



Circular

ICAR-Winter School  
2024-25

# Genetic and Genomic Approaches for Improvement of Stress Resilience and Nutritional Quality in Crops (28<sup>th</sup> February – 20<sup>th</sup> March, 2025)



**Programme Director: Dr. Gopala Krishnan S**

Division of Genetics  
ICAR-Indian Agricultural Research Institute  
New Delhi - 110012



*The ICAR-Indian Agricultural Research Institute, New Delhi, invites applications from faculty members, and researchers of ICAR institutions/ State Agricultural Universities/ Central Agricultural Universities under NARES system for a 21-day winter school on "Genetic and genomic approaches for improvement of stress resilience and nutritional quality in crops" sponsored by the Indian Council of Agricultural Research, New Delhi scheduled from 28<sup>th</sup> February – 20<sup>th</sup> March, 2025.*

## **About the Institute**

*The ICAR-Indian Agricultural Research Institute (ICAR-IARI) is the country's premier institution for agricultural research, education and extension. It has been serving the cause of science and society with distinction through development of appropriate agricultural technologies and human resources. The Division of Genetics at ICAR-IARI, widely regarded as the "Seat of Green Revolution" in India, is one of the important pillars of this institute. Since its inception in 1960, the Division has been making significant contributions to basic, strategic and applied research in genetics and plant breeding of various crops as well as model genetic organisms.*

## **Background**

*Quality and stress resilience in crops is essential requirement for dealing with changing climate conditions. Hence, the objective of modern breeding programs is to develop superior varieties/ hybrids with inbuilt tolerance to biotic and abiotic stress, as well as superior quality. The integration of emerging technologies in the breeding programs can accelerate the pace of product development. Hence, it is imperative to provide training and exposure to cutting-edge technologies for researchers. The planned training program aims to train researchers across the country on the latest advancements in genetic and genomic techniques for incorporation of tolerance to biotic stress and/ abiotic stress, and improvement of quality of the produce.*

## **Objective:**

- *To provide information on basic concepts, rational strategies and applied aspects of research that can effectively be utilized in developing crop varieties with resilience to stress and superior quality.*
- *To provide hand-on experience in undertaking recent techniques for stress tolerance and quality improvement in breeding programme.*

## **Duration:**

*21 days training would be during 28<sup>th</sup> February –20<sup>th</sup> March, 2025*

## **Venue:**

*Division of Genetics, ICAR-Indian Agricultural Research Institute, New Delhi*

## **Important dates:**

- *Last date for receipt of application : 25<sup>th</sup> January 2025*
- *Intimation of selection : 3<sup>rd</sup> February 2025*
- *Confirmation of participation by candidates : 7<sup>th</sup> February 2025*

## **Eligibility**

### **25 participants**

*1) This training program is open to Scientists, Assistant Professors, or equivalents in agriculture and allied subjects who are employed at ICAR institutes, SAUs, KVKs, CAUs, or the Agriculture faculty of AMU, BHU, Viswa Bharati, and Nagaland University.*

*2) M.Sc. or Ph.D. in Crop Genetics, Plant Breeding and Biotechnology*

**Desirable:** *Basic knowledge on genetics and plant breeding, crop improvement*

## **Topics:**

### **Theme: Biotic Stress Resistance**

- *Approaches for Genetic and Molecular Analysis for Disease Resistance*
- *Strategies to discovering resistance gene(s) and confirming their novelty*
- *Understanding the molecular mechanisms associated with the host pathogen interaction*
- *Cloning and characterization of R genes in plants, with implications for crop improvement*
- *Approaches for comprehending the pathogen diversity and importance in resistance breeding*
- *Rapid generation advancement approaches, integrating high throughput phenotyping for accelerated development of resistant cultivars*

### **Theme: Abiotic Stress Tolerance**

- *Genomics-based strategies to dissect abiotic stress tolerance in rice*
- *Genome editing for abiotic stress tolerance in crops*
- *Phenotyping techniques and genome-editing for resource use efficiency*
- *Breeding for resource use efficiency*
- *Role of root system architecture in improving tolerance to abiotic stresses in crops*
- *Exploring radiation use efficiency for enhancing yield in crops*

