

Mohammad Shamshad

Plant Breeder & Geneticist | Sugarcane Breeder, PAU RRS Kapurthala

shamshad.rattan@gmail.com | shamshad.in | Skype: live:shamshad.rattan

Plant Breeder and Geneticist with extensive experience in R-programming, SAS, bioinformatics, data analysis, trait phenotyping, genotyping, breeding methodology, quantitative techniques, germplasm development, and genetic mapping. Expertise spans wheat, sugarcane, cotton, sunflower, and other crops, with a strong foundation in genomic selection, QTL mapping, and nitrogen use efficiency.

EDUCATION

Ph.D. – Plant Breeding and Genetics

Punjab Agricultural University, Ludhiana, India

Jan 2016 – Sep 2019

- Dissertation: "Genetic and physiological basis of nitrogen uptake and utilization in wheat"
- Collaboration with University of Bristol & University of Nottingham, UK
- Minor: Agricultural Biotechnology

M.Sc. – Plant Breeding & Genetics

Punjab Agricultural University, Ludhiana, India

Jul 2012 – Nov 2014

- Dissertation: "Assessment of morphological and genetic diversity ... in sunflower"
- Minor: Agricultural Biotechnology

B.Sc. – Agriculture (Plant Science)

Punjab Agricultural University, Ludhiana, India

Jul 2008 – Jun 2012

- All subjects related to Agriculture prescribed by ICAR, India

PROFESSIONAL EXPERIENCE

Sugarcane Breeder

PAU Regional Research Station (RRS), Kapurthala, Punjab, India

Present

- Development and evaluation of improved sugarcane varieties for high sugar yield, disease resistance, and adaptability
- Management and characterisation of sugarcane germplasm for breeding objectives
- Conducting multi-environment field trials (ACRIP) for varietal testing
- Designing crossing programs for early maturity, ratoonability, and red rot/wilt resistance
- Application of genomic and molecular tools for marker-assisted selection
- Coordination with state/national sugarcane improvement networks

Plant Breeder – Cotton

PAU Ludhiana & PAU RRS Faridkot, India

Previous

- Breeding and evaluation of *Gossypium hirsutum* and *G. arboreum* for yield, fibre quality, and pest resistance
- Development and maintenance of cotton germplasm for pre-breeding programs
- Molecular marker-based diversity assessment and marker-assisted selection
- Crossing programs targeting bollworm resistance, drought tolerance, and improved lint yield
- Collaboration with national cotton research (ACRIP) for multi-location testing and variety release

Post Doctorate Research Associate (TIGR2ESS)

University of Cambridge, UK Collaboration with PAU

Aug 2020 – Mar 2022

- Pre-breeding and germplasm characterisation using novel genomics, phenomics, and statistical tools

- Development of core panels and identification of phenotypic trait gaps
- Extensive field trials, crossing, phenotyping, and data collection across environments
- Double haploid breeding in wheat using wheat × Maize crosses

Junior Research Fellow

Plant Breeding & Genetics, Punjab Agricultural University

Aug 2019 – Jul 2020

- Quantitative genetic analysis of field trials
- Genome-wide analysis and genomic predictions for nitrogen use efficiency
- Crosses in wheat for grain yield, heat, drought, salt, and stripe rust resistance

Research Assistant

Department of Plant Breeding and Genetics, PAU, Ludhiana

Jan 2015 – Dec 2015

- Development of germplasm and core panel for yield, quality, and quantity oils
- Extensive field trials, crossing of A, B and R lines, and data collection of Advanced Variety Trials

GRADUATE EXPERIENCE

Scientific Associate

School of Biosciences, University of Nottingham, UK

Jun – Aug 2018

- Hydroponics and shovelomics for root system architecture
- Image analysis using RootNav and ImageJ ObjectJ (Supervisor: Dr. John Foulkes)

Student Exchange

School of Biosciences, University of Bristol, UK

Sep – Oct 2018

- 35K array genotyping, SNP calling, QTL mapping for NUE (Supervisor: Prof. Keith Edwards)

Ph.D. Research – INEW International Fellow

Punjab Agricultural University

Jan 2016 – Jul 2019

- Development and evaluation of RIL mapping population for nitrogen uptake and utilization
- High-density linkage map based on Breeder array of 35K SNPs
- Genome-wide QTL mapping for agro-physiological, N-uptake, and utilization efficiency traits
- High-throughput phenotyping of wheat and soybean
- Genomic selection/prediction in the PAU wheat breeding program
- Proficiency in Unix, Perl, GBS data analysis, R packages, and SAS; multi-environment analysis with ASReml

Graduate Research Assistant (M.Sc.)

