Durgesh Kumar Tripathi is presently working an Associate Professor at Amity Institute of Organic Agriculture, Amity University, Noida, Uttar Pradesh, India. His research interests include various types of nanomaterial-plant interactions and their effect on plant physiology along with their effects in combating biotic and abiotic stress in plants. He is presently serving as Editor in chief of Plant Nano biology [Elsevier Journal] and Associate editor of many reputed journals including Plant Physiology and Biochemistry, Plant Growth Regulation, Plant Signaling and Behavior. He was among Top 1% researchers around globe in 2021 – Clarivate™, Web of Science, USA.

## Contact

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**Last date for registration: To be announced later.**

Bank Details

To be announced later