Muhammad Hassaan Khan, PhD

Post Doctoral Fellow, Centre for Advanced Studies in Agriculture and Food Security (CAS-AFS), University of Agriculture Faisalabad, Punjab, Pakistan. Cell No. +92-323-2467141 Email: <u>hassaan_faizan@yahoo.com</u>

LinkedIn: <u>https://www.linkedin.com/in/dr-muhammad-hassaan-khan-8b9aa74a/</u> ResearchGate: <u>https://www.researchgate.net/profile/Muhammad-Hassaan-Khan</u>

Research Interests:

Genome Editing using CRISPR-Cas Technology, Transgenics development, Plant tissue culture optimization, *P*rotein purification through bacterial and yeast expression system, Plant-insect interaction, Insect resistance in transgenics by expressing *Bt*- and Arachnidian neuro-toxins, Bioinformatics, Mathematical modeling and Statistical analysis.

Education:

2021	Doctor of Philosophy in Biotechnology Pakistan Institute of Engineering and Applied Sciences, Islamabad, Pakistan.
2014	MS Leadings to PhD in Biotechnology Pakistan Institute of Engineering and Applied Sciences, Islamabad, Pakistan.
2013	Bachelor of Honors in Agriculture (Major: Agricultural Biotechnology) University of Agriculture, Faisalabad, Pakistan.
2009	Intermediate in Pre-Medical Board of Intermediate and Secondary Education (BISE), Faisalabad.

2007 Matriculation in Sciences Board of Intermediate and Secondary Education (BISE), Faisalabad.

Work Experience:

May 2024 – Conti. Centre for Advanced Studies in Agriculture and Food Security (CAS-AFS), University of Agriculture, Faisalabad, Punjab, Pakistan.

Postdoctoral Research Fellow

Project Title: Establishment of National Center for Genome Editing for Crop Improvement and Human Health (NCGE)

Research Domain: Genome Editing of Vegetable Crops

- I am working to improve vegetable crops, mainly: soybean, tomato, potato and chilies, by utilization of CRISPR technology.
- I am optimizing tissue culture setup of these crops to develop genome edited plants and developed various CRISPR-Cas9 constructs to target various biotic, abiotic stresses and nutrition improvement.
- Side-by-side, I am managing CAS-AFS website and material inventory with the team of IT experts and administration.

Sep 2023 – Apr 2024 National Institute of Biotechnology & Genetic Engineering (NIBGE), Faisalabad, Punjab, Pakistan.

IPFP Fellow/Senior Scientist (Interim Placement of Fresh PhDs by HEC, PK)

Research Domain: Biopesticide and Abiotic Stress Tolerance

Projects: (1) Development and Assessment of Protein based Biopesticide;

- (2) Abiotic stress tolerant transgenics.
- I developed *In vitro* purified insecticidal Vip3A protein & *hvt* arachnidian neurotoxin using bacterial and yeast expression system.

- I estimated the efficacy of these toxins in both raw & purified versions and dialyzed them in 16 various buffer system to prepare a formulation. I also estimated their thermal stability at four various temperatures.
- I was also involved in *APX* and *SOD1* gene construct development along with the signature sequence to limit the issues of Biopiracy.

Oct-2021 – Aug 2023 Department of Bioinformatics and Biotechnology, Faculty of Life Sciences, Government College University Faisalabad (GCUF), Punjab, Pakistan. Assistant Professor (Tenured)

Teaching Faculty: Taught various courses at under- and post-graduate levels.

Dec 2014 – Jun 2021 National Institute of Biotechnology & Genetic Engineering (NIBGE), Faisalabad, Punjab, Pakistan.

PhD Research Scholar (MS Leadings to PhD)

Dissertation: Cloning and characterization of synthetic Vip3A gene for insect resistance.

- I developed and characterized transgenic cotton and tobacco plants, horbouring vip3A insecticidal toxin (*Bt*-Toxin) and tested them using detached leaves bioassays.
- I purified the Vip3A insecticidal protein using *E. coli* expression system and estimated its potential through diet-overlay bioassays.
- In MS research, I developed transgenic abiotic stress tolerant potato for cold stress using *DREB1* gene.