Department of Plant Breeding and Genetics, PAU, Ludhiana

Jul 2012 – Nov 2014

- Identification of potential restorers for newly developed temperate CMS lines
- Association of morphological and genetic diversity with heterosis and combining ability

SKILLS

Quantitative & Bioinformatics:

GBS/SNP calling, RNA-seq, QTL Mapping (R/qtl, ASMap, IciMapping), GWAS (PLINK, TASSEL, GAPIT, FarmCPU), Genomic Selection (BGLR, rrBLUP), R · SAS · ASReml · Python

Wet Lab:

DNA extraction, PCR, real-time PCR, electrophoresis, SSR and KASP marker genotyping

Computational:

Linux · macOS · Windows · LaTeX · R Markdown

Field Experiments:

Field experimental designs, crossing, agronomic management, DH production; crops: Wheat, Sugarcane, Cotton, Sunflower, Rice, Chickpea, Pigeon pea, Maize

PUBLICATIONS

Peer-Reviewed Articles

- Sharma, H., Singh, S., **Shamshad, M.**, et al. (2022). Variability in iron, zinc, phytic acid and protein content in pre-breeding wheat germplasm. *Plant Growth Regul.* doi:10.1007/s10725-022-00943-5
- Sharma, A., Arif, M.A.R., **Shamshad, M.**, et al. (2022). Preliminary Dissection of Grain Yield ... Through Association Mapping. *Mol. Biotechnol.* doi:10.1007/s12033-022-00535-8
- Padhy, A.K., Kaur, P., Singh, B., **Shamshad, M.**, et al. (2022). In silico characterisation of Thinopyrum elongatum-derived PsyE1 gene ... *Cereal Research Communications.* doi:10.1007/s42976-022-00279-w
- Gudi, S., Saini, D.K., **Shamshad, M.**, et al. (2022). Consensus genomic regions for quality traits in wheat using meta-QTL analysis. *Planta*, 255(6). doi:10.1007/s00425-022-03904-4
- Gupta, P.K., Balyan, H.S., **Shamshad, M.**, et al. (2022). Pyramiding of genes for grain protein content, quality, and rust resistance. *Molecular Breeding*, 42(4). doi:10.1007/s11032-022-01277-w
- Kaur, Sarabjit, **Shamshad, M.**, et al. (2022). RNA-Seq transcriptomics for nitrogen use efficiency in Indian wheat cultivars. *Frontiers in Genetics*, 13. doi:10.3389/fgene.2022.853910
- Kaur, Sukhjit, **Shamshad, M.**, et al. (2022). Iranian wheat landraces for salinity stress tolerance. *Cereal Research Communications.* doi:10.1007/s42976-022-00245-6
- Sharma, A., **Shamshad, M.**, et al. (2021). Salt Stress Genotypic Response: Relative Tolerance of Wheat Cultivars. *Agricultural Research Journal*, 58(6), 974–982.
- **Shamshad, M.** and Dhillon, S.K. (2016). Morphological and molecular genetic diversity in Helianthus annuus. *Electronic Journal of Plant Breeding*, 7(4), 1216–1223.
- **Shamshad, M.**, Dhillon, S.K., & Kaur, G. (2016). Heterosis for oil content and oil quality in sunflower. *Current Advances in Agricultural Sciences*, 8(1), 44.
- **Shamshad, M.**, Dhillon, S.K., Tyagi, V., Akhatar, J. (2014). Assessment of Genetic Diversity in Sunflower Germplasm. *IJAFST*, 5(4), 267–272.

Book Chapters

- **Shamshad, M.** and Sharma, A. (2018). The usage of genomic selection strategy in plant breeding. In: *Next Generation Plant Breeding*. Pp 93–108. Intech Publisher, London, UK.
- Sharma, A., **Shamshad, M.**, Kaur, S., et al. (2022). Tackling a Cereal Killer on the Run. In: *New Horizons in Wheat and Barley Research*. Springer, Singapore.

ACHIEVEMENTS / SCHOLARSHIPS / AWARDS

- Ph.D. Fellowship under the Indo-UK Project for Nitrogen Use Efficiency – INEW
- Qualified ICAR-National Eligibility Test (NET) in Genetics and Plant Breeding – 2014, 2016
- Travel Grant to University of Nottingham, Rothamsted Research Station, and University of Bristol, UK
- Travel Grant to attend CerealsDB work at the University of Bristol, UK

TALKS & PRESENTATIONS

Hydroponics and shovelomics for root system architecture

Oct 26, 2018 | Invited Talk, PBG, PAU

SNP chip-based High-Density Linkage Map and QTL Mapping of NUE in Bread Wheat

Oct 3, 2018 | Invited Talk, University of Bristol, UK

Breaking yield ceiling in wheat: Genomic and molecular approaches

Apr 20, 2017 | Ph.D. Seminar, PBG, PAU

Evolution of free threshing habit in wheat

Nov 4, 2016 | Ph.D. Seminar, PBG, PAU

Does genomic selection strategies help improve crop plants?

May 16, 2016 | Invited Talk, PBG, PAU

Correlation and its application in Crops

Oct 3, 2013 | M.S. Lecture, PBG, PAU

Overcoming the barriers to alien gene transfer in Crop Improvement

Sep 27, 2013 | M.S. Seminar, PBG, PAU

PROFESSIONAL TRAININGS

- Next Generation Genomics and Integrated Breeding for Crop Improvement (VII-NGGIBCI), ICRISAT, Hyderabad – May 2020
- General Assembly/Training for PDRA and Early Career Researchers, ICRISAT, Hyderabad – January 2020
- Scientific Exchange: Shovelomics and Hydroponics for Root System Architecture, University of Nottingham, UK
- Workshop: Precision Nitrogen Nutrition in Wheat – Integrating Genetics and Precision Agronomy, BISA, Ludhiana – March 2018
- Workshop on CerealsDB, University of Bristol, UK – September 2018
- Workshop: Wheat Genomic Data Analysis for NUE, ICAR-NBPGR, New Delhi – February–March 2019
- Short-term Bioinformatics Training (RNA-Seq and DNA-Seq), ArrayGen Technologies, Pune – Oct–Nov 2018

References and additional information available upon request.