

Dr. Muhammad Sarwar

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Date of Birth 07-08-1985

Nationality Pakistani

Career Summary: *Lecturer (University of Agriculture, Faisalabad, Pakistan)*

Assistant Research Officer (Ayub Agricultural Research Institute, Faisalabad)

1) Professional Preparation

- **PhD (Agronomy):** Department of Agronomy, University of Agriculture Faisalabad, Pakistan (2011-16)
Thesis title: Enhancing heat tolerance in Bt cotton (*Gossypium hirsutum* L.) through different management practices
- **Graduate Institutes:** Faculty of Agriculture, University of Agriculture Faisalabad, Pakistan:
Major degree: Master of Science (Hons.) in Agriculture-Agronomy (2009-11)
Thesis title: Effect of different nitrogen levels and sowing dates on yield, quality and earliness of Bt and non-Bt cotton (*Gossypium hirsutum* L.)
- **Undergraduate Institute:** Faculty of Agriculture, University of Agriculture Faisalabad, Pakistan:
Major degree: Bachelor of Science (Hons) in Agriculture-Agronomy (2005-09)
- **Other:** IRSIP (Six months) University of Sydney, Australia (2015)

2) Appointments

- Current: 17.09.2019 to date, Lecturer at Department of Agronomy, University of Agriculture Faisalabad, Pakistan
- Previous: 20.05.16 to 17.09.2019, Agricultural Research Officer at Ayub Agricultural Research Institute Faisalabad, Pakistan

3) Products/Publications

1. Tanveer, A., Sarwar, M., Farrukh Saleem, M., Ali, B., Ahmad, H., Asghar, M. S., Nabeel, A. A. and Zafar, M. (2025). Enhancing Garlic (*Allium sativum* L.) Productivity by Maximizing the Efficacy of Applied Nutrients with Alligator Weed Compost. *Communications in Soil Science and Plant Analysis*, 1-14 (**IF 1.3**).
2. Baloch, R., Saleem, M.F., Shahbaz, M., Sarwar, M. (2024). Evaluation of Basmati Rice (*Oryza sativa* L.) Genotypes for Seedling Growth and Leaf Physiology Under High-Temperature Stress. In: *Journal of Agronomy and Crop Science*, 210(6):12777 (**IF 3.7**).
3. Shahid, M., Saleem, M.F., Saleem, A., Sarwar, M., Shakoar, A., Mahmood, K. Anjum, S.A. (2024). Qualitative Traits of Heat Stressed Bread Wheat (*Triticum aestivum* L.) were Improved by Exogenous Potassium Signaling. *Journal of Soil Science and Plant Nutrition*, 25:183-194 (**IF 3.4**).
4. **Sarwar, M.**, M.F. Saleem, N. Ullah, M.J. Khan, H. Maqsood, H. Ahmad, A. Tanveer and M. Shahid. 2023. Silver nanoparticles protect tillering in drought-stressed wheat by improving leaf water relations and physiological functioning. Submitted in *Functional Plant Biology* (**IF = 3.0**)
5. Shahid M, M.F. Saleem, A. Saleem, **M. Sarwar**, M.A.S. Raza, S.A. Anjum and A Hussain. 2023. Sustainable production of bread wheat under terminal heat stress: an investigation of foliar selenium-mediated biochemical regulations in association with yield. *Cereal Research Communications*. 21:1-1 (**IF = 1.6**)
6. **Sarwar, M.**, M.F. Saleem, N. Ullah, A. Ali, B. Collins, M. Shahid, M.K. Munir, S.M. Chung and M. Kumar. 2023. Superior leaf physiological performance contributes to sustaining the final yield of cotton (*Gossypium hirsutum* L.) genotypes under terminal heat stress. *Physiology and Molecular Biology of Plants*. <https://doi.org/10.1007/s12298-023-01322-8>. (**IF = 3.5**)
7. **Shakoar, A.**, M.F. Saleem, **M. Sarwar** and M.Z.U. Haq. 2023. Exogenous Application of Chitosan Mediated Biochemical, Phenological, Quality, and Yield Attributes of Heat-stressed Cotton (*Gossypium hirsutum* L.). *Gesunde Pflanzen*. <https://doi.org/10.1007/s10343-023-00832-5> (**IF 2.082**)

