

## Babur S Mirza

Missouri State University  
901 S National Ave,  
Springfield, Missouri, 65897

Department of Biology, temple hall 273  
Email: baburmirza@missouristate.edu  
Ph#: (417) 836-5062

### Education/work

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- 2017 – present **Assistant professor** in Biology Department, Missouri State University, MO, USA
- 2015 – 2017 **Researcher III** in Environmental Microbiology, Utah Water Research Laboratory, Department of Civil and Environmental Engineering, Utah State University, UT, USA
- 2013 – 2014 **Postdoctoral research associate** in Environmental Microbiology, Utah Water Research Laboratory, Department of Civil and Environmental Engineering, Utah State University, UT, USA
- 2010 – 2012 **Postdoctoral research associate** in Molecular Microbial Ecology, University of Texas at Arlington, TX, USA
- 2006 – 2009 **Ph.D.** in Aquatic Resources Program (Microbial ecology), Texas State University, TX, USA
- 2001 – 2003 **M.Phil.** in Plant Physiology, Quaid-I-Azam University, Islamabad, Pakistan
- 1996 – 2000 **B.Sc. (Hons.)** in Soil Sciences/Soil microbiology, University of Agriculture, Faisalabad, Pakistan

### Publications

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- Mirza B.S.,** D.L. Sorensen, R.R. Dupont, and J.E. McLean (2017). New arsenate reductase gene (*arrA*) PCR primers for diversity assessment and quantification in environmental samples. *Applied and Environmental Microbiology* 83: eAEM2725-16
- Mirza B.S.,** D.L. Sorensen, R.R. Dupont, D. McGlenn, and J.E. McLean (2017). General community and *Dehalococcoides* populations' characterization from differentially trichloroethene dechlorinating, large flow-through columns. *Applied microbiology and Biotechnology* 101: 4799-4813.
- Meyer K.M., A.M. Klein, J.L.M. Rodrigues, K. Nüsslein, S. Tringe, **B.S. Mirza,** J.M. Tiedje, T. Brown, and B.J.M. Bohannan (2017). Conversion of Amazon rainforest to agriculture alters community traits of methane-cycling organisms. *Molecular Ecology* 26: 1547-1556.
- Mirza B.S.,** D.L. Sorensen, R.R. Dupont, and J.E. McLean (2016). *Dehalococcoides* abundance and alternate electron acceptor effects on large, flow-through trichloroethene dechlorinating columns. *Applied microbiology and Biotechnology* 100: 2367-2379.
- Mukhtar S., S. Mehnaz, M.S. Mirza, **B.S. Mirza,** J.E. Mclean, and K.A. Malik (2017). Understanding the effects of soil salinity on rhizosphere microbiome assemblage. *Plos One* (In revisions# PONE-D-16-14430).
- Zaheer A., **B.S. Mirza,** J.E. Mclean, S. Yasmin, T.M. Shah, K.A. Malik, and M.S. Mirza (2016). Association of plant growth-promoting *Serratia* spp. with the root nodules of chickpea. *Research in Microbiology* 167: 510-520.
- Mirza B.S.,** C. Potisap, K. Nüsslein, B.J.M. Bohannan, and J.L.M. Rodrigues (2014). Response of free-living nitrogen-fixing microorganisms to land use change in the Amazon rainforest. *Applied and Environmental Microbiology* 80: 281-288.
- Mirza B.S.,** S. Muruganadam, X. Meng, D.L. Sorensen, R.R Dupont, and J.E. McLean (2014). Arsenic(V) reduction in relation to Iron(III) transformation and molecular analysis of arsenate reductase (*arrA*) gene

within sediments of a Northern Utah, basin-fill aquifer. *Applied and Environmental Microbiology* 80: 3198-3208.

