Babur S Mirza

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Education/work

2023 – present	**Associate professor** in Biology Department, Missouri State University, MO, USA
2017 – 2023	**Assistant professor** in Biology Department, Missouri State University, MO, USA
2015 – 2017	**Research Scientist** 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 (*corresponding author)

Kincaid JC, Owen MR, Pavlowsky RT, ***Mirza BS** (2022) Microbiome of bacterially impaired watersheds: Distribution of potential bacterial pathogens. *Diversity* 14:96.

Charles A, ***Mirza BS,** Wait AD (2022) The effects of phyllosphere-bacteria on plant physiology and growth of soybean infected with *Pseudomonas syringae*. "Beneficial Microorganisms in Sustainable Agriculture" a special issue of *Plants* 11(19): 2634.

Mayhood P, ***Mirza BS** (2021) Soybean root nodule and rhizosphere microbiome: Distribution of rhizobial and non-rhizobial endophytes. *Applied and Environmental Microbiology* 87(10):e02884-20.

Imran A, Sardar F, Khaliq Z, Nawaz MS, Shehzad A, Ahmad M, Yasmin S, Hakim S, **Mirza BS,** Mubeen F, Mirza MS (2021) Bioactive compost from plant waste improves the growth and yield of chili pepper and tomato. *Frontiers in Bioengineering and Biotechnology* 9:787764.

***Mirza BS,** McGlinn D, Bohannan BJM, Nüsslein K, Tiedje JM, Rodrigues JLM (2020) Diazotrophs show signs of restoration in Amazon rain forest soils with ecosystem rehabilitation. *Applied and Environmental Microbiology* 86(10):e00195-20.

Hakim S, **Mirza BS**, Imran A, Zaheer A, Yasmin S, Mubeen F, Mclean JE, Mirza MS (2020) Illumina sequencing of 16S rRNA tag shows disparity in rhizobial and non-rhizobial diversity associated with root nodules of mung bean (*Vigna radiata* L.) growing in different habitats in Pakistan. *Microbiological Research* 231:1-14.

Rasul M, Yasmin S, Hakim S, Zaheer, **Mirza BS**, Mirza BS (2020) Metagenomic analysis of bacterial community associated with rhizosphere and phyllosphere of basmati rice. *Frontiers in Microbiology* (online) https://www.biorxiv.org/content/10.1101/2020.04.09.034009v1.

Larson CA, **Mirza BS,** Rodrigues JLM, Passy SI (2018) Iron limitation effects on nitrogen-fixing organisms with possible implications for Cyanobacterial blooms. *FEMS Microbiology Ecology* 94:fiy046. https://doi.org/10.1093/femsec/fiy046.

Mukhtar S, **Mirza BS**, Mehnaz S, Mirza MS, Mclean JE, Malik KA (2018) Impact of soil salinity on the microbial structure of halophyte rhizosphere microbiome. *World Journal of Microbiology and Biotechnology* 34:136.

Mukhtar S, Mehnaz S, Mirza MS, **Mirza BS,** Malik KA (2018) Diversity of *Bacillus*-like bacterial community in the rhizospheric and non-rhizospheric soil of halophytes (*Salsola stocksii* and *Atriplex amnicola*) and characterization of osmoregulatory genes in halophilic Bacilli. *Canadian Journal of Microbiology* 64(8):567-579.

Hakim S, **Mirza BS**, Zaheer A, Mclean JE, Mirza MS (2018) Retrieved 16S rRNA and *nifH* sequences reveal co-dominance of *Bradyrhizobium* and *Ensifer* (*Sinorhizobium*) strains in field-collected root nodules of the promiscuous host *Vigna radiata* (L.) R. Wilczek. *Applied Microbiology and Biotechnology* 102:485-497.

***Mirza BS,** Sorensen DL, Dupont RR, McLean JE (2017) New arsenate reductase gene (*arrA*) PCR primers for diversity assessment and quantification in environmental samples. *Applied and Environmental Microbiology* 83:eAEM2725-16.

***Mirza BS,** Sorensen DL, Dupont RR, McGlinn D, McLean JE (2017) General community and *Dehalococcoides* populations' characterization from differentially trichloroethene dechlorinating, large flow-through columns. *Applied Microbiology and Biotechnology* 101:4799-4813.

Meyer KM, Klein AM, Rodrigues JLM, Nüsslein K, Tringe S, **Mirza BS,** Tiedje JM, Brown T, Bohannan BJM (2017) Conversion of Amazon rainforest to agriculture alters community traits of methane-cycling organisms. *Molecular Ecology* 26:1547-1556.

Mirza BS, Sorensen DL, Dupont RR, McLean JE (2016) *Dehalococcoides* abundance and alternate electron acceptor effects on large, flow-through trichloroethene dechlorinating columns. *Applied Microbiology and Biotechnology* 100:2367-2379.

