

Curriculum Vitae

Dr. Muhammad Sajjad, Ph.D.
Tenured Associate Professor

Visiting Scientist (CAS-PIFI Fellow)
CIB, Chengdu, (2023-24)

Department of Biosciences,
COMSATS University Islamabad,
Park Road, Islamabad

Post doctorate (CAS-PIFI)
IGDB, Beijing (2015-2017)



PERSONAL DETAILS

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RESEARCH INTERESTS

Plant genetics, genomics, and genome editing.

My research focuses on bridging the gap between the genome, transcriptome, and phenome in crop plants. I employ cutting-edge AI, genetics, genomics, and transcriptomics tools to understand these interconnected aspects and utilize the CRISPR Cas9 system for genome editing in plants.

BIOGRAPHY

Dr. Muhammad Sajjad holds the position of '**Tenured Associate Professor**' in the Department of Bioscience at COMSATS University Islamabad, Pakistan.

He earned his PhD from the University of Agriculture, Faisalabad, with an international fellowship at ARS-USDA, California. Following that, he pursued a postdoctoral fellowship at IGDB, CAS, Beijing (2015-2017), and also completed his CAS-PIFI fellowship at CIB, CAS in 2024.

*Dr. Sajjad is renowned for his discoveries of novel yield and quality-related genes in bread wheat, along with the development of KASP markers for high throughput **marker-assisted selection (MAS) in wheat**. He has also devised a protocol for the discovery and **haplotyping of multiple genes** within a vast collection of accessions in bread wheat, which has been filed for a patent in Beijing.*

*He has introduced a simplified method for preserving wheat **pollen grains**, tiller angle and **smartphone image based phenotyping** in wheat .*

*Recently he developed **high amylose wheat** in Pakistani wheat background through the integration of KASP genotyping and speed breeding.*

*Dr. Sajjad's contributions to the field are reflected in his extensive publication record, with over **60 research articles in SCI journals**. Furthermore, he serves as an editor for *Frontiers in Genetics*, *Frontiers in Plant Science* and *Gene*.*

*Currently, Dr. Sajjad is leading **four projects** in the realm of cereal genetics and genomics, one as a Principal Investigator (**PI**) and the others as a Co-Principal Investigator (**Co-PI**).*

*He also mentors a team of 6 MS students and 4 **PhD students**. To complement his research, Dr. Sajjad has contributed significantly to education, having taught a diverse range of **14 undergraduate and graduate courses**, consistently achieving an average teaching score of **>90%**.*

ACADEMIC RECORD

- Ph.D, Plant Breeding and Genetics** (1st Division)
 Aug. 2007-Feb. 2013
 University of Agriculture Faisalabad/ ARS-USDA Albany, California
 Thesis title: Association mapping of yield traits in wheat (*Triticum aestivum* L.)
- M.Sc (Hons), Plant Breeding and Genetics** (1st Division)
 Sep. 2005- Aug. 2007
 University of Agriculture, Faisalabad, Pakistan
 Thesis title: Genetic Diversity and Phylogenetic Relationships among Existing Sugarcane Cultivars in Pakistan.
 Marks: 77.55%, CGPA: 3.58/4
- B.Sc (Honours), Plant Breeding and Genetics** (1st Division)
 Dec. 2001- Aug. 2005
 Internship Research Title: DNA/Protein Profiling of Wheat Cultivars
 University of Agriculture, Faisalabad, Pakistan
 Marks: 82.32%, CGPA: 3.92/4

JOB RECORD

- Tenured Associate Professor**
July 2021 to present
 Department of Biosciences
 COMSATS University Islamabad, Islamabad Campus.
- Assistant Professor**
May 2019 to July 2021
 Department of Biosciences
 COMSATS University Islamabad, Islamabad Campus.
- Assistant Professor**
August 2014 to May 2019
 Department of Environmental Sciences
 COMSATS University Islamabad, Vehari Campus.
- Assistant Professor**
June 2013 to June 2014
 Department of Plant Breeding and Genetics
 PMAS, Arid Agriculture University, Rawalpindi

PATENT

Liu Dongcheng, Zhang Aimin, Ma Xiaoling, Yu Kang, **Muhammad Sajjad**, Yu Kang, Yang Wenlong. A Novel Method for Gene/Allelic Variation in Polyploid Plant Species Using Third Generation Sequencing Platform (PacBio RS II). Chinese Patent, 201710214678. 3, Filed on 1st April 2017.

PUBLICATIONS**Journal Articles**

- 67Akila Wijerathna-Yapa, Ruchi Bishnoi, Buddhini Ranawaka, Manu Maya Magar, Hafeez Ur Rehman, Swati G. Bharad, Michal T. Lorenc, Vinita Ramtekey, Sasha Gohar, Charu Lata, Md. Harun-Or-Rashid, Maryam Razzaq, Muhammad **Sajjad**, Bhoja R. Basnet, 2024. Rice–wheat comparative genomics: Gains and gaps, *The Crop Journal*. <https://doi.org/10.1016/j.cj.2023.10.008>
- 66Rauf A, Sher MA, Farooq U, Rasheed A, **Sajjad M**, Jing R, Khan Z, Attia KA, Mohammed AA, Fiaz S, Chen J, Rehman SU. An SNP based genotyping assay for genes associated with drought tolerance in bread wheat. *Mol Biol Rep*. 2024 Apr 18;51(1):527. doi: 10.1007/s11033-024-09481-x. PMID: 38637351
- 65Zulfiqar, S., Ishfaq, S., Bukhari, S. A. R., **Sajjad, M.**, Akhtar, M., Liu, D., & Rahman, M. (2024). New genetic resources for aphid resistance were identified from a newly developed wheat mutant library. *Heliyon*, 10(5), e26529. <https://doi.org/10.1016/j.heliyon.2024.e26529>
- 64Khan, I.; Naeem, M.K.; Shahzad, A.; Zhang, Z.; Chen, J.; **Sajjad***, M. Optimizing Wheat Pollen Preservation for Enhanced Viability and In Vitro Germination. *Agronomy* 2024, 14, 201. <https://doi.org/10.3390/agronomy14010201>
- 63A. Rasheed, S. Maqbool, S. Naseer, N. Zahra, F. Rasool, H. Qayyum, K. Majeed, M. Jahanzeb, M. Naeem, M. Khan, H. Zhang, H.i Li, **M. SAJJAD**, and Muhammad Fayyaz. 2023. RNAseq of diverse spring wheat cultivars released during last 110 years. *Scientific Data*. 10, 884 (2023). <https://doi.org/10.1038/s41597-023-02769-w>