8. **Sarwar**, M., M.F. Saleem, B. Ali, M. Sagir, M.B. Tahir, M.A. Wahid, M. Shahid, T.M. Mwamba, B.A. Khan and H. Maqsood. 2023. Manipulation of plant growth stimulants on plant morphology, phenology, and disease incident of *Gossypium hirsutum* L. under various thermal regimes. *Arab J Geosci* **16**: 170. <https://doi.org/10.1007/s12517-023-11183-w> (IF = 2.01)
9. Shahid, M., M.F. Saleem, A. Saleem, **M. Sarwar**, B.L. Ma, S.A Anjum and A. Hussain. 2023. Does Exogenous Selenium Elicited Biochemical Regulations Make Economic Improvements in Terminally Heat-Stressed Bread Wheat? An Evidence from Marginal Analysis. *Journal of Soil Science and Plant Nutrition*. <https://doi.org/10.1007/s42729-023-01268-6>. 1-16. (IF = 3.61)
10. **Sarwar**, M., M.F. Saleem, B. Ali, M. Sagir, M.B. Tahir, M.A. Wahid, M. Shahid, T.M. Mwamba, B.A. Khan and H. Maqsood. 2023. Manipulation of plant growth stimulants on plant morphology, phenology, and disease incident of *Gossypium hirsutum* L. under various thermal regimes. *Arab J Geosci* **16**: 170. <https://doi.org/10.1007/s12517-023-11183-w> (IF = 2.01)
11. Shakoor, A., M.F. Saleem, **M. Sarwar** and M.Z.U. Haq. 2023. Exogenous Application of Chitosan Mediated Biochemical, Phenological, Quality, and Yield Attributes of Heat-stressed Cotton (*Gossypium hirsutum* L.). *Gesunde Pflanzen*. <https://doi.org/10.1007/s10343-023-00832-5> (IF 2.082)
12. Atta, M.I., Z. Shi, S.S. Zehra, D. Ali, I. Ali, **M. Sarwar**, Ali, B. R. Iqbal, S. Bawazeer, K.Usama, A. Hamed and I. Ali. 2023. Amassing of heavy metals in soils, vegetables and crop plants irrigated with wastewater: Health risk assessment of heavy metals in Dera Ghazi Khan, Punjab, Pakistan. *Frontiers in Plant Science*. 13:5418. (IF = 6.627)
13. **Sarwar**, M., M.F. Saleem, S. Ahmed, H. Maqsood, S. Hussain, M.A. Wahid, M.K. Munir, M. Zafar, N. Ullah and A. Khoddami. 2022. Hydrogen peroxide promotes terminal heat stress recovery in wheat by strengthening leaf physiological functioning. *Journal of Plant Growth Regulation*. 1-17 (IF = 4.64)
14. **Sarwar**, M., M.F. Saleem, H. Maqsood, N. Ullah, A. Khan, M. Waqas, N. Sattar, M. Tasneem, X. Xu, H. Zhangli and Y. Shuang. 2022. Strengthening leaf physiological functioning and grain yield formation in heat-stressed wheat through potassium application. *Frontiers in Plant Science*. 13:1005773. doi: 10.3389/fpls.2022.1005773 (IF = 6.63)
15. Shahid, M., M.F. Saleem, A. Saleem, **M. Sarwar** and A. Hussain. 2022. Improving the Spike Initiation and Flowering Stage Heat Tolerance in Bread Wheat Through Foliar Application of Potassium. *Journal of Plant Growth Regulation*. (IF = 4.64)
