SAQIB ALI

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About Me

Plant pathologist and bioinformatician (M.Sc. Hons.) specializing in comparative genomics, phylogenomics, and molecular evolution. Combines advanced wet-lab skills (molecular diagnostics, SSR genotyping, marker-assisted selection, stress screening) with computational expertise in genome-wide analysis, synteny mapping, protein structure prediction, molecular dynamics simulations, and population genetics. Proficient in integrated R/Python workflows for plant-pathogen interaction studies and stress-responsive gene discovery.

Education

University of Agriculture Faisalabad Sep 2022 – Sep 2024
M.Sc. (Hons.) Agriculture Plant Pathology *Faisalabad, Pakistan*
CGPA: 3.55/4.00

University of Agriculture Faisalabad Aug 2018 – Jul 2022
B.Sc. (Hons.) Agriculture Plant Pathology *Faisalabad, Pakistan*
CGPA: 3.64/4.00

Research Experience

Postgraduate Thesis Research Sept 2022 – Jul 2024
Department of Plant Pathology, University of Agriculture Faisalabad *Faisalabad, Pakistan*.
Thesis: "Incidence of *Meloidogyne graminicola* in Maize Crops and Its Integrated Management"
Supervisor: Prof. Dr. Sajid Aleem Khan

- Conducted **field surveys** and greenhouse **experiments** to assess root-knot nematode incidence in **maize**, implementing **integrated management** strategies through biological, chemical, and cultural practices in replicated field trials
- Developed **proficiency** in **nematology** and **plant pathology techniques** including nematode extraction and identification, pathogen isolation and culturing, media preparation, and Koch's postulates validation
- Collaborated on field experiments for **cotton** Verticillium wilt, **vegetable crop** nematode screening (**carrot, grapevine**), and **cereal pathology trials** (rice, wheat), contributing to experimental design, data collection, and statistical analysis.
- Applied **novel agricultural technologies** including **laser-assisted nanoparticle** treatments on **rice** and **wheat** for disease management and crop improvement research.
- **Mentored undergraduate students** through laboratory demonstrations and training in plant pathology techniques and experimental protocols.

Research Fellow Sep 2025 – Present
Nuclear Institute for Agriculture and Biology - (PAEC-IAEC) *Faisalabad, Pakistan*
Supervisor: Dr. Muhammad Rashid

Project 1: In-Silico Analysis of WRKY Genes in Rice Subspecies (Sep–Oct 2025)

- Identified and characterized **252 WRKY** transcription factors across ***O. sativa indica***, ***japonica***, and ***O. glaberrima*** using PlantTFDB and SMART databases
- Constructed maximum likelihood **phylogenetic trees** (ClustalX, MEGA12) to classify genes into evolutionary subgroups based on conserved domain architecture
- Analyzed **spatio-temporal expression** patterns across **42 tissue types** using RiceXPro and constructed **co-expression networks** with RiceFRIEND to identify functional modules
- Generated publication-quality visualizations using **R** (gplots, heatmap.2, ComplexHeatmap) and **TBtools** for multi-dimensional expression profiling

Project 2: Comparative Genomics Across Seven Cereal Genomes (Nov 2025–Jan 2026)

- Conducted genome-wide identification of **547 WRKY genes** using HMMER and BLAST with **redundancy filtering** (CD-HIT); performed **multiple sequence alignment** (MAFFT) and phylogenetic reconstruction (iTOL)
- Characterized **gene structure**, **conserved motifs** (MEME Suite), and protein domains (InterProScan) to establish **evolutionary relationships** across cereals
- Executed comparative **synteny analysis** using MCScanX and Circa, mapping **700+ orthologous gene pairs** and visualizing chromosomal relationships with TBtools and circlize
- Calculated **evolutionary selection pressure** (KaKs_Calculator 2.0), demonstrating strong **purifying selection** (Ka/Ks = 0.08–0.12) across WRKY gene families
- Applied **multivariate statistical methods** (PCA, t-SNE) and codon usage bias analysis (seqinr) to compositional datasets; developed **reproducible analytical workflows** using Python (BioPython) and R for statistical testing and high-dimensional visualization

Wet Laboratory & Physiological Screening (Sep–Oct 2025)

- Conducted comprehensive **stress resistance screening in rice** germplasm using **physiological** (**SPAD**, **IRGA**, porometer, osmometer, pressure chamber) and **biochemical assays** (MDA, POD, EC, ion quantification via spectrophotometry and flame photometry)
- Applied molecular techniques for **genetic characterization**: DNA quantification, PCR, gel electrophoresis, **SSR marker genotyping**, marker-assisted selection (**MAS**), and primer design (**Primer3**)
- Performed **plant pathology assays** including inoculum preparation, pathogen staining, varietal screening, and plant–pathogen interaction studies.