- 62Zafer MZ, Tahir MHN, Khan Z, **Sajjad M**, Gao X, Bakhtavar MA, Waheed U, Siddique M, Geng Z, Ur Rehman S. Genome-Wide Characterization and Sequence Polymorphism Analyses of Glycine max Fibrillin (FBN) Revealed Its Role in Response to Drought Condition. *Genes*. 2023; 14(6):1188. <https://doi.org/10.3390/genes14061188>
- 61Farooq, A., Khan, U.M., Khan, M.A. Ali Z, Maqbool R, **Sajjad* M**. Male sterility systems and their applications in hybrid wheat breeding. *CER RES. COMMUN*. (2023). <https://doi.org/10.1007/s42976-023-00376-4>
- 60Mehvish, A.; Aziz, A.; Bukhari, B.; Qayyum, H.; Mahmood, Z.; Baber, M.; Sajjad, M.; Pang, X.; Wang, F. Identification of Single-Nucleotide Polymorphisms (SNPs) Associated with Heat Tolerance at the Reproductive Stage in Synthetic Hexaploid Wheats Using GWAS. *Plants* 2023, 12, 1610. <https://doi.org/10.3390/plants12081610>
- 59Khan I, Wu J and Sajjad M (2022) Pollen viability-based heat susceptibility index (HSI_{pv}): A useful selection criterion for heat-tolerant genotypes in wheat. *Front. Plant Sci.* 13:1064569. <https://doi:10.3389/fpls.2022.1064569>
- 58Gohar S, **Sajjad M**, Zulfiqar S, Liu J, Wu J and Rahman M-u (2022), Domestication of newly evolved hexaploid wheat—A journey of wild grass to cultivated wheat. *Front. Genet.* 13:1022931. <https://doi:10.3389/fgene.2022.1022931>
- 57Nisar T, Tahir MHN, Iqbal S, **Sajjad M**, Nadeem MA, Qanmber G, Baig A, Khan Z, Zhao Z, Geng Z and Ur Rehman S (2022) Genome-wide characterization and sequence polymorphism analyses of cysteine-rich poly comb-like protein in Glycine max. *Front. Plant Sci.* 13:996265. <https://doi:10.3389/fpls.2022.996265>
- 56Ashfaq, M., Rasheed, A., **Sajjad, M.** et al. Genome wide association mapping of yield and various desirable agronomic traits in Rice. *Mol Biol Rep* (2022). <https://doi.org/10.1007/s11033-022-07687-5>
- 55Ahmad I, Rana RM, Hassan MU, Khan MA, **Sajjad M**. Association mapping for abiotic stress tolerance using heat- and drought-related syntenic markers in okra. *Mol Biol Rep.* 2022 Aug 12. <https://doi: 10.1007/s11033-022-07827-x>
- 54Taj M, **Sajjad* M**, Li M, Yasmeen A, Mubarak MS, Kaniganti S and He C (2022) Potential Targets for CRISPR/Cas Knockdowns to Enhance Genetic Resistance Against Some Diseases in Wheat (*Triticum aestivum* L.). *Front. Genet.* 13: 926955. <https://doi://10.3389/fgene.2022.926955>
- 53Khan, S.H., **Sajjad*, M.**, Gulnaz, S. et al. Genetic dissection of grain yield traits in a large collection of spring wheat (*Triticum aestivum* L.) germplasm. *J. Crop Sci. Biotechnol.* 25, 215–223 (2022). <https://doi.org/10.1007/s12892-021-00124-2>
- 52Tabussam N, Rana RM, Shah MKN, Ahmad MS, **Sajjad M**, Lu Y (2022) Nutraceutical profiling of elite onion germplasm and breeding hybrids with improved nutraceutical quality. *PLoS ONE* 17(1): e0262705. <https://doi.org/10.1371/journal.pone.0262705>
- 51Zaheer M, Rehman S, Khan SH, Shahid S, Rasheed A, Naz R, **Sajjad* M.** (2021). Characterization of new COBRA like (COBL) genes in wheat (*Triticum aestivum*) and their expression analysis under drought stress. *Mol Biol Rep.* Feb;49(2):1379-1387. <https://doi.org/10.1007/s11033-021-06971-0>
- 50Rehman S, Ali Sher M, Saddique MAB, Ali Z, Khan MA, Mao X, Irshad A, **Sajjad M**, Ikram RM, Naeem M and Jing R (2021). Development and Exploitation of KASP Assays for Genes Underpinning Drought Tolerance Among Wheat Cultivars From Pakistan. *Front. Genet.* 12:684702. <https://doi.org/10.3389/fgene.2021.684702>
- 49Hu X, Yang M, Gong S, Li H, Zhang J, **Sajjad M**, Ma X, Yuan D. (2021) Ethyleneregulated immature fruit abscission is associated with higher expression of CoACO genes in *Camellia oleifera*. *R. Soc. Open Sci.* 8: 202340. <https://doi.org/10.1098/rsos.202340>
- 48Bakhat, H.F., Arshad, S., Natasha, Abbas, S., Shah, G.M., Fahad, S., Hammad H. M., **Sajjad, M.**, Ashfaq, M., Shahid, M. 2022. Genotypic Differences Among the Rice Genotypes to Arsenic Stress Cultivated Under Two Water Regimes: With an Inference to Human Health. *J Plant Growth Regul* 41, 558–568. <https://doi.org/10.1007/s00344-021-10321-6>
- 47Mubarik, M.S., Khan, S.H., **Sajjad, M.**, Raza, A., Hafeez, M.B., Yasmeen, T., Rizwan, M., Ali, S. and Arif, M.S. (2021), A manipulative interplay between positive and negative regulators of phytohormones: A way forward for improving drought tolerance in plants. *Physiol Plant.* 2021 Jun;172(2):1269-1290. <https://doi.org/10.1111/pp1.13325>
- 46Rashid, U., Yasmin, H., Hassan, M.N., Naz, R., Nosheen, A., **Sajjad, M.**, Ilyas, N., Keyani, R., Jabeen, Z., Mumtaz S., Alyemini M. N., Ahmad P. (2021). Drought-tolerant *Bacillus megaterium* isolated from semi-arid conditions induces systemic tolerance of wheat under drought conditions. *Plant Cell Rep.* <https://doi.org/10.1007/s00299-020-02640-x>
- 45Arain S, M. Meer, **M. Sajjad**, H Yasmin. 2021. Light contributes to salt resistance through GAI protein regulation in *Arabidopsis thaliana*. *Plant Physiology and Biochemistry* 159 (2021) 1–11. <https://doi.org/10.1016/j.plaphy.2020.12.004>
- 44Yasmin H, Rashid U, Hassan MN, Nosheen A, Naz R, Ilyas N, **Sajjad M**, Azmat A, Alyemini MNI. 2021. Volatile organic compounds produced by *Pseudomonas pseudoalcaligenes* alleviated drought stress by modulating defense system in maize (*Zea mays* L.). *Physiologia Plantarum.* 2021;1–16. <https://doi.org/10.1111/ppl.13304>
- 43Yang, M., Hu, X., Ouyang, X., **Sajjad, M.**, Ma, X., Yuan D (2021). Molecular cloning and characterization of three CoIDA genes in *Camellia oleifera*. *Braz. J. Bot* 44, 391–400 (2021). <https://doi.org/10.1007/s40415-020-00691-8>
- 42Rasheed A, M. Ashfaq, **M. Sajjad**. 2021. Combining ability and heterosis analysis for grain yield traits in fine long grain rice (*Oryza sativa* L.). *J. Animal Plant Sci.* 31(3): 764-772. <https://doi.org/10.36899/JAPS.2021.3.0266>

