NAZISH ANNUM

PERSONAL DETAILS

National Center for Genome Editing (NCGE), D-8 Research Center for Agriculture and Food Security (D-8 RCAFS), Center for Advanced Studies (CAS), University of Agriculture Faisalabad (UAF).
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EMPLOYMENT

Post Doctoral Fellow **May 2024 – Cont.**
Wheat Biotechnology Lab, D-8 Research Center for Agriculture and Food Security (D-8 RCAFS), National Center for Genome Editing (NCGE)
Center for Advance Studies in Agriculture and Food Sciences (CAS-AFS), University of Agriculture Faisalabad (UAF)
Project Title: CRISPR-Cas9 based genome editing of wheat for rust tolerance, starch resistance and high grain weight/yield.
Funding Agency: Pakistan Ministry of Science, Pakistan
Job Responsibilities: Construction of CRISPR/Cas9 constructs, Cloning and transformation of plasmids in local wheat varieties and wild germplasm, multi-location field trials, molecular, biochemical and physiological experimentation and data collection, preparation of biannual progress research reports, presenting scientific data at various Institutional levels, supervising postgrad students, manuscript writeup, and updating of the project fiscal report

Research Associate **May 2023 – April 2024**
Wheat Biotechnology Lab, Agricultural Biotechnology Division (ABD) National Institute for Biotechnology and Genetic Engineering (NIBGE) Faisalabad, Pakistan
Project #: PSF-NSLP/P-NIBGE (960)
Project Title: CRISPR-Cas9 based precise excision of *TaHyPRP1* domain to generate salt stress tolerance in wheat.
Funding Agency: Pakistan Science Foundation (PSF)
Job Responsibilities: Construction of CRISPR/Cas9 constructs, Cloning and transformation of plasmids in local salt-tolerant and susceptible wheat varieties, Timely utilization of allocated funds for specific preparation of biannual progress research reports, presenting scientific data at various Institutional levels, supervising undergrad students, manuscript writeup, and updating of the project fiscal report

Researcher **Mar 2020 – Feb 2023**
Wheat Biotechnology Lab, Agricultural Biotechnology Division (ABD) National Institute for Biotechnology and Genetic Engineering (NIBGE) Faisalabad, Pakistan, Faisalabad
Project #: HEC NRPU # 7202
Project Title: Improvement of heat tolerance wheat under climate change scenario
Funding Agency: Higher Education Commission of Pakistan (HEC)
Job responsibilities: Molecular marker-assisted investigation and expression profiling of genes for their possible involvement in heat tolerance, germplasm screening, conducting multi-location varietal trials, collecting and analyzing experimental data, preparing research reports, and writing research articles.

International Research Support Initiative Program (IRSIP) Fellowship **Aug 2018 – Apr 2019**
Higher Education Commission (HEC), Pakistan
Nine months fellowship to conduct part of research at the Swammerdam Institute for Life Sciences, University of Amsterdam, The Netherlands, under the International Research Support Initiative Program (IRSIP) of the Higher Education Commission (HEC), Pakistan. Meanwhile, also assisted in the coursework of Cellular Physiology (Cellulaire Fysiologie) at the University of Amsterdam as a Teaching Assistant to graduate students during my stay there.

Researcher **Sep 2015 – Aug 2023**
Wheat Biotechnology Lab, Agricultural Biotechnology Division (ABD) National Institute for Biotechnology and Genetic Engineering (NIBGE) Faisalabad, Pakistan, Faisalabad
Project Title: Cloning and molecular characterization of Arabidopsis thaliana Phospholipase C Isoform 5 (*AtPLC5*) gene for improving heat tolerance in wheat
Funding Agency: King Abdullah University of Science and Technology (KAUST), The Kingdom of Saudi Arabia.
Research work: Cloning and *Agrobacterium*-mediated transformation of *AtPLC5* gene using immature embryos as an explant. Protocol optimization for tissue culturing of wheat genotypes, Molecular, Physiological, Biochemical and Agronomic characterization of transgenic wheat plants under high temperature stress.