Research Intern Jul 2024 – Aug 2024
PepsiCo Roshan Kal for Pakistan *Faisalabad, Pakistan*

- Contributed to **Bonsucro-certified model farm** development by validating **sustainable agriculture practices** and conducting **supply chain sustainability** assessments in collaboration with industry and academic partners.

Research Intern Feb 2022 – May 2022
Vegetable Research Institute, Ayub Agricultural Research Institute *Faisalabad, Pakistan*

- Designed and conducted **field trials** in **walk-in tunnels** to study **disease prevalence** and **fungicide efficacy** in **vegetable crops** (tomatoes, cucumbers, watermelons, onions, garlic), with emphasis on tomato early blight and grey mold management.
- Performed **plant pathology diagnostics** including pathogen isolation, **ELISA-based virus identification**, and **PCR-based detection** for bacterial and nematode pathogens.
- Contributed **disease resistance data** to **vegetable** and **cereal breeding programs** through **statistical analysis** (RStudio, Python), supporting crop improvement strategies.

Professional Experience

Agriculture Officer Extension (Intern) Sep 2024 – Sep 2025
Department of Agriculture Extension, Government of Punjab *Chiniot, Pakistan*

- Provided **technical advisory** support to **1,500+ farmers** on **integrated pest and disease management**, translating **research-based recommendations** into practical, cost-effective control strategies to improve crop yields.
- Conducted **field-based pest scouting** and **crop health assessments** through regular **farmer visits**, diagnosing disease/pest issues and providing targeted intervention recommendations.
- Assisted in **seed and agrochemical quality assessments** to ensure product efficacy and **regulatory compliance**, supporting farmer access to certified inputs.

Research & Knowledge Management Intern May 2025 – July 2025
World Agriculture Forum *Remote*

- Collaborated with **policy research** team to **analyze global agricultural trends** and compile technical reports **promoting sustainable agricultural** practices and stakeholder dialogue.

Publications

Publication Summary: 8 peer-reviewed articles (**6** first author), **4** conference presentations
Research Articles (Submitted/Under Review):

1. **Ali, S.** (2026). Evolutionary Origins and Structural Mechanism of V2-Mediated Host Immunity Suppression in Soybean Stay-Green Associated Virus (SoSGV). **Submitted** to **Archives of Virology** (Springer Nature).
2. **Ali, S**. (2026). Systematic Characterization of Glycine max IQD Genes Reveals Insights into Drought Stress Adaptation and Hormonal Regulation of Plant Architecture. **Submitted** to **3 Biotech** (Springer Nature).
3. **Ali, S.,** Hanjra, Z., Saeed, M., Fatima, T., Khalil, S., Iltaf, B., & Rashid, M. (2025). In-silico analysis of WRKY transcription factors (WRKY) gene family in rice. **Submitted** to **BMC Plant Biology**.
4. Hanjra, Z., **Ali, S.,** Fatima, T., Saeed, M., Khalil, S., & Rashid, M. (2026). High-resolution comparative genomics and compositional analysis of WRKY transcription factors across seven cereal and model plant genomes. **Submitted** to **BMC Plant Biology**.

Research Articles (Published/Accepted):

5. **Ali, S.,** Khan, S. A., Abbas, H., Khadim, U., Aslam, A. & Anwaar, M. (2025). Incidence of *Meloidogyne Graminicola* on Maize and Its Integrated Management. **Accepted** in **Pakistan Journal of Zoology**.
6. Tufail, M. M., Abbas, H., Khadim, U., Bashir, M. R., Kamran, M., Khan, S. A., Zafar, M., Shahbaz, M. U., ul Haq, M. E., & **Ali, S**. (2024). Management of *Macrophomina phaseolina* infecting sesame germplasm. **Journal of Phytobiology**, 4(1), 9–17.

Review Articles:

7. **Ali, S.,** Mithal, U., Bibi, J., Hanif, A., Zohaib, M., Asghar, J., ... & Sohail, A. (2025). Revolutionizing Cotton Leaf Curl Disease Detection: CRISPR-Based Diagnostics for Rapid, Field-Deployable Solutions. ***Planta Animalia***, *4*(4), 347-362.
8. **Ali, S**., Anwaar, M., Khadim, U., & Bakhsh, B. P. (2025). CRISPR-based biosensors for plant disease diagnostics: Innovations, applications, and future prospects. **Annual Methodological Archive Research Review**, 3(8).

