# "Hands-on-Training on Pre-Breeding and Cytogenetic Approaches for Crop Improvement: Advancement, Challenges and Opportunities"

**(Sponsored by Science and Engineering Research Board (SERB), Department of Science and Technology, Govt of India under the "ABHYAS" program of Accelerate Vigyan Scheme, High-End Workshop (Karyashala)**

## About ICAR-National Institute for Plant Biotechnology (ICAR-NIPB), New Delhi

The institute was founded in 1985 as the 'Biotechnology Centre' of Indian Agricultural Research Institute (IARI) for molecular biology and biotechnology research in crop plants. The prescience of the role of biotechnology in agriculture led to a bigger responsibility for this centre and it was elevated as National Research Centre on Plant Biotechnology (NRCPB) in the year 1993 (Now NIPB). ICAR-National Institute for Plant Biotechnology has been entrusted with the responsibility of developing new tools and techniques and to deliver breakthrough in biotechnology for crop improvement. With a humble beginning and a few dedicated scientists, the centre could successfully deliver varieties such as Pusa Jai Kisan. Moricandia based CMS system developed at NIPB has contributed to the commercial production of mustard hybrids namely NRC Sankar Sarson (DRMR, Bharatpur) and Coral 432 (Advanta India). The rice blast resistance gene Pi54 identified, mapped, cloned and characterized at NIPB has been transferred in mega varieties of rice like Pusa Basmati and BPT 5204. The centre has matched steps with the changing time and conducted research in basic and applied research for crop improvement resulting in many publications in high impact factor journals, patents and public private partnerships. The state-of-the-art infrastructure and expertise of the scientists have enabled the successful execution of International (rice, tomato and wheat) and National (Pigeonpea, Mango, Mesorhizobium, Puccinia and Magnaporthe) genome sequencing projects. NIPB is also engaged in teaching postgraduate students with regular PhD and MSc degree programmes in Molecular Biology and Biotechnology. The institute takes lead and has contributed substantially towards human resource development by developing strong inter-and intra-institutional linkages and organizing training programmes, summer/winter schools sponsored by Education Division of ICAR as well as other major National funding agencies. The institute is utilizing many crop wild species (CWS) in different crops *viz.*, Brassica, rice, wheat, pigeon pea, chickpea etc for crop improvement program through advance molecular biology tools.

## About the Training

Pre-breeding refers to all activities to identify desirable characteristics/or genes from unadopted materials, that cannot be used directly in the Breeding populations. It also further includes the transfer these traits to an intermediate set of materials that breeder can use further in varietal/crop improvement program. A low genetic base in the germplasm pool is limiting the scope of further improvement and exclusively retarding the potentiality of yield enhancement. It imposes genetic sealing to improve agronomically important traits. The genetic base can be broadened through pre-breeding *via* wide hybridization using progenitor or crop wild relatives (CWRs). CWR as they are known for their resilience and resistance to natural and man-made disturbances. Exploring the crop wild relatives for the specified traits alongwith introgression of the same from CWR to cultivated species is a way out of the different problems, but at the same time, it is a challenging task. The genetic stocks developed through pre-breeding can be analysed using differnt genomic and cytological tools for the proper use in the crop improvement program. Cytogenetic studies provided the earliest observations for genomic shock and meiotic instabilities inherent to newly formed genetic stocks. This will help the researchers to understand the mechanisms that lead to these changes and diversification. This will lead to give detailed insight about investigate the evolution of polyploids, species formation, intergenomic interactions, and diversification in crops.

This "Hands-on Training in Pre-Breeding and Cytogenetic Approaches for Crop Improvement: Advancement, Challenges and Opportunities" will enable the young minds to understand the different aspects of the pre-breeding in the crop plants. The students can learn the different techniques viz., wide hybridization, embryo rescue etc. for the development of genetic stocks through pre-breeding methods. They will also get and hands-on training on different cytological tools and techniques to characterize and analyze these developed genetic stocks such as, mitotic and meiotic analysis etc. The training will cover the different technological advances, opportunities and the challenges related to the pre-breeding and cytological analysis in crop plants.

## Participation and Eligibility

**Eligibility:**

Participants pursuing either M.Sc. or Ph.D. programmes from AICTE approved Central and State Universities in any field of Agricultural Sciences and Biological Sciences.

**How to Apply:** The registration form should be filled by the applicant along with all the necessary documents. Participants must submit a valid identity card issued by their college/institution and 'No Objection Certification (NoC)' from the Head of the Department/Supervisors during application and must produce in the event of selected for the training program.

**Number of participants**: 25 (Twenty Five) total

**Selection criteria**: Based on the application (purely based on merit/ research area/ statement of purpose).

## Logistics Details

**Travel, Accommodation and Food:**

All the selected students (offline mode) will be provided with travel allowance (as per GoI norms). Accommodation (on shared basis) and food will be provided to participants for the entire training duration.

**Venue Details:**

ICAR-National Institute for Plant Biotechnology (ICAR-NIPB, Delhi), LBS Building, Pusa Campus, New Delhi, India-110012.

**Mode:**
The mode of the workshop is offline (Physical) mode.

**Registration Fee:**
There is no registration fee for the workshop.

## Organizing Committee

**Patron:**
Dr. R. C. Bhattacharya (Director, ICAR-NIPB, Delhi)

**Event Organizer:**
Dr. Mahesh Rao (Senior Scientist, ICAR-NIPB, Delhi)

**Event Coordinators:**
Dr. Ashish Kumar (Pr. Sci, ICAR-NIPB, Delhi)
Dr. N. C. Gupta (Sr. Sci, ICAR-NIPB, Delhi)

**Event Co-coordinator:**
Dr. Sandhya Sharma (Sci., ICAR-NIPB, Delhi)

**Organizing Members:**
Dr. Anamika Kashyap
Ms. Jyoti Kumari
Mr. Shiv Shankar Sharma
Ms. Pooja Garg

**Important Dates (Tentative):**
**Registration:** 01st December to 21st December 2023
**Intimation of the selection:** 01st -05th January 2024 (to the selected candidates)
**Training date:** 16th January 2024 to 25th January 2024 (10 Days)

**Contact details:**
Organizing Team,
+91-9968835622; +91-11-25841787 (ext. 202, 222)
ppeb.nipb@gmail.com
www.nipb.icar.gov.in

**Certificates will be provided to all participants on successful completion**

**Registration Link: https://forms.gle/nGv4DAD5j791hCd96**

To apply the Google Form, scan the QR