- 41Mubarik MS, Khan SH, Ahmad A, Raza A, Khan Z, **Sajjad M**, Sammour RHA, Mustafa AE-ZMA, Al-Ghamdi AA, Alajmi AH, Alshamasi FKI, Elshikh MS. Controlling Geminiviruses before Transmission: Prospects. *Plants*. 2020; 9(11):1556. <https://doi.org/10.3390/plants9111556>
- 40Shoaib, M., Yang, W., Shan, Q. Sun L, Wang D, **Sajjad M**, Li X, Sun J, **Liu D**, Zhan K, Zhang A. 2020. *TaCKX* gene family, at large, is associated with thousand-grain weight and plant height in common wheat. *Theor Appl Genet* (2020). 133, 3151–3163 <https://doi.org/10.1007/s00122-020-03661-6>
- 39Yasmin, H.; Naz, R.; Nosheen, A.; Hassan, M.N.; Ilyas, N.; **Sajjad, M.**; Anjum, S.; Gao, X.; Geng, Z. Identification of New Biocontrol Agent against Charcoal Rot Disease Caused by *Macrophomina phaseolina* in Soybean (*Glycine max* L.). *Sustainability* 2020, 12, 6856. <https://doi.org/10.3390/su12176856>
- 38Tahir, A., M.K. Ilyas., M.M. Sardar, A.K. Pouya, F. Rasouli, A. Bibi, Z. Jabeen, **M. Sajjad**, S. U. Siddiqui, A. Ghafoor, 2020. Selection criteria for yield potential in a large collection of *Vigna radiata* (L.) accessions. *Euphytica*, 216, 138. <https://doi.org/10.1007/s10681-020-02675-x>
- 37Sarfraz, M., Hussain, K., Nawaz, K., Yasin, G., Geng, Z., **Sajjad, M.** and Parveen, S. (2020). Determination of Effective Method of NPK Fertilization in Pea (*Pisum sativum* L.) Cultivars Grown in Pakistan. *Legume Research*. 44: 431-438. DOI: 10.18805/LR-570
- 36Ahmed, H. G. M.D, Kashif M., **Sajjad M**, Zeng Y.W. 2020. Genetic dissection of protein and gluten contents in wheat (*Triticum aestivum* L.) under normal and drought conditions. *App. Ecol. Environ. Res.* 18(4):5645-5659. http://dx.doi.org/10.15666/aecr/1804_56455659
- 35Azmat A, Yasmin H, Hassan MN, Nosheen A, Naz R, **Sajjad M**, Ilyas N, Akhtar MN. 2020. Co-application of bio-fertilizer and salicylic acid improves growth, photosynthetic pigments and stress tolerance in wheat under drought stress. *PeerJ* 8:e9960 DOI 10.7717/peerj.996
- 34Ahmed, H.G. M; **Sajjad, M.**; Zeng, Y.; Iqbal, M.; Khan, S.H.; Ullah, A.; Akhtar, M.N. Genome-Wide Association Mapping through 90K SNP Array for Quality and Yield Attributes in Bread Wheat against Water-Deficit Conditions. *Agriculture*, 2020, 10, 392. <https://doi.org/10.3390/agriculture10090392>
- 33Muhammad S, **M. Sajjad***, S.H. Khan et al. 2020. Genome wide association analysis for stripe rust resistance in spring wheat (*Triticum aestivum* L.) germplasm. *J. Integ. Agric.* 19(8): 2035-2043 [https://doi:10.1016/S2095-3119\(19\)62841-8](https://doi:10.1016/S2095-3119(19)62841-8)
- 32Tayyab N, Naz R, Yasmin H, Nosheen A, Keyani R, **Sajjad M**, et al. (2020) Combined seed and foliar pre-treatments with exogenous methyl jasmonate and salicylic acid mitigate drought induced stress in maize. *PLoS ONE* 15(5): e0232269. <https://doi.org/10.1371/journal.pone.0232269>
- 31Ma X, X. Li, J. Wang, **M. Sajjad**, H. Xue, W. Yang, D. Liu, J. Sun, A. Zhang. 2020. Transformation of Pinb-D1x to soft wheat produces hard wheat kernel texture. *J. Cereal Sci.* 91: 1-7. <https://doi.org/10.1016/j.jcs.2019.102889>
- 30Ahmed HGMD, M Kashif, MAR Rashid, **M Sajjad**, Y Zeng (2020). Genome wide diversity in bread wheat evaluated by SSR markers. *Intl J Agric Biol* 24:263–272
- 29Ashfaq M., M.A.Anjum,M.S.Haider, M. Ali, U. Mubashar, U. Bashir1 H.M.U Aslam, **M. Sajjad**. 2020. Association of cladosporium cladosporioides brown leaf spot of lady palm in Pakistan. *J. Animal Plant Sci.* 30(2): 371-376. <https://doi.org/10.36899/JAPS.2020.2.0060>
- 28Nadeem, M., Tariq, M. N., Amjad, M., **Sajjad M.**, Akram, M., Imran, M. Kulikov, D. (2020). Salinity induced changes in the nutritional quality of bread wheat (*Triticum aestivum* L.) genotypes. *AGRIVITA J. Agric. Sci.* 42(1), 1–12. <https://doi.org/10.17503/agrivita.v42i1.2273>
- 27Ahmed HGMD, **M Sajjad**, M Li, MA Azmad, M Rizwan, RH, Maqsood, SH Khan, 2019. Selection Criteria for Drought-Tolerant Bread Wheat Genotypes at Seedling Stage. *Sustainability*. 11(9), 2584; <https://doi.org/10.3390/su11092584>
- 26Gad M A, Li X, Alam MA, **Sajjad M***, Li M, 2019. Geographical distribution and virulence phenotypes of *Puccinia striiformis* f. sp. *tritici* from wheat in Yunnan, China. *Sci. Asia*. 45: 572-580.
- 25Shoaib M, W Yang, Q. Shan, **M. Sajjad**, A. Zhang, 2019. Genome wide identification and expression analysis of new cytokinin metabolic genes in bread wheat (*Triticum aestivum* L.). *PeerJ* 7: e6300
- 24Ashfaq M., W. Ahmad, MS Haider, M. Ali, **M. Sajjad**, F. Khan, S. Shaheen, M.A. Anjum, U. Mubasher. 2019. Molecular and agronomic characterization of selected rice germplasm under normal and water stress conditions. *Pak. J. Agric. Sci.* 56: 29-36.
- 23Gulnaz, S., M. Zulkiffal, **M. Sajjad***, J. Ahmed, M. Musa, M. Abdullah, A. Ahsan, and A.U. Rehman, 2019. Identifying Pakistani wheat landraces as genetic resources for yield potential, heat tolerance and rust resistance. *Intl. J. Agric. Biol.* 21: 520–526

