



SPARC- Ministry of Education, Govt. of India  
sponsored

# International Workshop-cum-Hands on Training on Genome Editing Approaches for Crop Improvements

23 May, 2022 - 06 June, 2022

## Course Director

**Dr. Upendra Kumar**

Assistant Professor, Department of MBB&B  
COBS&H, CCS HAU Hisar  
(Indian PI of SPARC Project)

## Course CO-Directors

**Dr. O. P. Dhankher**

Professor in Agriculture Biotechnology  
Stockbridge School of Agriculture  
University of Massachusetts, Amherst, USA  
(International PI of SPARC Project)

**Dr. K. S. Gill**

Professor & Director  
Department of Crops & Soil Sciences  
Washington State University, Pullman, USA  
(International Co-PI of SPARC Project)



Organized by

Department of Molecular Biology, Biotechnology & Bioinformatics  
College of Biotechnology  
CCS Haryana Agricultural University  
Hisar - 125004, (Haryana) India



## ABOUT THE UNIVERSITY

The Haryana Agricultural University was established on February 2, 1970, as a result of bifurcation of the erstwhile Punjab Agricultural University, through a Presidential Ordinance, ratified later by the Haryana and Punjab Agricultural Universities Act, 1970 (Act No 16 of 1970) passed by the Lok Sabha on 29<sup>th</sup> March, 1970. From 31<sup>st</sup> October, 1991, it has been renamed as Chaudhary Charan Singh Haryana Agricultural University. The University is spread over an area of 7219 acres at Hisar and 1426 acres at outstations. Area at Hisar under farms is 6483 acres and under buildings and roads is 736 acres. During its existence so far it has made rapid progress in building an excellent infrastructure. It has one of the best developed campuses in India to meet academic and extra-curricular needs of the students. February 2019 marks a significant milestone in CCSHAU's history : Beginning of Golden Jubilee Year. To commemorate the occasion, a plethora of exciting events are planned which are spread over the year with our collaborators/ partners, alumni and well wishers.

## ABOUT THE DEPARTMENT

Realizing the role and wide application of Biotechnology and Molecular Biology in various fields of Agriculture, Industry and environment protection, the Department of Molecular Biology, Biotechnology & Bioinformatics was established at CCS Haryana Agricultural University, Hisar in January 1997. It offers M.Sc. and Ph.D. programs in Molecular Biology and Biotechnology and M.Sc in Bioinformatics. Today, it is recognized as one of the best and leading Department for research and teaching in various fields of Plant Biotechnology and Molecular Biology and Bioinformatics. Faculty of this department has a unique distinction and privilege to secure several prestigious fellowships. Most of our Ph.D. students have cleared CSIR/ICAR/UGC NET. The department has three projects from different outside agencies such as DST and SPARC, MHRD, Govt. of India. The department is pursuing research in several priority areas of state/ country interests. The major areas of research include:

- Plant tissue culture and micro-propagation of important plant species Micropropagation of important crop plants, cash crops, ornamentals and forest and horticultural trees.
- Biofortification of staple food crops for iron, zinc, vitamins, and beta glucan etc. through conventional breeding and molecular approaches.
- Application of CRISPR/Cas9 genome editing techniques for development of low silicone rice suitable for paddy straw management
- Development of transgenic for abiotic and biotic stress tolerance and quality improvement in wheat, rice, chickpea and pigeon pea.
- Molecular mapping and tagging of abiotic stress tolerant genes/ QTLs for development of heat and salt tolerant wheat, drought tolerant chickpea, pearl millet, brassica etc. Marker-assisted selection for resistance to rusts in wheat etc.



## ABOUT THE WORKSHOP-CUM-TRAINING

The global human population is projected to exceed more than 9 billion by 2050 requiring crops with higher quality yields with multiple beneficial traits. Advanced breeding technologies like genome editing offers the potential to transform science at an astonishingly rapid rate for precise editing of the genomes, both basic and applied research and potentially can pole vault crop and livestock breeding programs without any adverse impact on the native phenotypes. These technologies have revolutionized the process of making DNA-level changes and the implications of this technology reach far beyond standard molecular biology applications.

Genome editing represents the next step of evolution in our ability to analyse and edit the genetics of plants, animals, humans and microbes. The applications of gene editing technologies such as ZFN, TALEN, have grown significantly in recent years. Genome editing technologies and expectations from them are causing a lot of stir around the world as well as in India. The advances in genome editing can be traced back to quiet beginnings in the 1990s, but the current remarkable surge is largely because of the introduction of the CRISPR-CAS9, a Nobel Prize Winning genome-editing tool that can be used to make changes in sections of the DNA sequence, in 2012. Now genome editing can positively impact the sustainable development, environmental management, crop improvement, food security and find applications in therapeutics also.

Considering the importance of genome editing technologies, Department of Molecular Biology, Biotechnology & Bioinformatics, CCSHAU, Hisar, intends to support Human Resource Development through advanced training/ workshop for capacity building and promoting use of genome engineering technologies for Ph.D. students, Post-Docs & Early to Mid-Career Researchers working in different areas of life sciences like health research, crop improvement, environmental management and livestock improvement etc.