Internship **Oct 2014 – Sep 2015**
Center of Agricultural Biochemistry and Biotechnology (CABB), University of Agriculture Faisalabad, Pakistan, Faisalabad
Project Title: Protocol development for the regeneration of *Brassica rapa* and *Brassica juncea* through callus induction.

PUBLICATIONS

1. **Annum N**, Ahmed M, Tester M, Mukhtar Z and Saeed NA (2023). Physiological responses induced by phospholipase C isoform 5 upon heat stress in *Arabidopsis thaliana*. *Front. Plant Sci.* 14:1076331. http://doi:10.3389/fpls.2023.1076331
2. Imtiaz K, Ahmed M, **Annum N**, Tester M and Saeed NA (2023). *AtCIPK16*, a CBL-Interacting Protein Kinase Gene confers salinity Tolerance in Transgenic Wheat. *Front. Plant Sci*. 14:1127311. https://doi.org/10.3389/fpls.2023.1127311
3. **Annum N**, Ahmed M, Imtiaz K, Mansoor S, Tester M and Saeed NA (2022). $^{32}P_i$ Labeled Transgenic Wheat Shows the Accumulation of Phosphatidylinositol 4,5-bisphosphate and Phosphatidic Acid Under Heat and Osmotic Stress. *Front. Plant Sci.* 13:881188. https://doi.org/10.3389/fpls.2022.881188
4. Zain N., Masood S.A., **Annum N.,** Arshad S., Khalid M.A.R., Anam R. and Ali Q. (2015). Genetic variability among sunflower (*Helianthus annuus* L.) accessions for relative growth and seedling traits. Academia Arena; 7(8):1-5.
5. Zain N., Masood S.A., Arshad S., **Annum N.**, Bashir M.K., Anum R., Ali Q., Ali A. and Kanwal N. (2015). Critical study of gene action and combining ability for varietal development in wheat: An Overview. Life Sci. J., 12 (3s):104-108.
6. Ahmed M†, Aslam S†, Annum N, Rahman L, Rehman A, Mukhtar Z, Saeed NA (2025). Enhancing Nitrogen Use Efficiency in Tobacco Plants with Application of Dual Emissive Carbon Dots. BioNano Sci. Manuscript ID aee5771a-bf90-4588-8fa7-71141643e413 (Under Review).

EDUCATION

PhD Biotechnology **Aug 2023**
National Institute for Biotechnology and Genetic Engineering College (NIBGE-C), Pakistan Institute of Engineering and Applied Sciences, Faisalabad

Dissertation Title: Cloning and Molecular Characterization of *Arabidopsis thaliana* Phospholipase C Isoform 5 Gene for Improving Heat Tolerance in Wheat.

Short Abstract: *AtPLC5* gene was isolated from *Arabidopsis thaliana* and cloned in a binary vector under *pUBQ10* and *CaMV35S* constitutive promoters. *AGL1* strain of Agrobacterium tumefaciens was transformed with both of these gene constructs. *Agrobacterium*-mediated In-planta transformation and tissue culturing of immature embryos of wheat (*Triticum aestivum* L.) *cv. Faisalabad-2008* was used for transformation purposes. Putative transgenic wheat plants were validated through antibiotic selection, leaf dip, leaf paint assays, PCR amplification, Southern blotting and real-time quantitative PCR. Transgenic wheat plants were grown in successive generations to achieve homozygosity of selected wheat lines up till T_4 generation. Then transgenic wheat plants were further investigated for possible heat tolerance at 40 ºC for three hours (everyday) for a period of 14 days at pre-anthesis and post-anthesis stages. Upon completion of heat stress treatment, plants were allowed to grow for recovery at normal 25 ºC until plant maturity. Transgenic wheat plants were evaluated for their physiological, biochemical and agronomic traits at pre-anthesis and post-anthesis stages and compared with wild type under controlled and field conditions.