- 22Shahzad M., S.H. Khan, **M.Sajjad***, A. Rehman, M. Nadeem, A.S. Khan, 2019. Allelic composition at Glu genes in a collection of spring wheat germplasm. *Bang. J. Botany*, 48(1): 25-31.
- 21Wattoo, J., S. Liaqat, H. Mubeen, M. Ashfaq, M.N. Shahid, A. Farooq, **M. Sajjad** and M. Arif, 2019. Genetic mapping of grain nutritional profile in rice using basmati derived segregating population revealed by SSRs. *Intl. J. Agric. Biol.*, 21: 929–935
- 20**Sajjad, M***, S. H. Khan and M Shahzad, 2018. Patterns of allelic diversity in spring wheat populations as revealed by SSRs. *Cytology & Genetics*. 52(2): 155-160.
- 19Shah GM, Nasir M, Imran M, Bakhath HF, Rabbani F, **Sajjad M**, Umer Farooq AB, Ahmad S, Song L. 2018. Biosorption potential of natural, pyrolysed and acid-assisted pyrolysed sugarcane bagasse for the removal of lead from contaminated water. *PeerJ*6:e5672
- 18Tariq, M., MKN Shah, MU Hassan, **M.Sajjad**, M. Jamil, M. Ali, A.M. Kazi, 2018. Prevalence of higher glutenin variation in synthetic wheat germplasm. *J. Animal Plant Sci.*, 28(2): 568-575.
- 17Muhammad, S., A. Ahmad, A.I. Khan, F.S. Awan, M. Qasim, A. Rehman, A. Rehman, M.A. Javed, I. Manzoor and **M. Sajjad**, 2018. Genome wide association analysis for leaf rust resistance in spring wheat (*Triticum aestivum* L.) germplasm. *Int. J. Agric. Biol.*, 20: 2384–2397
- 16**Sajjad M**, X. Ma, W. Yang, Ji. Sun D. Liu and A. Zhang, 2017. TaFlo2-A1, an ortholog of rice Flo2, is associated with thousand grain weight in bread wheat (*Triticum aestivum* L.). *BMC Plant Biology*. 17:164, 1-11. <https://doi.org/10.1186/s12870-017-1114-3>
- 15Ma X., **M. Sajjad**, J. Wang, W. Yang, J. Sun, A. Zhang, D. Liu, 2017. Diversity, distribution of Puroindoline genes and their effect on kernel hardness in a diverse panel of Chinese wheat germplasm. *BMC Plant Biology*. 17:158, 1-12. <https://doi.org/10.1186/s12870-017-1101-8>
- 14Ashfaq M., U. Mubashar, M. S. Haider, M. Ali, A. Ali and M. Sajjad. 2017. Grain discoloration: an emerging threat to rice crop in Pakistan. *J. Animal Plant Sci*. 27(3): 696-707
- 13Ashfaq M., M. A. Anjum, R. Hafeez, A. Ali, M. S. Haider, M. Ali, M. B. Chattha, S. R. Ahmad, F. Ahmad, M. Sajjad. First Report of Fusarium equiseti Causing Brown Leaf Spot of Fishtail Palm (Caryotamitis) in Pakistan. *Plant Disease* 101(5): 840. The American Phytopathological Society. USA
- 12Shehzad M., S.H. Khan, A.S. Khan, **M. Sajjad**, A. Rehman, A.I. Khan, 2016. Identification of QTLs on chromosome 1b for grain quality traits in bread wheat (*Triticum aestivum* L.). *Cytology & Genetics*. 50(2): 13-20.
- 11Mubarik S, Sultan H. Khan, A Ahmad, Z Khan, **M Sajjad**, IA. Khan. 2016. Disruption of Phytoene Desaturase Gene using Transient Expression of Cas9: gRNA Complex. *Int. J. Agric. Biol*. 18(5): 990-996.
- 10Nadeem M., F. M. Anjum, M. R. Khan, **M.Sajjad**, S. Hussain & M. S. Arshad. 2016. Electrophoretic Characteristics of Gluten Proteins as Influenced by Crop Year and Variety. *Int. J. Food Prop*. 19(4): 897-910. <https://doi.org/10.1080/10942912.2015.1045518>
- 9 Ahmad MQ, S. H. Khan, **M. Sajjad** and I. A. Khan. 2015. Analysis of drought responsive traits in hexaploid wheat (*Triticum aestivum* L.). *Pak. J. Agri. Sci.*, Vol. 52(3), 701-707.
- 8 **Sajjad, M.**, S. H. Khan, M. Q. Ahmad, A. Rasheed. A. Mujeeb-Kazi, I. A. Khan 2014. Association mapping identified QTLS on wheat chromosome 3A for yield related traits. *Cer. Res. Commun*. 42(2): 177-188.
- 7 Rehman, A, **M. Sajjad**, S. H. Khan, R. J. Peña, N. I. Khan, 2014. Lower tendency of allelic variation of *Glu* genes and absence of 1BL-1RS translocation in modern Pakistani wheats. *Cer. Res. Comm*. 42(1): 139-150.
- 6 Ahmad M. F., S. M Shehzad. K. Hussain, S. H. Khan, and **M. Sajjad**. 2014. Influence of *fusarium moniliforme* inoculation on heterosis and heterobeltiosis for agronomic traits in maize (*Zea mays* L.). *Int. J. Agric. Biol*. 16: 1041-1049.
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- 3 Al-Maskari, A. Y., **M. Sajjad** and S. H. Khan. 2012. Association mapping: A step forward to discovering new alleles for crop improvement. *Int. J. Agric. Biol*. 14: 153-160.
- 2 **Sajjad, M.**, S.H. Khan and A.S. Khan, 2011. Exploitation of germplasm for grain yield improvement in spring wheat (*Triticum aestivum*). *Int. J. Agric. Biol.*, 13: 695-700.

