



Muhammad Sayyar Khan

Associate Professor

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Summary

Dedicated Life Scientist with a strong background in molecular biology with 19 years of experience in Teaching and Research. Proficient in advanced laboratory equipment use and techniques. Demonstrated publication and organizational skills in leading research teams and skilled in conceptualization, design, and implementation of research projects. Vast expertise in mentoring and supervision of research students. Networked with elite international research groups from top-ranked international institutions.

Education

Heidelberg University

Ph.D. Molecular Biology

Thesis: The role of sulfite reductase in assimilatory sulfate reduction in *Arabidopsis thaliana*

Heidelberg, Germany

The University of Agriculture Peshawar

M.Sc. (Hons) Plant Breeding and Genetics

Thesis: Heterotic studies for various characters in sunflower (*Helianthus annuus* L.)

Peshawar, Pakistan

The University of Agriculture Peshawar

B.Sc. (Hons) Plant Breeding and Genetics

Peshawar, Pakistan

Work History

Associate Professor

Institute of Biotechnology and Genetic Engineering

The University of Agriculture Peshawar, Pakistan

Supported multidisciplinary research teams focused on scholarly publications

Supervised Master and Ph.D. students in their research projects and thesis work

Made contributions to curricular development and innovation in teaching strategies

Taught multiple courses in the areas of cell biology, genetics, recombinant DNA technology, etc.

Peshawar, Pakistan

Sep. 2017 — continue

Postdoctoral fellow

Chinese Academy of Sciences (CAS), Beijing, China

Institute of Genetics and Developmental Biology (IGDB)

Conducted cutting-edge research and used state-of-the-art genomics research facilities at IGDB

to investigate the crosstalk between iron and sulfur networks using mutants impaired

in sulfur metabolism, iron homeostasis, and glutathione biosynthesis

Beijing, China

May 2017 — Aug. 2018

Assistant Professor

Institute of Biotechnology and Genetic Engineering

The University of Agriculture Peshawar, Pakistan

Supervised graduate students in their research projects and thesis work

Taught multiple courses at undergraduate and graduate level.

Peshawar, Pakistan

Jan. 2010 — Sep. 2017

Postdoctoral fellow

Center for Organismal Studies (COS), University of Heidelberg, Germany

Conducted cutting-edge research using state-of-the-art metabolomics facilities at COS, Heidelberg

to investigate selenium species-dependent differences in selenium toxicity and their contribution to

whole plant selenium toxicity

Heidelberg, Germany

Feb. 2009 — Aug. 2009

Lecturer

Department of Plant Breeding and Genetics

The University of Agriculture Peshawar, Pakistan

Taught courses at the undergraduate level and assisted seniors in their teaching assignments.

Peshawar, Pakistan

Jan. 2005 — Jan. 2010

Funded Projects

Production of genetically engineered Oilseed rape for enhanced disease resistance

Funding Agency: Pakistan Science Foundation (PSF)

Funding amount: PKR 1.02 Million.

Role: PI

A transgenic approach to modulate sulfur-enhanced defense in Oilseed rape

Funding Agency: Higher Education Commission of Pakistan (HEC)

Funding amount: Rs. 4.26 Million.

Role: PI

Overproduction of glutathione via sulfur metabolic engineering for enhanced phytoremediation and improved iron nutrition

Funding Agency: PSF

Funding amount: PKR 4.46 Million.

Role: PI

Environmental biosafety assessment on transgenic Oilseed rape lines harboring the synthetic *chitinase gene (NIC)* conferring fungal disease resistance

Funding Agency: The ILSI Research Foundation

Funding amount: 10,000 USD.

Role: Co-PI

Environmental risk assessment studies for the potential production and release of transgenic Oilseed rape lines with enhanced disease resistance

Funding Agency: Directorate of Science and Technology (DOST)

Funding amount: PKR 0.40 Million.

Role: Co-PI

Establishment of efficient and reproducible protocols for callus induction and regeneration of promising *Brassica napus* genotypes

Funding Agency: HEC

Funding amount: PKR 0.48 Million.