Conference Abstracts:

9. **Ali, S**. (2025). Multi-Omics and Machine Learning for Predicting Biocontrol Efficacy under Climate-Driven Pathogen Shifts. [Abstract] 9th ICCPS PMAS UAAR, Pakistan
10. Aslam, A., Khan, S. A., **Ali, S.,** Abbas, H., Anwar, M., & Ul Haq, U. (2023). Plant growth-promoting rhizobacteria as a biocontrol tool for root-knot nematode killing in lab [Abstract]. 8th ICCPS IUB, Pakistan.
11. **Ali, S**., Khan, S. A., Abbas, H., Aslam, A., Abbas, W., & Khadim, U. (2023). Evaluation of resistant sources of tomato against early blight under natural field conditions and its management through newly introduced chemicals [Abstract]—8th ICCPS IUB, Pakistan.
12. **Ali, S**. (2025). Harnessing Host-Induced and Exogenous RNAi for Precision Nematode Control. [Abstract] VIRTUAL NEMATOLOGY CONFERENCE 2025

Professional Service:

- **Peer Reviewer**, *Journal of Plant Diseases and Protection* | Springer Nature (2025).
- **Peer Reviewer**, *Journal of Advances in Biology & Biotechnology* (2025).

Honors & Awards

Ehsaas Undergraduate Scholarship Sep 2019 – Jul 2022
HEC Pakistan *Faisalabad, Pakistan*
PEEF Scholarship Sep 2016 – Jun 2018
Punjab Educational Endowment Fund *Faisalabad, Pakistan*

Training & Certifications

BONSUCRO Sugarcane Sustainability Training Workshop Aug 2024
PepsiCo Pakistan *Lahore, Pakistan*
International Conference Climate-Smart Agriculture for Food Security July 2024
University of Poonch Rawalakot *Azad Jamu Kashmir*

University-Level Certifications (2025)

- Python for Everybody Specialization | University of Michigan (via Coursera)
- Bioinformatic Specialization | University of California, San Diego (via Coursera)
- Data Visualization & Dashboarding with R | Johns Hopkins University (via Coursera)
- Geographic Information Systems (GIS) | University of California, Davis (via Coursera)
- Plant Bioinformatic Methods Specialization | University of Toronto (via Coursera)
- Agroforestry Specialization | University of Florida (via Coursera)
- Agribusiness & Sustainable Food Production Economics Specialization | University of Illinois Urbana Champaign (via Coursera)
- Agriculture, Economics and Nature | University of Western Australia (via Coursera)
- DNA Decoded | McMaster University (via Coursera)

Fellowships

Forward Program 🖇 Mar 2025 – Jul 2025
McKinsey.org *Remote*
Career-Prep Fellowship 🖇 Aug 2023 – Oct - 2023
Amal Academy (Stanford Seed-funded) *Faisalabad, Pakistan*
Foster Fellowship 🖇 Mar 2019 – May - 2019
Foster Learning Pakistan *Faisalabad, Pakistan*

Skills

- **Molecular Biology & Plant Pathology:** Pathogen isolation & identification, **PCR**, Gel Electrophoresis, **SSR Genotyping**, Marker-Assisted Selection **(MAS)**, Primer Design. **Physiological Assays** (SPAD, IRGA, Porometer, Osmometer, Spectrophotometry). Biochemical profiling (MDA, POD activity).

- **Genome-Wide & Comparative Genomics:** HMM-based gene family identification (HMMER 3.0), protein domain verification (SMART, Pfam), gene structure analysis (GSDS 2.0), motif discovery (MEME Suite). **Synteny analysis** (MCScanX, Circos, TBtools-II), promoter cis-element analysis (PlantCARE), subcellular localization prediction (WoLF PSORT).

- **Phylogenomics & Molecular Evolution: Phylogenetic reconstruction** (MEGA 11/12; Maximum Likelihood, Neighbor-Joining; 1,000 bootstrap replicates). **Sequence alignment** (MAFFT, ClustalW). **Recombination detection** (RDP5, 7 algorithms). Positive selection analysis (MEME). **Evolutionary metrics** (KaKs_Calculator, DnaSP 6). **Tree visualization** (iTOL, ggtree).

- **Protein Structure & Docking:** Structure prediction (ColabFold), Protein-protein docking (HDOCK), **Molecular dynamics simulations** (GROMACS). PPI network analysis (STRING database).

- **Data Analysis & Visualization: R Programming** (tidyverse, ggplot2, ComplexHeatmap, pheatmap, circlize, seqinr), **Python** (BioPython, Pandas), **Statistical analysis** (ANOVA, Kruskal-Wallis, PCA, t-SNE), **RNA-seq analysis** (expression profiling, heatmap clustering), **GIS** & Remote Sensing.

- **Field & Agricultural Research:** Greenhouse & field trial management (RCBD, factorial design), Screening for biotic & abiotic stress tolerance in rice and other crops, Agroecological data collection, IPM/IDM practices, sustainable agriculture frameworks

- **Academic & Professional:** Scientific writing, conference presentations, Fundraising.

Recommendations

Dr. Muhammad Rashid
Deputy Chief Scientist Rice Group, Plant Breeding and Genetics Division,
Nuclear Institute for Agriculture and biology (NIAB) Faisalabad, Pakistan
Email: mrashid_niab@yahoo.com
Phone: +92-323-4003201 ***Relationship****: Fellowship Supervisor*

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