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Book Chapters

- 7 Baloch, F.S. et al. (2022). Origin, Taxonomy, and Distribution of Ancient Wheats in Turkey. In: Zencirci, N., Ulukan, H., Baloch, F.S., Mansoor, S., Rasheed, A. (eds) Ancient Wheats. Springer, Cham. https://doi.org/10.1007/978-3-031-07285-7_3
- 6 Muhammad Umar Iqbal, Sultan Habibullah Khan, Muhammad Salman Mubarik, Aftab Ahmad, Muhammad Sajjad, Hafiz Muhammad Imran (2022). Cotton Genetics and Genomics. In: Khan, Z., Ali, Z., & Khan, A.A. (Eds.). (2022). Cotton Breeding and Biotechnology: Challenges and Opportunities (1st ed.). CRC Press. <https://doi.org/10.1201/9781003096856>
- 5 Mubarik M.S., Khan S.H., **Sajjad M.** (2021) Key Applications of CRISPR/Cas for Yield and Nutritional Improvement. In: Ahmad A., Khan S.H., Khan Z. (eds) CRISPR Crops. Springer, Singapore. https://doi.org/10.1007/978-981-15-7142-8_7
- 4 Khan S.H., Ghouri MZ, Aslam S, Mubarik MS, Khan Z, Ahmad MQ, **Sajjad M** (2021) Applications of CRISPR/Cas Beyond Simple Traits in Crops. In: Ahmad A., Khan S.H., Khan Z. (eds) CRISPR Crops. Springer, Singapore. https://doi.org/10.1007/978-981-15-7142-8_8
- 3 Akram R. et al. (2022) Research on Climate Change Issues. In: Jatoi W.N., Mubeen M., Ahmad A., Cheema M.A., Lin Z., Hashmi M.Z. (eds) Building Climate Resilience in Agriculture. Springer, Cham. https://doi.org/10.1007/978-3-030-79408-8_17
- 2 Arain Saima Mir, Meer Maria, **Sajjad Muhammad** and Sial Mahboob Ali (October 26th, 2020). Potential of Mutation Breeding to Sustain Food Security [Online First], IntechOpen, <http://doi.org/10.5772/intechopen.94087>
- 1 Husnu Aktas, Awais Rasheed, **Muhammad Sajjad**, Faheem Shehzad Baloch (2020) Taxonomy, Evolution, Distribution and Origin. In. Nusret Zencirci, Hakan Ulukan, Calvin O Qualset, Mark Nesbitt (eds) Hulled Wheat. Springer International Publishing AG; 1st ed. 2018 edition. ISBN-13: 978-3319998039