Sep 2018 – Mar 2019 Boyce Thompson Institute for Plant Research, Cornell University, Ithaca, New York, United States of America.

Visiting Research Scientist

Research Domain: Insect resistance and Protein Biology

- I developed RNAi based gene constructs targeting Cathepsins genes and developed transgenic Arabidopsis and tobacco plants to control aphids.
- I screened the GM tobacco plants using detached leaves and *in vitro* purified recombinant Vip3A protein using diet-overlay bioassays.

Dec 2014 – Jun 2015 Nuclear Institute of Agriculture and Biology (NIAB), FSD, Punjab, Pakistan. Internee

Research Domain: Screening and evaluation of plants using Marker-Assisted Breeding.

Skills

- Molecular Biology: Molecular cloning, gRNA designing, RNAi technology.
- Protein Biology: In sillico protein engineering and purification via bacterial and yeast expression system.
- **Transgenic Technology:** GM plants development using *Agrobacterium*, plant transformation and tissue culture optimization, Transgenics characterization.
- Microscopy, thin layer chromatography and insect bioassays.
- Bioinformatics, routine computer softwares, mathematical modeling and statistical analysis.

Professional Competence:

- Outstanding organizational and multi-tasking skills.
- Enthusiastic to learn new techniques and skills.
- Possession of good communication, record keeping and management skills.
- Capable of both independent and collaborative research at ease.
- Manages and trains junior staff as appropriate.

Patents:

- "Development of Insect Resistant Vip3A Transgenic Cotton", (2021). (Under Pipeline)
- "Development of Broad-Spectrum Insecticidal Biopesticide", (2024). (Under Pipeline)

Database Submissions:

• "Synthetic construct insecticidal toxin vip3A gene, complete cds", (Gene Bank Accession # MK761073.1)

Memberships:

- Member of Entomological Society of America for 2019 to 2022.
- Advisory Board Member of **National Journal of Biological Sciences (NJBS)** since 2021, published by the Women University Mardan.

Achievements:

- Certificate of organizers of three days workshop, **"From Microscope to Machine Learning: Hands-on Training in Plant Disease Diagnosis"** at **CAS-AFS**, UAF, Faisalabad.
- Certificate of organizers of 1st International Hands-on Training on "CRISPR/CAS mediated Genome Editing" at CAS-AFS, University of Agriculture, Faisalabad.
- Certificate of participation in 1st National Workshop on "CRISPR Applications in Biological System", at CAS-AFS, University of Agriculture, Faisalabad.
- Certificate of organizers of 19th National training course on **"Modern Techniques in Biotechnology"**, at **NIBGE**, Faisalabad.
- Certificate of participation in IPFP Fellow training under "National Faculty Development Program by National Academy of Higher Education (NAHE)", at Higher Education Commission (HEC), Islamabad, Pakistan.
- Certificate of participation in 5th national symposium on "Advances in Biotechnology: Towards Circular Bioeconomy" at GCUF, Faisalabad.
- Certificate of participation in International Seminar on "Crop Type Mapping Using Remote Satellite Sensing", at Mian Nawaz Sharif University of Agriculture, Multan, Pakistan.
- Certificate of Guest Speaker for delivering a lecture on **"Recent Trends in Agricultural Biotechnology"** at **AKHUWAT-FIRST**, Faisalabad.
- Certificate of Participation in 4th national symposium on "Advances in Biotechnology: Trends, Challenges & Opportunities", at GCUF, Faisalabad.
- Awarded an international research fellowship by the Higher Education Commission (HEC) of Pakistan under *"International Research Support Initiative Program"* for six months duration. (Availed).
- Awarded with an indigenous PhD scholarship by the Higher Education Commission (HEC) of Pakistan under the venture of *"PhD Fellowship for 5000 Scholars, Phase II, Batch-III"* in 2015. (Not Availed).
- Awarded with the "Internal Merit Scholarship" from B.Sc. (Hons.) Agriculture (2009-2013). (Availed)
- Awarded with the *"University Merit Scholarship"* from B.Sc. (Hons.) Agriculture (2009-13). (Not Availed)
- Participated in **INTEL**[®] *"Science Olympiad"* and got 1st (provisional) and 2nd position at national level.
- Awarded with a laptop by the Government of Punjab under the venture of *"Shabaz Sharif, Youth Initiative Program"* in 2012.