16. **Sarwar**, M., M.F. Saleem, B. Ali, M.H. Saleem, M. Rizwan, K. Usman, A.E. Keblawy, A. Ali, M. Afzal, M.S. Sheteiwy and S. Ali. 2022. Application of Potassium, Zinc and Boron as potential plant growth modulators in *Gossypium hirsutum* L. under heat stress. *Turkish J. of Agriculture and Forestry*. 46(4): 567-584s (IF = 2.9)
17. Tanveer, A., M. **Sarwar**, M.S. Asghar, M.F. Saleem, H. Maqsood, B. Ali, M.K. Munir, M. Arshad, R.M. Ikram, N.A. Ikram and M. Rizwan. 2022. Reducing nutrient uptake in okra weeds by suppressing their population through alligator weed compost mulch for better pod yield and quality. *Arabian Journal of Geosciences*. 15:1006. (IF = 1.827)
18. **Sarwar**, M., M.F. Saleem, B. Ali, M. Nadeem, M.A. Ghani, W. Zhou and F. Islam. 2021. Improving thermotolerance in *Gossypium hirsutum* by using signalling and non-signalling molecules under glass house and field conditions. *Industrial Crops and Products*. 172: 113996. (impact factor: 5.645).
19. Saleem M.F., A. Shakoor, A.S. Raza, M. Shahid, **M. Sarwar**, and H.Z. Khan. 2021. Enhancing yield of heat stressed cotton by modulating secondary metabolites and water relations through exogenous chitosan application. *Pak. J. Agri. Sci*. 58(5):1569-80. (IF = 0.748)
20. Munawar, S., M.A. Ghani, B. Ali, M. Azam, R. Anjum, M. **Sarwar**, T. Ahmad, A. Noor, Q. Iqbal, K.L. Cheema and M.M. Jahangir. 2021. Attenuation of cadmium induced oxidative stress in cucumber seedlings by modulating photosynthesis and antioxidant machinery through foliar applied glutamic acid. *Horticultural Science*. 49 (1):19–28. (IF = 0.833).
21. Irshad, M., M.A., Wahid, M.F. Saleem, S. Khan, S. Irshad, A. Matloob, **M. Sarwar**, M. Ali, Z. Hasnail and A. Cheema. 2021. Zinc coated urea enhanced the growth and quality of rice cultivated under aerobic and anaerobic culture. *Journal of Plant Nutrition*. 1-16 (IF = 1.69).
22. Hussain, S., S. Hussain, R. Guo, **M. Sarwar**, X.R.D. Krstic, Z. Aslam, U. Zulifqar, A. Rauf, C. Hano and M.A. El-Elaw. 2021. Carbon Sequestration to Avoid Soil Degradation: A Review on the Role of Conservation Tillage. *Plants*. 10: 200. <https://doi.org/10.3390/plants10102001>. (IF = 3.935)
23. Tanveer, A., M.S. Asghar, **M. Sarwar**, M.F. Saleem, M. Nadeem, M.K. Munir, M. Zafar, M. Rizwan and G. **Sarwar**. 2021. Improving the productivity of okra (*Abelmoschus esculentus* L.) by strengthening the impact of applied nutrients through alligator weed compost. *Pak. J. Agri. Sci*. 58(4): 1131-1139. (IF = 0.748)