PROJECTS

S.No	Project Title	Duration	Amount (million PKR)	Funding Agency	Present Status/Role
12.	CRISPR/Cas9-mediated knockout of TaNP1 genes to develop complete male sterile wheat lines in Pakistan	2024-2027	4	Pak. Sci. Foundation	Approved/ PI
11.	Low-cost domestic production of Taq Polymerase enzyme for research and diagnostics	2024	1	Higher Education Commission (HEC)	Ongoing/Collaborator
10.	Green Technology Integration and Mode Construction of Highland Barley in Tibet	2023-2026	40	Sichuan Province Regional Innovation Cooperation	Ongoing/CoPI
9.	Cultivation of Major New Varieties of Green and High efficiency Wheat	2023-2026	20	Sichuan Province Regional Innovation Cooperation	Ongoing/CoPI
8.	Adapting to Climate Change through Climate Smart Agricultural Practices in Water-limited Landscapes in South Asia	2023-2025	25	Asia Pacific Network (APN)	Ongoing/Collaborator
7.	Application of genomic assays for the development of improved wheat genotypes—varieties with improved amylose content	2023-2024	4	Pak Sci Found-Nation Sci Found China (PSF-NSFC)	Ongoing/CoPI
6.	Identification and development of functional molecular markers related to resistance against viral diseases in chili	2021-2024	5	Pak. Sci. Foundation	Ongoing/CoPI
5.	Genome editing in wheat for improving yield, biotic and abiotic stress tolerance	2021-2024	10	PCST	Ongoing/Collaborator

4	Rapid development of high yielding drought tolerant lines of wheat through introgression of stable QTLs/Genes based on novel 90K iSELECT SNP assay	2018-2021	7.5	USPCAS-PARB	Completed/CoPI
3	Development of Protocol for long reads haplotyping in hexaploid wheat using PacBio Circular Consensus Sequencing	2019-2021	1.2	PSF-MSRT	Completed/PI
2	Biochemical and immunochemical prospects of modified wheat gluten in relation to gluten sensitive enteropathy.	2016-2017	0.5	Higher Education Commission (HEC)	Completed/CoPI
1	High resolution mapping for brown, yellow and black rust resistance genes in Pakistani wheat germplasm	2015-2016	0.5	HEC	Completed/PI

INVITED/KEYNOTE TALKS

S.No	Title	Conference/Symposium	Organizers	Date
5.	Status and Prospects of Wheat OMICS in Pakistan	1 st International Symposium "Applications of OMICS technology in Health and Disease"	University of Glasgow-COMSATS University	July 30, 2024
4.	Rapid Introgression of quintuple SBEII mutant genes into Pakistani Wheats through Marker Assisted Speed Breeding	Seminar	Crop Research Institute, Anhui Academy of Agricultural Sciences, China	July 22, 2024
3.	Wheat Breeding for High Amylose Content for Better Human Health.	1 st International Congress on Biotech Solutions for Sustainability	GTU Turkiya-MANSUAM-Pakistan.	May 8-10, 2024
2	Insight on some heat tolerance traits in Spring Wheat	Seminar	Hebei Agricultural University, China	January 27, 2024
1.	Cloning and characterization of grain yield and heat tolerance related FLOURY ENDOSPERM 2 (Flo2) gene in common wheat (<i>Triticum aestivum</i> L.)	Tackling Climate Change through Plant Breeding	PMAS-UAAR, Pakistan	Nov13-15, 2017.

COURSES TAUGHT

Undergraduate

- Introductory Genetics
- Introduction to Biosciences
- Introduction to Bioinformatics
- Natural Resource Management
- Environment and Development
- Environmental impact assessment

Postgraduate

- Advances in Biosciences Research
- Population Genetics
- Breeding Pulse Crops
- Breeding for Quality
- Cytogenetics for Crop Plants
- Molecular Plant Breeding