Role: Co-PI

Exploring the role of *retinoblastoma gene (rbr-4)* in salinity stress in *Arabidopsis thaliana*

Funding Agency: HEC

Funding amount: PKR 0.50 Million.

Role: Co-PI

Publications

- 1) Fariha, Q., **Khan, M.S.** (2023). Evaluating the performance of genetically engineered *serine acetyltransferase 4 (NtSAT4)* overexpression *Brassica napus* L. lines under xenobiotics exposure. *Sarhad. J. Agric.* 39:765-772. <https://dx.doi.org/10.17582/journal.sja/2023/39.3.765.772>
- 2) Syed, S., **Khan, M.S.**, Jalal, A., Iqbal, Z. (2023). Inoculation of *Serratia sp.* under cadmium stress significantly affected *Brassica juncea* growth attributes and glutathione levels. *Pak. J. Agri. Sci.* 61(1): 75-81.
- 3) **Khan, M.S.**, Soyk, A., Wolf, I., Peter, M., Meyer, A.J., Rausch, T., Wirtz, M., Hell, R. (2022). Discriminative long-distance transport of selenate and selenite triggers glutathione oxidation in specific subcellular compartments of root and shoot cells in *Arabidopsis*. *Front. Plant Sci.* 13: 894479. <https://doi.org/10.3389/fpls.2022.894479>
- 4) **Khan, M.S.**, Lu, Q., Cui, M., Rajab, H., Chai, T., Wu, H-L., Ling, H-Q. (2022). Crosstalk between iron and sulfur homeostasis networks in *Arabidopsis*. *Front. Plant Sci.* 13: 878418. <https://doi.org/10.3389/fpls.2022.878418>
- 5) Khan, A.D., **Khan, M.S.**, Bangash, S.J.A., Naeem, K., Tayyab, M. (2022). Cadmium and arsenic provoke mostly distinct but partly overlapping responses in *Brassica juncea*. *Crop Pasture Sci.*, 73: 160-169. <https://doi.org/10.1071/CP21157>
- 6) Ahmad, D., Zehra, F., Jalal, A., Ali, W., Khan, **M.S.** (2022). Determination of the genetic diversity in populations of halophytic grass *S. ioclados* using PBA markers. *K.J.S.* 49(2): 1-11. <https://doi.org/10.48129/kjs.12893>
- 7) Shah, A.U., Rajab, H., Jalal, A., Ajmal, M., Bangash, S.A.K., Ahmad, D., **Khan, M.S.** (2020). Inoculation of *Brassica napus* L. genotypes with endophytic bacteria promote growth and alleviate cadmium toxicity. *J. Animal Plant Sci.* 30(5): 1187-1193. <https://doi.org/10.36899/JAPS.2020.5.0136>