Publication:

- "Designing of smart gene resources and computational approaches for sustainable environment: Opportunities and Future Challenges", *Journal of Soil, Plant and Environment*, 3(2), 86–104, (2024). <u>https://doi.org/10.56946/jspae.v3i2.492</u>
- "Characterization of NaCl Stress in Young Bismarckia Palm (*Bismarckia Nobilis*)", *Journal of Bioresource Management*, 10(3), 4, (2023). <u>https://corescholar.libraries.wright.edu/jbm/vol10/iss3/4</u>
- "Assessment of Halotolerant Bacterial and Fungal Consortium for Augmentation of wheat in Saline Soils", *Frontiers in Microbiology*, 14, 1207784, (2023). <u>https://doi.org/10.3389/fmicb.2023.1207784</u>

- "Efficient Adsorption of Aromatic and Aliphatic Hydrocarbons by Electrospun Hydrophobic PTFE-NiO Composite Nanofiber Filter Mats", *Discover Nano*, 18(65), 01-17, (2023). <u>https://doi.org/10.1186/s11671-023-03834-4</u>
- "Allelopathic potential of crop water extracts of Gossypium hirsutum on germination and growth of wheat (*Triticum aestivm* L.)", *Pakistan Journal of Weed Science Research*, 29(1), 9-18, (2023). <u>https://dx.doi.org/10.17582/journal.PJWSR/2023/29.1.9.18</u>
- "Transporters and transcription factors gene families involved in improving nitrogen use efficiency (NUE) and assimilation in rice (*Oryza sativa* L.)", *Transgenic Research*, 31, 23–42, (2022). https://doi.org/10.1007/s11248-021-00284-5
- "Genetic association of polymorphism and relative mRNA expression of tumor necrosis factor-alpha gene in mastitis in Sahiwal cow", International Journal of Agriculture and Biology, 25(1), 701–708, (2021). <u>https://doi.10.17957/IJAB/15.1719</u>
- "Development and evaluation of synthetic vip3A gene in transgenic cotton for protection against chewing insect pests", International Journal of Agriculture and Biology, 25(1), 211-221, (2021). https://doi.10.17957/IJAB/15.1658
- "Comparison of *in vitro* and *in planta* toxicity of Vip3A for lepidopteran herbivores", *Journal of Economic Entomology*, 113(6), 2959-2971, (2020). <u>https://doi.org/10.1093/jee/toaa211</u>

List of References

1- Dr. Sultan Habibullah Khan,

Professor & Director CAS-AFS,

Centre for Advanced Studies in Agriculture and Food Security (CAS-AFS), University of Agriculture, Faisalabad, Pakistan. Contact: 0092-333-9917733, <u>sultan@uaf.edu.pk</u>

2- Dr. Zaheer Ahmed

Associate Professor & Head of Soybean Lab,

Centre for Advanced Studies in Agriculture and Food Security (CAS-AFS), University of Agriculture, Faisalabad, Pakistan. Contact: +92-300-5127165, <u>zaheerahmed@uaf.edu.pk</u>

3- Dr. Georg Jander

Adjunct Professor & George L. McNew Distinguished Scientist,

Boyce Thompson Institute for Plant Research, Cornell University, New York, United States of America. Contact: +1 (607) 254-1365, gj32@cornell.edu

4- Dr. Zahid Mukhtar

Chief Scientist (CS) & Director General (DG) Agriculture and Biotechnology,

Pakistan Atomic Energy Commission (PAEC), Islamabad, Punjab, Pakistan. National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad, Pakistan. Contact: +92-0300-9665964, <u>zahidmukhtar@yahoo.com</u>

5- Dr. Muhammad Arshad

Principal Scientist,

National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad, Pakistan. Contact: +92-347-7627476, <u>arshadchbt@yahoo.com</u>

6- Dr. Shaheen Aftab (Retired) Deputy Chief Scientist,

National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad, Pakistan. Contact: 0092-300-6647609, <u>aftab6104@gmail.com</u>