### **Theme: Nutritional quality**

- *Understanding the genetic basis and improvement of end-use quality traits in crops*
- *Genomics-assisted breeding for enhancement of nutritional quality traits in crops*
- *Genome editing for enhancing quality traits*
- *Principles of analytical techniques for extraction and quantification of nutrients from grains*
- *Genetic enhancement of micronutrient content*
- *Transgenic approaches for the improvement of quality traits*

## **Hands-on sessions:**

- *DNA isolation from leaf and seed samples*
- *Designing of markers through bioinformatics tools*
- *PCR reactions and electrophoresis*
- *Softwares applications development of linkage map, mapping genes/ QTLs, association mapping*
- *Phenomics in crop improvement: visit to Phenomics Facilities*
- *Demonstration of MAS in rice, wheat, maize, pearl millet, chickpea, mustard & soybean*
- *Analysis of in-vitro protein digestibility and protein quality*
- *Gas Chromatography (GC) based profiling of fatty acid composition*

## **REGISTRATION OF PARTICIPANTS**

*The applicants may see the guidelines available on the website for the winter school. As per the ICAR instructions, the interested candidates should register and apply online through 'Capacity Building Programme' (CBP) Portal as follows: at [https://cbp.icar.gov.in/Data/Announcements/Guidelines %20of%20Summer%20Winter%20School.pdf](https://cbp.icar.gov.in/Data/Announcements/Guidelines%20of%20Summer%20Winter%20School.pdf) 1. Visit <https://cbp.icar.gov.in/> <http://www.icar.org.in/> or click the Capacity Building Programme link under 2. Login using your user ID and Password. To create a user ID, use the "Create New Account" link. 3. After login, click on the "Participate in Training" link and fill in the proforma. 4. Take a printout and send a duly signed copy through the proper channel to the Course Director, Winter School on Genetic and Genomic approaches for improvement of stress resilience and nutritional quality in crops', DIVISION OF GENETICS, ICAR IARI, Pusa, New Delhi-110012 by post along with registration fee as per the address and contact details given overleaf. The advance scanned copy of the nomination may be e-mailed to [winterschoolgenetics@gmail.com](mailto:winterschoolgenetics@gmail.com).*

*Note: The participants are required to pay a sum of Rs. 50/- (Rupees Fifty only) as a registration fee (Nonrefundable) along with the completed application in the form of a Demand Draft/ Indian Postal Order drawn in favor of the Director, IARI, New Delhi' payable at Delhi.*

## Accommodation and Food:

ICAR-IARI will provide the boarding and lodging at the guest house. The travelling for the selected participants will be paid to and fro by the shortest route as per the entitlement. For the class of travel restricted to the AC-II fair by train, they are requested to produce their original along with photocopies of the tickets in support of their claim.

## Contact:



### Course Director:

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**Dr. Gopala Krishnan S**, Principal Scientist and Head, Division of Genetics  
ICAR-IARI, New Delhi-110012  
Phone: +91-9873545505, e-mail: gopal\_icar@yahoo.co.in



### Course Coordinator:

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**Dr. S. K. Jha**, Senior Scientist, Division of Genetics  
ICAR-IARI, New Delhi-110012  
Phone: +91-9868574102, e-mail: jhashail78@gmail.com



### Course Co-Coordinator:

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**Dr. Vignesh Muthusamy**, Senior Scientist, Division of Genetics  
ICAR-IARI, New Delhi-110012  
Phone: +91-8802713269, e-mail: pmvignesh@yahoo.co.in



### Course Co-Coordinator:

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**Dr. Ranjith Kumar Ellur**, Senior Scientist, Division of Genetics  
ICAR-IARI, New Delhi-110012  
Phone: +91-8010303649, e-mail: ranjithellur@gmail.com

- The interested candidates should follow the ICAR guidelines, register and apply online through the Capacity Building Programme (CBP) portal of ICAR <https://cbp.icar.gov.in//>