- Paula F.S., J.L.M. Rodrigues, J. Zhou, L. Wu, R. Mueller, **B.S. Mirza**, B.J.M. Bohannan, K. Nüsslein, T. Yuan, Y. Deng, J.M. Tiedje, V.H. Pellizari (2014). Land use change alters functional gene diversity, composition and abundance in Amazon rainforest soil microbial communities. *Molecular Ecology* 23: 2988-2999.
- Mueller R., F. Paula, **B.S. Mirza**, J.L.M. Rodrigues, K. Nüsslein, and B.J.M. Bohannan. (2014). Links between plant and fungal communities across a deforestation chronosequence in the Amazon rainforest. *International Society of Microbial Ecology* 8: 1548-1550.
- Rodrigues J.L.M., V.H. Pellizari, R. Mueller, K.H. Baek, E. Jesus, F.S. Paula, **B.S. Mirza**, J.M. Tiedje, B.J.M. Bohannan, and K. Nüsslein (2013). Conversion of the Amazon Rainforest to cattle pastures homogenization and loss of diversity in soil bacterial communities. *Proceeding of the National Academy of Sciences USA* 110: 993-998.
- Mirza B.S.**, and J.L.M. Rodrigues (2012). Development of a direct isolation procedure for free-living diazotrophs under controlled hypoxic conditions. *Applied and Environmental Microbiology* 78: 5542-5549.
- Hahn D., **B.S. Mirza**, C.G. Vogel, and M. Tonolla (2011). Typing of nitrogen-fixing *Frankia* strains by matrix-assisted laser desorption ionization-time-of-flight (MALDI-TOF) mass spectrometry. *Systematic and Applied Microbiology* 34: 63-68.
- Pokharel A., **B.S. Mirza**, J.O. Dawson, and D. Hahn (2010). *Frankia* populations in soil and root nodules of sympatrically grown *Alnus* taxa. *Microbial Ecology* 61: 92-100.
- Mirza B.S.**, A.K. Welsh, and D. Hahn (2009). Growth of *Frankia* strains in leaf litter-amended soil and the rhizosphere of a non-actinorhizal plant. *FEMS Microbiology Ecology* 70: 132-141.
- Mirza B.S.**, A.K. Welsh, and D. Hahn (2009). Diversity of frankiae in soils from five continents. *Systematic and Applied Microbiology* 32: 558-570.
- Mirza B.S.**, A.K. Welsh, G. Rasul, J.P. Rieder, M.W. Paschke, and D. Hahn (2009). Variation in *Frankia* populations of the *Elaeagnus* host infection group in nodules of six host plant species after inoculation with soil. *Microbial Ecology* 58: 384-393.
- Welsh A.K., **B.S. Mirza**, J.P. Rieder, M.W. Paschke, and D. Hahn (2009). Diversity of frankiae in root nodules of *Morella pensylvanica* grown in soils from five continents. *Systematic and Applied Microbiology* 32: 201-210.
- Mirza B.S.**, A.K. Welsh, and D. Hahn (2007). Saprophytic growth of inoculated *Frankia* sp. in soil microcosms. *FEMS Microbiology Ecology* 62: 280-289.
- Mirza B.S.**, M.S. Mirza, A. Bano, and K.A. Malik (2007). Co-inoculation of chickpea with *Rhizobium* isolates from roots and nodules and phytohormone producing *Enterobacter* strains. *Australian Journal of Experimental Agriculture* 47: 1-8.

**Manuscripts in preparation**

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**Mirza B.S.**, D. McGlenn, B.J.M. Bohannan, K. Nüsslein, J.M. Tiedje, and J.L.M. Rodrigues (2017). Free-living diazotrophs influenced by the change in land use of the Amazon rain forests and showed signs of recovery in the 12 to 17 year old secondary forests. To be submitted to *International Society of Microbial Ecology*.

Hakim S., **B.S. Mirza**, A. Zaheer, J.E. Mclean, and M.S. Mirza (2017). Co-dominance of *Bradyrhizobium* and *Ensifer* strains in the field-collected root nodules of *Vigna radiata* L. In review *Applied microbiology and Biotechnology*.