24. Shahid, M., M.F. Saleem, A. Saleem, **M. Sarwar**, H.Z. Khan and A. Shakoor, 2020. Foliar Potassium-Induced Regulations in Glycine Betaine and Malondialdehyde Were Associated with Grain Yield of Heat-Stressed Bread Wheat (*Triticum aestivum* L.). *Journal of Soil Science and Plant Nutrition*. <https://doi.org/10.1007/s42729-020-00250-w>. (**Impact Factor: 2.271**).
25. Hanif, S., M.F., Saleem, **M. Sarwar**, M. Irshad, A. Shakoor, M.A. Wahid and H.Z. Khan, 2020. Biochemically triggered heat and drought stress tolerance in rice by proline application. *Journal of Plant Growth Regulation*. <https://doi.org/10.1007/s00344-020-10095-3>. (**Impact Factor: 2.179**)
26. Nadeem, M., A. Tanveer, H. Sandhu, S. Javed, M.E. Safdar, M. Ibrahim, M.A. Shabir, **M. Sarwar** and U. Arshad, 2020. Agronomic and Economic Evaluation of Autumn Planted Sugarcane under Different Planting Patterns with Lentil Intercropping. *MDPI Agronomy*. doi:10.3390/agronomy10050644. (**Impact Factor: 2.25**).
27. **Sarwar**, M., M.F. Saleem, N. Ullah, S. Ali, M. Rizwan, M.R. Shahid, M.N. Alyemeni, S.A. Alamri and P. Ahmad, 2019. Role of mineral nutrition in alleviation of heat stress in cotton plants grown in glasshouse and field conditions. *Scientific Report*. 9: 1-17 (**Impact Factor: 3.998**)
28. Shahid, M., M.F. Saleem, A. Saleem, M.A.S. Raza, M. Kashif, A. Shakoor and **M. Sarwar**, 2019. Exogenous Potassium–Instigated Biochemical Regulations Confer Terminal Heat Tolerance in Wheat. *Journal of Soil Science and Plant Nutrition*. doi: 10.1080/01904167.2017.1310886: 1-15 (**Impact Factor: 2.006**)
29. **Sarwar**, M., M.F. Saleem, U. Najeeb, M. Rizwan, S. Ali, M.R. Shahid, S.A. Alamri, M.N. Alyemeni and P. Ahmad, 2018. Exogenously applied growth regulators protect the cotton crop from heat-induced injury by modulating plant defense mechanism. *Scientific Reports*. 8: 1-15. (**Impact Factor: 4.011**)
30. Ullah, N., **M. Sarwar**, B.J. Atwell, M.P. Bange and D.K.Y. Tan, 2017. Endogenous ethylene concentration is not a major determinant of fruit abscission in heat-stressed cotton (*Gossypium hirsutum* L.). *Journal of frontiers in plant science*. 8: 1-14 (**Impact Factor: 4.298**)
31. Bilal, M.F., M.F. Saleem, M.A. Wahid, A. Shakeel and **M. Sarwar** 2017. Management practices to control premature senescence in Bt cotton. *Journal of Plant Nutrition*. 40 (14): 1978-1992 (**Impact Factor: 0.705**)
32. **Sarwar**, M., M.F. Saleem, U. Najeeb, A. Shakeel and M.F. Bilal. 2016. Hydrogen peroxide reduces heat-induced yield losses in cotton by protecting cellular membrane damage. *Journal of Agronomy and Crop Science*. 203(5): 429-441 (**Impact Factor: 2.837**)
33. **Sarwar**, M., M.F. Saleem, M.A. Wahid, H.N. Asghar and M. Shahid. 2016. Comparative ability of some growth regulators for inducing thermotolerance in cotton under different thermal regimes. *Pakistan Journal of Agricultural Sciences*. 53(4): 467-475. (**Impact Factor: 0.728**)
34. Bilal, M.F., M.F. Saleem, S.A. Anjum, W. Farhad and **M. Sarwar**. 2016. Effect of fruiting branch removal and nitrogen rate on cotton senescence. *Journal of Animal and Plant Science*. 24(4): 977-987. (**Impact Factor: 0.478**)
35. Shahid, M., M.F. Saleem, H.Z. Khan, M.A. Wahid and **M. Sarwar**. 2015. Improving wheat (*Triticum aestivum* L.) yield and quality by integration of urea with poultry manure. *Soil and Environment*. 34(2): 148-155. (**HEC RECOGNIZED**)
36. Saleem, M.F., M.F. Bilal, S.A. Anjum, H.Z. Khan, **M. Sarwar** and W. Farhad 2014. Planting time and N nutrition on cell membrane thermostability, Bolls' retention and fiber traits in cotton. *Journal of Animal and Plant Science*. 24(3):829-837. (**Impact Factor: 0.543**)