M.Sc (Hons.) Plant Breeding and Genetics **Nov 2014**

University of Agriculture Faisalabad (UAF), Faisalabad

Dissertation Title: Estimation of Heterosis Manifestation for Hybrid Development in Sunflower (*Helianthus annus* L.)

Short Abstract: Crosses of 15 inbred lines of sunflowers were made in line × tester fashion. Ten lines were taken as female and five as male. The crossed seeds along with parents, were sown in a randomized complete block design with three replications in the next growing season. The data were recorded for plant height (cm), head diameter (cm), days to 50% flowering, stem-based diameter (cm), number of leaves per plant, No. of achene whorls/head, days to maturity, achene yield/plant (g), weight of 100 achenes (g), oil contents (%), protein contents (%) and fatty acid profile (%). The data thus collected were analyzed for variance, combining abilities and heterosis effects using standard statistical/biometrical techniques.

B.Sc (Hons.) Agri. Sciences **July 2012**

University of Agriculture Faisalabad (UAF), Faisalabad

Major: Plant Breeding and Genetics

Internship: Pulses Research Institute, AARI, Faisalabad.

Internship title: Agronomic and morphological evaluation of cross-pollinated desi chickpea germplasm under climatic conditions of Faisalabad region.

TECHNICAL EXPERIENCE

- DNA/RNA extraction
- Digital PCR, qRT-PCR
- *Invitro* Tissue culturing and Cell suspension culture
- $^{32}P_i$ Labeled lipid extraction
- Recombinant DNA Methods: Cloning, Transformation
- Crop (*Arabidopsis*, Wheat, Sunflower, Brassica, Chickpea) handling and crossing skills in field as well as under greenhouse conditions.
- Bioinformatic tools: R Studio, DARwin6, Power Marker, Map Man, ICIM, Tassel
- cDNA synthesis
- Agarose/SDS-PAGE gel electrophoresis,
- Southern Blotting, Western Blotting
- Library preparation for Next Generation sequencing (DNA/RNA)
- CRISPR Cas9-based genome editing
- Qualitative and Quantitative data analysis regarding key agronomic traits; Design different abiotic stress experiments to evaluate tolerance/resistance of particular crop
- Comprehensive command on MS Office, Prism, EndNote, and Reference Manager