### Teaching experience

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**BIO 508/608 Environmental Microbiology** (Fall 2017). Environmental Microbiology, at Department of Biology, Missouri State University, MO, USA

**Shared lecture class with Dr. Darwin Sorensen** (2015 and 2017 spring). Introduction to Environmental Microbiology (CEE 2620), at Department of Civil and Environmental Engineering, Utah State University, UT, USA

**Served as Doctoral Instructional Assistant** (2006 – 09). For the undergraduate and graduate level courses: General Microbiology (BIO-2400), Molecular Techniques in Microbial Ecology (BIO-7360), and Aquatic Microbial Ecology (BIO-7410), at the Texas State University San Marcos, TX, USA

### Students supervised in lab

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**Alejandro Waumann**, University of Texas at Arlington, Summer 2011, High school student research

**Maria Bhatti**, University of Texas at Arlington, Fall 2009 to Spring 2010, Undergraduate research

**Neda Jooya**, University of Texas at Arlington, Fall 2009 to Spring 2011, Undergraduate research

**Yen Thao Nguyen**, University of Texas at Arlington, Fall 2009 to Spring 2011, Undergraduate research

**Anita Pokharel**, Preferential nodulation of specific *Frankia* strains on different alder species, Texas State University, 2008 – 2009, Graduate research

**Ghulam Rasul**, Diversity of *Frankia* populations in root nodules of different host plant species, Texas State University, 2007 to 2008, Visiting senior scientist from Pakistan

### Research grants funded

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**Mirza, B.S.**, (2017). Bacteria source tracking to support watershed planning (Federal 319 grant), MSU-OEWRI via Watershed Committee of the Ozarks/MDNR/USEPA, (Funding \$6,000).

**Mirza, B.S., (PI)** and J.E. Mclean (2013-15). Biogeographic distribution of the dissimilatory arsenate reductase gene (*arrA*) in association with the increased arsenic contamination in the ground water of the Northern Utah. Mineral Lease Fund from the State of Utah (Funding: \$147,870).

Nüsslein, K., J.L.M. Rodrigues, B.J.M. Bohannan, C.T. Brown, **B.S. Mirza**, J.M. Tiedje, and P. Chain (2012-2014). Profiling metatranscriptomic consequences of the Amazon deforestation at different spatial scales. Community Sequencing Program at DOE Joint Genome Institute, USA (Funding: \$ 47,277).

### Oral and poster presentations at scientific meetings

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**Mirza, B.S.**, D.L. Sorensen, R.R. Dupont, and J.E. McLean. General community and *Dehalococcoides* populations' characterization from differentially trichloroethene dechlorinating, large flow-through columns. American Society for Microbiology Annual Meeting. 16-21 June 2016, Boston, Massachusetts, USA

- Mirza, B.S.**, X. Meng, D.L. Sorensen, R.R. Dupont, and J.E. McLean. Characterization of depth-related changes in the structural and functional microbial community associated with arsenic reduction in soil profile of Northern Utah. 9<sup>th</sup> International Society of Subsurface Microbiology meeting. 5-10 October 2014, Pacific Grove, California, USA
- Mirza, B.S.**, X. Meng, W. Breon, D.L. Sorensen, R.R. Dupont, and J.E. McLean. Metagenomic characterization of arsenate reducing microbial community associated with the arsenic contaminated sediments of Northern Utah. 6<sup>th</sup> Annual Argonne Soil Metagenomics meeting. 1-3 October 2014, Illinois, USA
- Mirza, B.S.**, S. Muruganadam, D. McGlenn, D.L. Sorensen, R.R. Dupont, and J.E. McLean. Characterization of the microbial community and environmental variables associated with trichloroethylene reducing large flow columns. 114<sup>th</sup> American Society for Microbiology Annual Meeting. 17-20 May 2014, Boston, Massachusetts, USA
- Mirza, B.S.** Evaluation of solid medium based methods for the isolation of free-living nitrogen-fixing microorganisms. Oral presentation, 43<sup>rd</sup> annual Texas Branch Meeting of the American Society for Microbiology, November 10-12, 2011, University of Texas Arlington, USA
- Tiedje, J.M., B.J.M. Bohannan, K. Nüsslein, V.H. Pellizari, K.H. Baek, B.J. Feigl, E.C. Jesus, **B.S. Mirza**, R. Muller, F.S. Paula, S.M. Tsai, and J.L.M. Rodrigues. Amazon rainforest microbial observatory: Deforestation of the largest CO<sub>2</sub> sequestration terrestrial ecosystem in the world causes losses in microbial community spatial structure. 6<sup>th</sup> Annual DOE JGI User Meeting on Genomics of Energy & Environment. 22-24 March 2011, California, USA
- Mirza, B.S.** *Frankia* in soil. Genome Biology Group at University of Texas Arlington. Oral presentation, February 26, 2010, University of Texas Arlington, USA
- Mirza, B.S.**, K. Nüsslein, B.J.M. Bohannan, J.M. Tiedje, V.H. Pellizari, B.J. Feigl, and J.L.M. Rodrigues. Understanding the effects of deforestation on the diversity of nitrogen fixing populations in the Amazon forest. 13<sup>th</sup> International Symposium on Microbial Ecology. 21-28 August 2010, Seattle, USA
- Nüsslein, K., K.H. Baek, G. Hamaoui, J.L.M. Rodrigues, **B.S. Mirza**, B.J.M. Bohannan, J.M. Tiedje, E.C. Jesus, V.H. Pellizari, and B.J. Feigl. Amazon rainforest microbial observatory: The effects of land use change on diversity and microbial community composition. 13<sup>th</sup> International Symposium on Microbial Ecology. 21-28 August 2010, Seattle, USA
- Mirza, B.S.** Fate of *Frankia* strains in soil and in the rhizosphere of a non-actinorhizal plant. 15<sup>th</sup> International *Frankia* and Actinorhizal plants meeting. Oral presentation, October 19-23, 2008, Bariloche, Argentina
- Mirza B.S.** Participated in a workshop on the “Identification, maintenance and preservation of microorganisms” organized by Department of Biological Sciences, Quaid-i-Azam University, 10-12 May 2004, Islamabad, Pakistan.
- Mirza, B.S.** Diversity among the *Azospirillum* strains of Kaghan valley of Pakistan. International symposium on biodiversity in the Northern areas of Pakistan, Oral presentation, September 8-10, 2003, Higher Education Commission of Pakistan, Pakistan

