Second Training Course on

New Crop Breeding Technologies

20-29 November 2023
ICRISAT, Hyderabad, India

**Background:** Plant breeding has evolved from a largely visual based selection of candidates from a population that have genetic variability for the targeted trait(s) to the use of sophisticated innovations and tools to make data-driven and evidence-based selection decisions. The principles of quantitative genetics are used in plant breeding to select the candidates with best genotypic value for a target population of environment (TPEs). Quantitative genetics principles have led to the design and refinement of breeding methods for continuous traits. In recent years, several advances were made in the areas of genomics, phenomics, speed breeding, multi-environment testing (MET) in the target environment, data analytics and management tools that have added new tools to the crop breeder’s tool kit to accelerate cultivar development and improve operational- and cost-efficiencies. Integration of new tools require the development of new breeding schemas, and the development and use of the new tools in crop breeding and testing requires engagement of interdisciplinary teams with scientific expertise in genetics, pathology, entomology, agronomy, physiology, bioinformatics and statistics, genomics, and social sciences.

**Purpose:** To impart training on modern tools and techniques of crop breeding and testing to enhance the rate of genetic gain in crop breeding programs and operational efficiency.

**Expected Output:** Trained researchers with enhanced knowledge and skills in use of new crop breeding tools and techniques, testing and the generation of good quality data, data management and selection decisions.

**Expected Outcome:** Crop breeders adopt modern tools and techniques in crop breeding and testing programs to generate improved germplasm of seed crops.

**Course Duration and Venue:** 10-days
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, India.

**No of participants:** A total of 25 participants from public and private institutes.

**Type of Training Materials Used:** The training course includes lectures, training materials (PDF and PowerPoint files), example data sets (Excel files) and Breeding View software + training license for hands-on practical sessions, visit to facilities and laboratories and field experiments.

www.icrisat.org
Course Content and/or Outline

- Genetic gain assessment and modern crop breeding to enhance rate of genetic gain and operational efficiency
- Crop product profiles & Market Segments – design and use to assess the progress
- Optimizing crop breeding schema based on the principles of quantitative genetics (case studies)
- Global crop genetic resources: Status, management, utilization, and global policies
- Rapid Generation Advancement (RGA), Double Haploid (DH) etc.
- Genomics & Genomics Assisted Breeding (marker assisted selection (MAS), Genomic Selection, Haplotype-Based Breeding and Quality Control (QC))
- Quantitative genetics for crop breeding
- Gene editing for trait development
- High throughput phenotyping for biotic and abiotic stresses, and quality testing of grain and plant residues
- Managed stress environments for drought tolerance selection
- Target population of environments (TPEs) and multi-environment testing
- Data-driven decisions in breeding (experimental designs, and data analysis) crop-breeding
- Mechanization of crop breeding operations & seed processing – a key to enhance operational efficiency.

Co-ordinators
Janila Pasupuleti
Cluster Leader and Head - Crop Breeding Principal Scientist – Groundnut Breeding
Janila.Pasupuleti@icrisat.org

Sean Mayes
Research Program Director - Accelerated Crop Improvement
Sean.Mayes@icrisat.org

Contact person at ICRISAT for the training details
Padmaja Ravula
Cluster Leader - Knowledge and Capacity Development Principal Scientist – Sociologist, Gender and nutrition research
padmaja.ravula@icrisat.org

Organized by
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

Resource persons
ICRISAT, ICAR, CIMMYT, IRRI, Private sector, Advanced Research Institutes (ARIs) in USA and EU.

Target Training Audience
Crop breeders engaged in development and testing of improved germplasm will benefit from the training program.