This introductory 21-day comprehensive training program will be ideal for researchers who are looking for a balanced theoretical vs hands-on introduction to gene editing. The program is structured as a combination of lectures and discussions with a hands-on laboratory instructions and technology demonstrations for helping the participants stay ahead imparting both theory and practical aspects of genome editing technologies. The course will walk you through a basic gene editing workflow, from design and synthesis of target specific guide RNAs (gRNAs), delivery of gRNAs in plant cells and detection to analysis of gene editing efficiencies in whole plant.

This is a great opportunity to interact and benefit from the expertise of our scientists and collaborators across the globe and sectors, as they help you design your first genome editing experiments. It is envisaged that at the end of the workshop, participants will be able to design their own experimental workflows. This training will also help in conceiving novel ideas, exchange points of view, and foster collaborations.

### Objectives :

- Equip participants with fundamental knowledge of genome editing techniques.
- Acquaint the participants with bioinformatics tools for guide-RNA designing and CRISPR/Cas9 constructs designing.
- Improve skills in high-throughput techniques for genome editing applications.
- Understand the ethics and biosafety of gene editing technologies.
- Detailed course guide containing all lecture materials, laboratory protocols, troubleshooting tips and more to help you get started right away.

## TOPICS TO BE COVERED

### The workshop will cover the following topics

- Bioinformatics and construct, designing for genome editing through CRISPR-Cas9, VIGS and RNAi approaches
- Genome Editing through CRISPR-Cas9, VIGS & RNAi Approaches
- Genetic Transformation and characterization of transgenic plants
- Gene expression analysis in plants using quantitative real-time PCR (qRT-PCR)

**The above topics will be extensively covered in the form of lectures and presentations delivered by the eminent experts of same area, which will be followed by hands-on-training.**

## WHO CAN ATTEND

Ph. D Student/Research Associate /PDF/Young Faculty

Participants must have at least Master's degree in any discipline of Life Sciences and must be actively involved in research in the area of molecular biology/biotechnology.

### REGISTRATION FEE

No fee will be charged for this workshop-cum-training. The cost of travel should be covered by themselves or other funding agency.

### ACCOMMODATION

The participants will be accommodated in the university guest house during the course of training. The participant will have to pay the charges of accommodation as per the university rule.

## VENUE

Department of Molecular Biology, Biotechnology & Bioinformatics  
CPB Building, CCSHAU Campus, Hisar

**Maximum Number of Participants 15**

## HOW TO APPLY

Duly signed scanned copy of application along with updated resume duly forwarded by the competent authority of the department/ institute/ university where the candidate is presently working/studying may be sent to the organizing secretary on or before 20 May, 2022 at the E-mail [upendra@hau.ac.in](mailto:upendra@hau.ac.in) (applications will be accepted only through E-mail).



**For any query, please contact the Organizing Secretary or the Office of Dept. of Molecular Biology, Biotechnology and Bioinformatics, College of Biotechnology, CCS Haryana Agricultural University, Hisar - 125004, (Haryana) India**

**Dr. Upendra Kumar**

Assistant Professor

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## ORGANIZING COMMITTEE

### Chief Patron

**Prof. B.R. Kamboj**

Vice-Chancellor,  
CCS Haryana Agricultural University, Hisar

### Patrons

**Dr. Jeet Ram Sharma**

Director of Research  
CCSHAU, Hisar  
Coordinator SPARC Projects

**Dr. Sudhir Kumar**

Dean  
College of Bio Technology  
CCSHAU, Hisar

**Dr. Neeraj Kumar**

Dean COBS&H and  
HoD MBB&B  
CCSHAU, Hisar

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### Nodal Officer

**Dr. Surender S Dhankhar**

SPARC Projects  
CCSHAU, Hisar

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Professor & Director  
Department of Crops & Soil Sciences  
Washington State University, Pullman, USA  
(International Co-PI of SPARC Project)

### Members of Organizing Committee

**Dr. Anil Sindhu**

Principal Scientist  
Department of MBB&B

**Dr. Anil Panwar**

Assistant Professor  
Department of MBB&B

**Dr. Shikha Yashveer**

Assistant Professor  
Department of MBB&B

**Ms. Neeru Redhu**

Assistant Professor  
Department of MBB&B

**Dr. Nita Lakra**

Assistant Scientist  
Department of MBB&B

**Dr. Navjeet Ahalwat**

Assistant Professor  
Department of MBB&B



Photo

Name \_\_\_\_\_

Date of Birth \_\_\_\_\_

Designation/Job Title \_\_\_\_\_

Organization (with Complete Address) \_\_\_\_\_

Mobile No. \_\_\_\_\_

E-mail ID \_\_\_\_\_

Sex \_\_\_\_\_ Age \_\_\_\_\_ Nationality \_\_\_\_\_

Educational Qualifications (Graduation onwards)

Degree	Year of Passing	Subject(s)	University/Institute	OGPA/% Marks

Research area of interest \_\_\_\_\_

How will this training help you? (Restrict to 300 words)

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Accommodation Required :    Yes     No 

Signature of Applicant

Remarks and recommendations of the Host Organization (Please state clearly the strong and weak points about applicant and how this training will be useful for your organization/country)

Signature of Research Supervisor/Project Coordinator/  
Head of the Department/Institution/University with seal