

Dr. Waseem Safdar

Associate Professor

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Profile

Dr. Waseem Safdar is an Associate Professor in the Department of Biotechnology at the National University of Medical Sciences (NUMS), Rawalpindi, with over 15 years of experience in research and teaching. He is an academic leader and accomplished scientist specializing in Food and Microbial Biotechnology, with a strong focus on translating fundamental research into practical applications in nutrition, health, and sustainability. His expertise includes metabolic engineering and microalgae-based omega-3 fatty acid production, where he employs advanced biotechnological and molecular approaches to address critical nutritional and biomedical challenges. In the area of sustainable microalgae/microbial processing, Dr. Waseem has screened and identified microalgae species that can achieve very high lipid content, representing potential biodiesel precursors, under varying phototrophic, heterotrophic, and mixotrophic conditions. Dr. Safdar has led multiple funded research projects in areas such as omega-3 enrichment, metabolic engineering of microalgae, antimicrobial and antiviral strategies, and functional food development. His research interests span metabolic engineering, fermentation technology, nutrigenomics, food safety, and antimicrobial and antifungal studies. With a strong publication record and editorial contributions to high-impact journals, he is recognized for his scientific rigor, translational impact, and commitment to mentoring the next generation of researchers.

Research Interest

Microbial Biotechnology, Metabolic Engineering, CRISPR gene editing, Fermentation Technology, Functional Foods & Nutraceuticals, Microalgal Biofuels, Microalgal PUFA

Selected Publications (I.F = ~ 356)

1. Naz T, Saeed MT, Umer Z, **Safdar W**, Mohamed H, Song Y and Zhao XY., (2026). *Yarrowia lipolytica* as a potential chassis for value-added products using a co-culture system and lignocellulose biomass-derived xylose. *Front. Microbiol.* 16:1704596. doi: 10.3389/fmicb.2025.1704596

2. Saleem, F., Hasan, M. A., **Safdar, W.**, Ahmed, S., & Munir, F. (2026). Carbonomics of large-scale algae cultivation for industrial and environmental applications. In *Algae Biotechnology* (pp. 41-65). Elsevier. Hasan, M. A., Bakry, A. M., & **Safdar, W.** (2026). Strain improvement for algae-based resource recovery and recycling. In *Algae Biotechnology* (pp. 97-133). Elsevier.
3. Imran, M., Shahzadi, I., Haider, A., Hassan, M., Ul-Hamid, A., **Safdar, W.**, Haider, J., & Ikram, M. (2025). Catalytic and antibacterial activities with molecular docking analysis of chitosan and polyethylene glycol-NiO₂ nanostructures. *Journal of Nanostructure in Chemistry*, 202510.
4. Manal, Munir, F., **Safdar, W.**, Abu bakr shabbir, M., Ahmed, S., Navid, M. T., Ali, M., & Ahmed, I. (2025). Production, characterization, and antimicrobial activity of polyhydroxyalkanoates synthesized by *Bacillus* species against skin pathogens. *RSC Advances*, 15(42), 35182–35200. <https://doi.org/10.1039/d5ra04375a>
5. Munir, F., Manal, Ahmed, S., **Safdar, W.**, Shah, S. A., Maan, M. K., Khan, R., & Karim, A. (2025). Native Oregano Essential Oil: Phytochemical Composition, Antibacterial and Synergistic Activities with Oxytetracycline Against Multi-Drug Resistant (MDR) Bacteria. *Microbial Pathogenesis*, 108034.

Grants/Awards/Achievements

- A research project entitled “Enhanced Production of Omega-3 Fatty Acids from microalgae” by HEC-NRPU-2021 Pakistan; budget = 14.2 Million. In Process.
- Development of Algal Product for treatment of multi drug resistant Bacterial infections and biofilms ORIC-NUMS-2026 budget = 10 Million. In Process.
- Novel Bacteriophage isolation for Controlling Poultry Pathogens: An *In vitro* and *In vivo* Approach Funded by ORIC-NUMS-TIF-2025; budget = 5.0 Million. In process
- Synthesis of polymer embedded nanofiber water filter as a solution for spread of AMR bacteria by ORIC-NUMS-TIF-2023; budget = 4.5 Million. In process
- “Enhanced Production of palmitoleic acid rich oil through fermentation regulation and metabolic engineering” by NUMS-IRF-2020; budget = 1.0 Million. Completed
- Co-PI: funded by NUMS-IRF-2020 Pakistan; budget = 0.95 Million Completed
- Co-PI: funded by NUMS-IRF-2021 Pakistan; budget = 0.58 Million Completed
- PI: “Bioethanol production from lignocellulosic biomass: by UoL-Isb-2019, ; budget = 2.1 Million PKR. Completed
- Editorial Board Members of *Frontier in Nutrition* (IF = 4.9)
- Editorial Board Members of *Frontier in Microbiology* (IF = 5.6)
- Editorial Board Members of (*MDPI-IJMS*) (IF = 5.1)
- Post-Doc/Visiting Scientist, Food Biotechnology and Engineering Johns Hopkins University, MD, USA 2023-2024.
- Chinese Government Scholarship (CSC) 2012-2017
- 2nd position president scholarship from Jiangnan University for the year 2014

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