- 8) Rajab, H., **Khan, M.S.**, Wirtz, M., Malagoli, M., Qahar, F., Hell, R. (2020). Sulfur metabolic engineering enhances cadmium stress tolerance and roots to shoot iron translocation in *Brassica napus* L. *Plant Physiol. Biochem.*, 152: 32-43
<https://doi.org/10.1016/j.plaphy.2020.04.017>
- 9) Rajab, H., **Khan, M.S.**, Malagoli, M., Hell, R., Wirtz, M. (2019). Sulfate-induced stomata closure requires the canonical ABA-signal transduction machinery. *Plants*. 8(1): 21. <https://doi.org/10.3390/plants8010021>
- 10) Ahmed, U., Ahmed, D., Jalal, A., Rajab, H., Alam, S.S., **Khan, M. S.** (2019). Genetic structure of Pakistani tomato accessions based on morphological traits and RAPD markers. *Songklanakarin J. Sci. Technol.*, 41(6): 1348-1355.
- 11) Rajab, H., **Khan, M.S.**, Shah, S.H., Shah, S.M.A. (2019). Genetic transformation of tobacco *serine acetyltransferase 4* (*NtSAT4*) gene in *Brassica napus* L. for enhanced stress tolerance. *Sarhad. J. Agric.* 35(4): 1224-1233.
<http://dx.doi.org/10.17582/journal.sja/2019/35.4.1224.1233>
- 12) BiBi, Z., Khan, N.U., Khan, Q.U., Khan, M.J., Khan, I. U., Khan, M.J., **Khan, M.S.**, Shah, S.H. (2018). Response of upland cotton genotypes to salinity at early growth stages. *Environ. Engg. Manag. J.* Bibi_14 17 (8): 1977-1988.
<http://eemj.eu/index.php/EEMJ/article/view/3661>
- 13) Durrani N.J., Ahmad, D., Jalal, A., Rajab, H., **Khan M. S.** (2017). The effect of explant sources and growth regulators on callus induction and regeneration in tomato cultivars. *J. Animal Plant Sci.* 27 (2): 481-89.
- 14) Shah, M.K., Saddique, U., Ahmad, S., Iqbal, A., Ali, A, Shahzad, W., Khan, **M.S.**, Khan, H., Ur-Rahman, H., Ali, S.S.S., Israr, A. (2017). Molecular Characterization of Local Isolates of *Mycoplasma capricolum* Sub Specie Capripneumoniae in Goats (*Capra hircus*) of Khyber Pakhtunkhwa, Pakistan. *Pak. Vet. J.* 37(1): 90-94.
- 15) Ahmad, K., Jalal, A., Rajab, H., Ullah, M., **Khan, M.S.** (2016). Screening of promising *Brassica napus* L. genotypes for callus induction and regeneration. *Int. J. Biol. Biotech.*, 13 (2): 203-215.
- 16) Ahmad, B., Ambreen., **Khan, M.S.**, Haider, A., Khan, I. (2015). Agrobacterium mediated transformation of *Brassica juncea* (L.) Czern. with *chitinase* gene conferring resistance against fungal infections. *Pak. J. Bot.*, 47 (1): 211-216.
- 17) Ilyas, M., Khan **M. S.**, **Khan**, M.R., Ahmad, K., Muhammad, A. (2015). Response of different mutants of *Arabidopsis thaliana* under arsenic stress. *J. Agric. Res.*, 53(3): 375-388.
- 18) Muhammad, A., Khalil, S.A., Zaman, A., Habibullah, **Khan, M. S.** (2014). Growth analysis of Soybean landraces under extended planting dates. *Sarhad J. Agric.* 30(3): 297-304.
- 19) Wazir, R., Muhammad, A, Subhan, M., Khan, I, Ali, M., **Khan, M.S.** (2014). Morpho-anatomical features of weed flora of rainfed maize field in Mir Ali, North Waziristan agency, Pakistan. *Pak. J. Weed Sci. Res.*, 20 (3): 385-403.
- 20) Bangash, S.A., **Khan, M.S.**, Ambreen., Khattak, S.H., Siddique, A.S. (2013). Genetic transformation of *Brassica juncea* with antimicrobial *Wasabi definsin* gene. *Pak. J. Bot.*, 45(3): 993-998.
- 21) Khan, I., **Khan, M.S.**, Khan, M.I., Rajab, H., Shah, S.H., and Jalal, A. (2013). Genetic transformation of *Brassica napus* with the antifungal *chitinase* gene. *Int. J. Agric. Biol.*, 15(5): 933-938.
- 22) Zamir, R., Khalil, S.A., Shah, S.T., **Khan, M.S.**, Ahmad, K., Shahenshah (2012). Efficient *in vitro* regeneration of sugarcane (*Saccharum officinarum* L.) from bud explants. *Biotechnol. Biotech. Eq.*, 26: 3094-3099.
<https://doi.org/10.5504/BBEQ.2012.0049>
- 23) Hsu, Fu-Chen., Wirtz, M., Heppel, S.C., Bogs, J., Krämer, U., **Khan, M.S.**, Bub, A., Hell, R., Rausch, T. (2011). Generation of Se-fortified broccoli as functional food: Impact of Se-fertilization on S-metabolism. *Plant, Cell and Environ.*, 34: 192-207.
<https://doi.org/10.1111/j.1365-3040.2010.02235.x>
- 24) **Khan, M.S.**, Haas, F.H., Allboje Samami, A., Moghaddas Gholami, A., Bauer, A., Fellenberg, K., Reichelt, M., Hansch, R., Mendel, R.R., Meyer, A.J., Wirtz, M., Hell, R. (2010). Sulfite Reductase Defines a Newly Discovered Bottleneck for Assimilatory Sulfate Reduction and Is Essential for Growth and Development in *Arabidopsis thaliana*. *Plant Cell*, 22: 1216-1231. <https://doi.org/10.1105/tpc.110.074088>
- 25) Jalal, A., Rahman, H., **Khan, M.S.**, Maqbool, K., and Khan, S. (2006). Inbreeding depression for reproductive and yield related traits in S1 lines of maize (*Zea mays* L.). *Songklanakarin. J. Sci. Technol.*, 28: 1169-1173.
- 26) Iqbal, A., Khalil, I.H., Ateeq, N., and **Khan, M.S.** (2006). Nutritional quality of improved food legumes. *F. Chem.*, 97: 331-335. <https://doi.org/10.1016/j.foodchem.2005.05.011>
- 27) Ahmad, S., **Khan, M.S.**, Swati, M.S., Khattak, G.S.S., and Khalil, I.H. (2005). A study on heterosis and inbreeding depression in sunflower (*Helianthus annuus* L.). *Songklanakarin. J. Sci. Technol.*, 27: 1-8
- 28) **Khan, M.S.**, Khalil, I.H., and Swati, M.S. (2004). Heterosis for yield components in sunflower (*Helianthus annuus* L.). *Asian J. Plant Sci.*, 3: 207-210.
- 29) Khattak, G.S.S., Ashraf, M., and **Khan, M.S.** (2004). Assessment of genetic variation for yield and yield components in mungbean (*Vigna radiata* L. Wilczek) using generation mean analysis. *Pak. J. Bot.*, 36: 583-588.
- 30) **Khan, M.S.**, Swati, M.S., Khalil, I.H., and Iqbal, A. (2003). Heterotic studies for various characters in sunflower (*Helianthus annuus* L.). *Asian J. Plant Sci.*, 2: 1010-1014.