### **Professional experience**

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**Assistant professor** (2017 – present), in the Biology Department, Missouri State University, MO, USA

**Researcher III** in Environmental Microbiology (2015 – 2017), Department of Civil and Environmental Engineering, Utah State University, USA

**Postdoctoral Research Associate** (2013 – 2015). Department of Civil and Environmental Engineering, Utah State University, USA

**Postdoctoral Research Associate** (2010 – 2012). Department of Biology, University of Texas Arlington, USA

**Doctoral Instructional Assistant** (2006 – 09). Department of Biology, Texas State University, USA

**Research Officer/Agricultural Officer** (2004 – 05). Soil and Water Testing Laboratory, Soil Fertility Department, Pakistan

**Research Associate** (2003 – 04). Department of Biological Sciences, Quaid-I-Azam University Islamabad, Pakistan. Project: “Association of *Rhizobium* and plant growth promoting rhizobacteria with rice plants”. Funded by the Pakistan Science Foundation, Pakistan

### **Research expertise**

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**Techniques** High throughput sequencing and data analysis of both taxonomy and functional genes, Cloning and sequencing, qPCR, DNA and RNA extraction, DNA finger-printing methods (RAPD, REP-PCR), Fluorescent *In situ* hybridization, Dot blot hybridization, Functional gene array analyses (FGA), Isolation and characterization of plant growth promoting rhizobacteria, Chromatography techniques (GC, HPLC), Phylogenetic, bioinformatics and multivariate statistical analyses

**Software** **Statistical analyses:** R, Primer-E, JMP  
**Phylogenetic analyses:** Mothur, MEGA, MEGAN, Mg-RAST, RDP, Muscle, PAUP, MrBayes, Sequencher, ClustalX, Rev Trans, MacClade, Python  
**Image analyses:** Image-Pro® Plus, NIS-Elements imaging software

### **Journals reviewer and institutional service**

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**Serving as a reviewer for the following journals:** Applied and Environmental Microbiology, Microbial Ecology, Symbiosis, Sustainability, Environmental Science Processes and Impacts, Agriculture Ecosystems and Environment, Environmental Science and Pollution Research, Molecular Biology Reports, Journal of Basic Microbiology, and Biodiversity

Served as a Graduate student representative on the Graduate Committee (2006–08). Department of Biology, Texas State University