➤ Environmental Impact Assessment

STUDENTS SUPERVISED

<u>PhD</u>	<u>Role</u>	<u>Students' names</u> <u>(registrations)</u>	<u>Thesis Title</u>	<u>Status</u>
6	Supervisor	Aneeqa Nadeem	Genetic Enhancement of Wheat: Marker Assisted Back Crossing for Improved Starch Characteristics	Enrolled
5		Zulqarnain Haidar	GWAS for lodging resistance traits in wheat	Enrolled
4.		Summan Aslam	Development of Alpha-gliadin Free Wheat Line(s) in Pakistan	Enrolled
3.		SP23-PBM-004 Irum Khan (Fa18-Pbs-003)	Genome Wide Association Study for Pollen Grain Viability, Seed Setting and Grain Ionome in Wheat under Normal and Heat Stress Conditions	Pr-defence
2.	Co-Supervisor	Sorour Arzhang	Genome and Transcriptome analysis of maize (<i>Zea mays</i> L.) under salt stress conditions	Completed
1.		Waseem Shah (CIITISP 18-PBS-003/ISB)	Large Scale Analysis of Polyadenylation Sites in Soybean	Enrolled
<u>MS</u>	Supervisor	Babar Ali CIIT/SP23/RBI/002	Rice-barley comparative genomics to expedite gene discovery in barley	Enrolled
16.		Irum Zahid CIIT/ FA22-RBI-001	Identification of genetic loci for tiller angle in pakistani historical varieties of wheat	Enrolled
15.		Zain Mehmood CIIT/SP22-RBI-011	Genome-Wide Association Study for Floral Architecture in Pakistani Wheat Germplasm	Completed
14.		Arifa Zahir CIIT/SP22-RBI-001	Image-Based Phenotyping of Wheat Anther Length and Width Analysis	Completed
13.		Hamid Raza (CIIT/ SP17-RES-005/VHR)	Evaluation of Historical Wheat Cultivars for Adaptation to Integrated and Organic Fertilizers	Completed
12.		ANIQA AHMAD (MS170200653)	Validation of genetic molecular markers Underpinning key yield components in Pakistan Bread wheat (<i>Triticum aestivum</i>)	Completed
11.		Rao Raheel Hussain (CIIT/FA17-RES-015/VHR)	Identification of Genetic Traits Associated with Arsenic Accumulation in Wheat Genotypes	Completed
10.		Mariam Idrees (CIIT/SP19-RBM-074/ISB)	Genome Wide-Identification and Expression Analysis of ARID gene family in Wheat (<i>Triticum aestivum</i>)	Completed
9.		Saima Anwaar, (MS170401605)	Marker-trait Association for yield and heat tolerance traits in Pakistani wheat germplasm	Completed
8.		Lubna Mamoonah (CIIT/FA19-RBS-012/ISB)	Genome-wide Identification of Alfin-like Transcription Factors in Bread Wheat (<i>Triticum aestivum</i> L.)	Completed
7.		Maria Sohail CUI/SP20-RBI-007/ISB	Genome-Wide Association Study for Grain Size in Pakistani Wheat Germplasm	Completed
		Hamid Raza (CIIT/ SP17-RES-005/VHR)	Evaluation of Historical Wheat Cultivars for Adaptation to Integrated and Organic Fertilizers	Completed
6.	Co-supervisor	Muhammad Zaheer (CIIT/FA18-RMG-013/ISB)	Genome-wide Identification and Expression Analysis of New Cobra-like Genes in Bread Wheat (<i>Triticum aestivum</i>)	Completed
5.		Ali Abdullah (CIIT/FA17-RES-011/VHR)	Interactive Effect of Genetic Variations and Silicon Application on Aphids Infestation and Nutritional Profile of Wheat (<i>Triticum aestivum</i> L.)	Completed
4.		Ayesha Farooq (51652004)	Karyotype analysis of hybrid of <i>Triticum aestivum</i> L. and <i>Hordeum vulgare</i> L. using fluorescence <i>in situ</i> hybridization	Completed

3.	Hamid Majeed (CIIT/FA17-RES-002/VHR)	Effect of urban heat island on socio-economic conditions of residents in Southern Punjab: A case study of Multan and Vehari	Completed
2.	Muhammad Mushtaq (CIIT/FA15-MES-008/VHR)	Genotypic and environmental Variation in the phenolic Antioxidant properties of Pakistani Wheat varieties	Completed
1.	Faisal Farooq (FA18-RMI-032)	Antibiotics, acid, and heat tolerance of essential oils adapted pathogenic microbes	Completed

PROFESSIONAL EXPERIENCE

Research

- CAS-PIFI Fellowship: Developing wheat and barley genetic resources and gene mining. Feb 2023- Aug 2024.
- CAS-PIFI Postdoctoral. Discovering yield and quality related genes in bread wheat. May, 2015-April 2017.
- IRSIP on genomics at Genomics and Gene Discovery Research Unit, USDA, Albany, California, USA. (August 2010-February 2011)
- Ph.D. research at Plant Breeding and Genetics, University of Agriculture, Faisalabad and Wheat Wide Crosses Lab, NARC. (Association mapping of yield traits in wheat (*Triticum aestivum* L.))
- M.Sc. Research at Ayub Agriculture Research Institute (AARI), Faisalabad. (Genetic diversity in sugarcane cultivars existing in Pakistan)
- Internship. B.Sc. (Hons.) research at Mutation Breeding Lab, Nuclear Institute for Agriculture and Biology (Plasmid isolation, PCR, gel electrophoresis and wheat physiological data recording using IRGA)

Teaching

- Teaching under-graduate and post-graduate courses from May 2019 to date
- Teaching various under-graduate and post-graduate courses from August 2014 to May 2019 in the Department of Environmental Sciences, COMSATS University.
- Teaching of under-graduate and post-graduate courses from 19th June 2013 to August 2014 in the Department of Plant Breeding and Genetics, PMAS-Arid Agriculture University Rawalpindi.