Book Chapters

- 1) **Khan, M.S.**, and Hell, R. (2008). A future crop biotechnology view of sulfur and selenium. *In: Sulfur a missing link between soils, crops, and nutrition*, (ed) Joseph, Jez., Agronomy Monograph No. 50. CSA Publ., Madison, USA, 50: 293-311
- 2) Hell, R; **Khan, M.S.**, and M. Wirtz. (2010). Cellular Biology of sulfur and its functions in plants. *In: cell biology of metals and nutrients* (ed) R. Hell and R. R. Mendel. Plant Cell Monographs 17. Springer-Verlag Berlin Heidelberg, Germany, 17: 243-280
- 3) **Khan, M.S.**, and Hell, R. (2014). Applied Cell Biology of Sulphur and Selenium in Plants. *In: Applied Plant Cell Biology*, (ed.), P. Nick and Z. Opatmy. Plant Cell Monographs 22, Springer-Verlag-Berlin Heidelberg, Germany, 22: 247-272

Honor & Awards

Competitive Ph.D. fellowship awards for Ph.D. studies at the University of Heidelberg, Germany (Awarded by HEC)

Competitive postdoc fellowship awards for studies at CAS, Beijing, China (Awarded by the Chinese Academy of Sciences)

Research Productivity Award 2014-15 (Awarded by Pakistan Council for Science and Technology)

Research Ambassador 2014 (Awarded by Heidelberg Alumni International Research -Alumni- Network)