POSTER PRESENTATIONS

1. Tayyaba Noor, Moddassir Ahmed, **Nazish Annum** and Nasir A. Saeed, "Dissecting the molecular genetics of iron and zinc metabolic pathway genes for bio-fortification in wheat grains" in "International Conference on Emerging Technologies for Crop Improvement in Pakistan" held on February 19-20, 2024, at CAS-UAF.
2. **Annum, N**; Ahmed, M; Tester, M; and Saeed, N. A. 2023. Role of *Arabidopsis thaliana* Phosphoinositide specific Phospholipase C Isoform 5 gene in sensing heat stress and conferring thermotolerance in spring wheat. Abstract and Poster presentation at "Long Term Experiments: Meeting Future Challenges, Three-day Hybrid event hosted online and at Rothamsted Research, West Common, Harpenden, UK, June 20th-22nd 2023.
3. Junaid Iqbal, **Nazish Annum**,** Moddassir Ahmed*, Mudassar Nawaz, Jawad Akbar, Imran Amin, Zahid Mukhtar, Nasir A. Saeed, "Editing of BT2 Gene Orthologs through CRISPR-Cas9 to Improve Nitrogen Use Efficiency in Wheat (*Triticum aestivum* L.)" in "IWC-UAF 2022" Technical workshop held on October 19-20, 2022.
4. Mudassar Nawaz**, Moddassir Ahmed*, Junaid Iqbal, **Nazish Annum**, Jawad Akbar, Imran Amin, Zahid Mukhtar, Nasir A. Saeed "Knockout of BT1 Orthologs by CRISPR Cas9 Approach to Improve Nitrogen Use Efficiency in Wheat (*Triticum aestivum* L.)" in "BGRI 2022 Technical Workshop held virtually on September 9, 2022. https://bgri.cornell.edu/portfolio/knocking-out-of-bt1-gene-orthologs-by-crispr-cas9-approach-to-improve-nitrogen-use-efficiency-in-wheat-triticum-aestivum-l/
5. **Nazish Annum,** Makky Javaid, Khadija Imtiaz, Nasir A. Saeed. "Molecular Characterization of *Arabidopsis thaliana* Phospholipase C Isoform 5 (*AtPLC5*) gene for Improving Heat Tolerance in Wheat" in "4th National Symposium on Advances in Biotechnology: Trends, Challenges and Opportunities" held on March 2-3, 2022.
6. M. M. Javaid, A. Ahmed, A. Rehman, M. Owais, **N. Annum,** M. Ahmed, N. A. Saeed, "Wild Wheat Relatives – A Unique Source of Host Rust Resistance and The Introduction Of New Ideotypes In Current Cultivated Bread Wheat" in "BGRI 2021 Technical Workshop held virtually on October 6-8, 2021. https://bgri.cornell.edu/portfolio/wild-wheat-relatives-a-unique-source-of-host-rust-resistance-and-the-introduction- of-new-ideotypes-in-current-cultivated-bread-wheat/
7. M. Mishkind, X. Zarza, E. Darwish, R. Alves, **N. Annum**, R. van Wijk R. Korver and T. Munnik, "Heat Stress in Plants: A Role for Phospholipid-based Signaling" in EPS Lunteren 2019 conference held at WUR April 2019.
8. Saeed N. A., Ahmed M., **Annum N.,** Imtiaz K., Haq F., Arshad Z., Habib I., Mukhtar Z., Tester M., Ali S. and Mansoor S., 2017. Wheat transformation to increase salinity and heat tolerance of commercial wheat: progress and prospects. Abstract and oral presentation at three-day workshop on Advances in Agricultural Biotechnology and Regulatory Affairs, September 25-27, 2017 at ORIC FCC Lahore.

CONFERENCES AND TRAINING

1. Participated as a resource person in "International Conference on Emerging Technologies for Crop Improvement in Pakistan" held on February 19-20, 2024, at CAS-UAF. Oral presentation entitled "Heat Whisperer: *AtPLC5* Gene Boosts Thermotolerance in Spring Wheat, Revealed through $^{32}P_i$ Transgenic Insights".
2. Participated in "Long Term Experiments: Meeting Future Challenges, Three-day Hybrid event hosted online and at Rothamsted Research, West Common, Harpenden, UK, June 20th-22nd 2023.
3. Participated in the 2-day International Wheat Conference "IWC-UAF 2022" technical workshop organized by the University of Agriculture Faisalabad on October 19-20, 2022.
4. Participated in the 4th National Symposium on "Advances In Biotechnology: Trends, Challenges and Opportunities" organized by Government College University Faisalabad on March 2-3, 2022.

5. Received two months of hands-on training by attending "Advance Wheat Improvement Course-2021" held at CIMMYT, Mexico, from August 02-October 01, 2021.
6. Participated in one day International Workshop on "Application of Computational Biology in Biotechnology" dated July 31st, 2017 held at the National Institute for Biotechnology and Genetic Engineering (NIBGE) Faisalabad.
7. Attended the 3-day "Next-Generation DNA Sequencing Data Analysis" workshop organized by Jamil-ur-Rahman Center for Genomic Research, Dr. Panjwani Center for Molecular Medicine and Drug Research, International Center for Chemical and Biological Sciences, University of Karachi on March 27-29, 2017.
8. Attended 2nd International Conference on Biological Sciences with the theme "Biotechnology" from Invention to innovation held at National Institute for Biotechnology and Genetic Engineering (NIBGE) Faisalabad from October 12-14, 2015

REFERENCES

Dr. Nasir A. Saeed (CS)
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