Book Chapters

1. Saleem, M.F., **Sarwar, M***, Tasneem, M., Ahmad, H., (2024). Climate Smart Soil Utilization and Management Systems in the Global South. In: *Sustainable Soil Systems in Global South: Climate Smart Soil Utilization and Management Systems in the Global South*. In: Springer Nature, Singapore. 523-543
2. **Sarwar, M.**, M.F. Saleem, N. Ullah, H. Maqsood and H. Ahmad. 2023. Physiological Ecology of Medicinal Plants: Implications for Phytochemical Constituents. In: "Physiological Ecology of Medicinal Plants: Implications for Phytochemical Constituents". Accepted
3. Najeeb, U., D.K.Y. Tan, **M. Sarwar** and S. Ali. 2019. Adaptation of crops to warmer climates: morphological and physiological mechanisms. In: "Sustainable solution for food security combating climate change by adaptation. pp:27-50. Springer Nature Switzerland. <https://doi.org/10.1007/978-3-319-77878-5>.

4. Najeeb, U., **M. Sarwar**, B.J. Atwell, M.P. Bange and D.K.Y. Tan. 2019. Endogenous ethylene concentration is not a major determinant of fruit abscission in heat-stressed cotton (*Gossypium hirsutum* L.). In: "Hormonal control of important agronomic traits. pp:183-196. Frontiers Media Lausanne, Switzerland | T 41(0)21 510 17 11. doi: 10.3389/978-2-88945-686-
 5. Khalil, S., S. Ali, M. Rizwan, K.U. Rahman, S.T.A.U. Karim, U. Najeeb, M.N. Ahmad, M. Adrees, **M. Sarwar** and S.M. Hussain. 2018. Role of mineral nutrients in plant growth under extreme temperatures. In: "Plant nutrients and abiotic stress tolerance". pp:499-524. Springer Singapore, Singapore. doi:10.1007/978-981-10-9044-8_21.
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4) Synergistic Activities

1. I have had an active research career during which I have published more than 36 research articles in highly acclaimed journals and five book chapters. My research outcomes have a significant impact on the scientific community e.g. Impact factor is 92.166
 2. As Assistant Research Officer at Ayub Agricultural Research Institute, Faisalabad Pakistan I conducted research on heat stress management in wheat and maize through exogenous application of growth stimulants and nutrients. I was undusted by the department was to help in planning and monitor the research work being carried out at Agronomic Research Institute, Faisalabad and its research sections located at different localities of province Punjab. Thenceforth, I helped in the planning of nearly 50 research trials during Rabi and 30 experiments during Kharif each year on different agronomic aspects of arable crops. During these 3.4 years, I had the opportunity to represent my institute before the delegates and individuals who visited it. Report writing regarding the research activities of the institute remained also my responsibility.
 3. My PhD research at the University of Agriculture, Faisalabad Pakistan was conducted in a close collaboration with the University of Sydney and the Macquarie University Australian. During this period, I found that squaring, flowering and boll formation stages of cotton are affected by heat stress and the foliar spray of biostimulants i.e. hydrogen peroxide, salicylic acid, ascorbic acid and *moringa* leaf extract and nutrients i.e. potassium, zinc and boron improved cell chemistry, physiology, water relations and seed cotton yield up to 15-18% under high temperature regimes. Five research papers were published from my PhD research (<https://pakjas.com.pk/papers/2637.pdf>, <https://onlinelibrary.wiley.com/doi/full/10.1111/jac.12203>, <https://www.nature.com/articles/s41598-018-35420-5>, <https://www.nature.com/articles/s41598-019-49404-6>, <https://www.sciencedirect.com/science/article/pii/S0926669021007615>, <https://online-journals.tubitak.gov.tr/agriculture/accepted.htm?jsessionid=C7A4703648BA1C79966FB5F20DE4742B>). During my stay in Australia, I developed protocols (using a commercial anti-ethylene agent AVG ReTain®, Chemicals Australia) for protecting cotton crops from heat injury (Najeeb et al. 2017; Frontiers in Plant Science. <https://www.frontiersin.org/articles/10.3389/fpls.2017.01615/full>).
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