Trainings/Workshops

- Universities Role in Artificial Intelligence (AI) Innovation Ecosystems. ASEF Higher Education. May 2nd to June 27th, 2024.
- Basic Wheat Improvement Course-2022 (BWIC2022). CIMMYT, Mexico; January 24th to May 31st, 2022.
- NIBGE-COMSTECH-ICGEB International Training Workshop on Use of Genome Editing and other New Breeding Technologies for Global Food Security, April 8-10, 2019.
- PINSTECH National Workshop on Analytical & Isotopic Tools for Hydrological & Environmental Studies, December 4-6, 2018.
- COMSTECH-PARC International Training Workshop on Plant Genetic Resources and Genebank Operations Management System, May 08 to 11, 2018.
- Genotyping by Sequencing overview and its application in crop improvement, NIBGE, 07th Feb 2013
- Six months training on genomics at Genomics and Gene Discovery Research Unit, USDA, Albany, California, USA.
- Intellectual property rights and innovation policy, COMSTECH, Islamabad, Pakistan, 6-10 June 2011.

Data analysis

Analysis and interpretations of data using softwares like R packages, Jamovi, XLSTAT, STATISTICA, MINITAB, SPSS, MSTATC, SRUCTURE and TASSEL, rTASSEL etc.

RESEARCH SKILLS

- QTL mapping approaches including linkage analysis (LA), association mapping (AM) and nested association mapping (NAM).
- Wheat hybridization and maintenance of various breeding populations
- Molecular biology techniques including cloning, plasmid and genomic DNA extractions, and numerous PCR applications.
- Development and application of unique repeat junction markers (RJM).
- Application of CRISPR Cas9 for genome editing in plants.

- Agronomy and plant genetics techniques including growing of plants in field, greenhouse and in sterile conditions, performing crossing, genetic analysis of phylogenies, application of statistical methods and marker-assisted selection.
- DNA and RNA and Protein sequence analysis using various analysis tools.

ACDAMIC AWARDS

- **Appreciation Letter** for Outstanding Performance (2023-24) from the Rector, COMSATS University Islamabad.
- **CAS-PIFI** Visiting Scientist 2023, Chengdu Institute of Biology, Chinese Academy of Science.
- **TYSP** Talented Young Scientist (2019) Yunnan Academy of Agricultural Sciences (YAAS). [Work Remotely due to COVID-19]
- **CAS-PIFI** Postdoctoral fellowship. Discovering yield and quality related genes in bread wheat. May, 2015-April 2017.
- **CRPA** COMSATS Research Productivity Award 2014-2023.
- **HEC** Ph.D-Indigenous scholarship from HEC, 2007-2012
- **IRSIP** International Research Support Initiative Program (IRSIP) from HEC, Aug 2010-Feb 2011
- **UMS** University Merit Scholarship for B.Sc (Hons), 2002-2005
- **USAID** Scholarship for M.Sc (Hons), 2005-2007

RESEARCH ACHIEVEMENTS

- Rapid development of High Amylose Wheat Line through Marker Assisted Speed Breeding (MASB)
- Identified two new QTLs in biparental population through Bulk Segregant Analysis at CIB,CAS
- Developed high-throughput image based phenotyping for pollen viability and anther size in wheat
- Developed new KASPS and their validation in Pakistani wheat germplasm
- Developed a new and simple method of preserving wheat pollen grains for longer time period.
- Submission of blast resistant and early maturing rice variety in VEC
- Developed RILs populations for QTL mapping of yield and drought stress.
- Identified more than 35 new yield related genes in bread wheat.
- Developed new InDel8 marker of marker assisted selection for TGW in hexaploid wheat.
- Developed a simple and cost-efficient protocol for mass scale gene cloning in hundreds of wheat accessions simultaneously.

PROFESSIONAL ACTIVITIES

- Member of The American Association for the Advancement of Science (AAAS)
- Member of National Academy of Young Scientists (NAYS)
- President Society of Plant Breeders and Geneticists (Aug 2009-Sep 2010)
- International Society for Development and Sustainability (ISDS)
Membership ID: M1500610

COMMUNITY SERVICE

International

- **Guest Associate Editor:** Frontiers in Genetics
- **Review Editor** for Plant Genomics, Frontiers in Genetics
- **Review Editor** for Plant Breeding, Frontiers in Plant Science
- **Guest Associate Editor:** Genes MDPI
- **Trainer:** Catered training to graduate students and faculty for developing SMRT sequencing libraries at Urmia University, Iran. (15-22 Feb 2020).
- Patent submitted in Beijing (2017)

Institutional

- Batch Counselor (Spring 2021, Fall 2022, Fall 2023).
- Member Undergraduate Programs Committee (Spring 2021).
At Vehari Campus
- Member of Research farm committee (Fall 2014)
- Vehari Campus Cricket Convener (Spring 2015)
- Departmental Convener Cricket (May 2017 -December 2018)
- Departmental Convener of committee (January 2019- May 2019)
- Member of performance evaluation committee (FA18-SP19)
- Member of Campus Proctorial committee (January 2019- May 2019)
- Member wheat Sale committee CUI, Vehari (May 2018-May 2019)
- Batch advisor BS Environmental Sciences-Fall 2018
- Member Printing and Press committee International Conference -ESCON2019
- Prepared press releases in Urdu and English about ESCON 2019

Peer ReviewsThesis Evaluations

- Bahauddin Zakariya University
 - -3 MS theses evaluated.
- University of Agriculture Faisalabad
 - -3 MS theses evaluated.
- University of the Punjab
 - -12 MS theses evaluated.

Journals Peer Reviews

- Peer reviews for the following SCI journals.
 - Plants
 - Genes
 - Frontiers in Plant Science
 - Agronomy-MDPI
 - Frontiers in Genetics
 - Molecular Biology Reports
 - BMC Plant Biology
 - International Journal of Agriculture and Biology
 - Pakistan Journal of Agricultural Sciences
 - Egyptian Journal of Agronomy
 - Horticulture-MDPI.
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