Zaheer A, **Mirza BS**, Mclean JE, Yasmin S, Shah TM, Malik KA, Mirza MS (2016) Association of plant growth-promoting *Serratia* spp. with the root nodules of chickpea. *Research in Microbiology* 167:510-520.

Mirza BS, Potisap C, Nüsslein K, Bohannan BJM, Rodrigues JLM (2014) Response of free-living nitrogen-fixing microorganisms to land use change in the Amazon rainforest. *Applied and Environmental Microbiology* 80:281-288.

Mirza BS, Muruganadam S, Meng X, Sorensen DL, Dupont RR, McLean JE (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 FS, Rodrigues JLM, Zhou J, Wu L, Mueller R, **Mirza BS,** Bohannan BJM, Nüsslein K, Yuan T, Deng Y, Tiedje JM, Pellizari VH (2014) Land use change alters functional gene diversity, composition and abundance in Amazon rainforest soil microbial communities. *Molecular Ecology* 23:2988-2999.

Mueller R, Paula F, **Mirza BS,** Rodrigues JLM, Nüsslein K, Bohannan BJM (2014) Links between plant and fungal communities across a deforestation chronosequence in the Amazon rainforest. *International Society of Microbial Ecology* 8:1548-1550.

Rodrigues JLM, Pellizari VH, Mueller R, Baek KH, Jesus E, Paula FS, **Mirza BS,** Tiedje JM, Bohannan BJM, Nüsslein K (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 BS, Rodrigues JLM (2012) Development of a direct isolation procedure for free-living diazotrophs under controlled hypoxic conditions. *Applied and Environmental Microbiology* 78:5542-5549.

Hahn D, **Mirza BS**, Vogel CG, Tonolla M (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, **Mirza BS**, Dawson JO, Hahn D (2010) *Frankia* populations in soil and root nodules of sympatrically grown Alnus taxa. *Microbial Ecology* 61:92-100.

Mirza BS, Welsh AK, Hahn D (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 BS, Welsh AK, Hahn D (2009) Diversity of Frankiae in soils from five continents. *Systematic and Applied Microbiology* 32:558-570.

Mirza BS., Welsh AK, Rasul G, Rieder JP, Paschke MW, Hahn D (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 AK, **Mirza BS**, Rieder JP, Paschke MW, Hahn D (2009) Diversity of Frankiae in root nodules of *Morella pensylvanica* grown in soils from five continents. *Systematic and Applied Microbiology* 32:201-210.

Mirza BS, Welsh AK, Hahn D (2007) Saprophytic growth of inoculated *Frankia* sp. in soil microcosms. *FEMS Microbiology Ecology* 62:280-289.

Mirza BS, Mirza MS, Bano A, Malik KA (2007) Co-inoculation of chickpea with *Rhizobium* isolates from roots and nodules and phytohormone producing Enterobacter strains. Australian *Journal of Experimental Agriculture* (re-named as Animal Production Science) 47:1-8.

Manuscripts in review/in preparation

Kincaid J, **Mirza BS** (2023) Distribution of Cyanobacteria and cyanotoxins associated genes within Missouri Little Sac and James River Watersheds. Will be submitted to *FEMS Microbiology and Ecology* (In preparation).

Durstock W, Urshadani S, Owen M, Pavlowsky RT, **Mirza BS**, (2023) Temporal variability of human fecal indicator bacteria and distribution of waterborne pathogens in Sequiota Spring, Springfield Missouri. Will be submitted to *Canadian Journal of Microbiology* (In preparation).

Edwards B, **Mirza BS** (2023) Role of soil pH in driving the selection of rhizobial endophytes within soybean root nodules. Will be submitted to *Plant and Soil* (In preparation).

McElveen S, Burton M, **Mirza BS** (2023) Selection of diazotrophs within root nodules and rhizosphere of soybean plants. Will be submitted to *International Journal of Molecular Sciences* (In preparation).

Research Grants/Contracts (Funded)

Edwards B, **Mirza BS**, Owen M, Pavlowsky RT (2023-25) Bacteria Source Tracking to Support Watershed Planning, Pearson Creek, Greene County, Missouri. Total funding **$22,413**; Mirza BS lab share **$14,400**.

Mirza BS (2023). Assessment of the distribution of potential waterborne pathogens within Sequiota spring using Next-Gen DNA. Environmental Services Department, City of Springfield. Funding **$5,985**.

Pavlowsky RT, **Mirza BS**, Owen M (2022) Human fecal marker testing in Sequiota spring, Springfield Missouri. Source: Environmental Services Department: City of Springfield, MO. Total funding **$6,413**; Mirza BS lab share **$5,985**.

Mirza BS (2020-21) Assessment of Cyanobacteria diversity and their toxigenic potential within the Little Sac watershed ecosystem using Next-Gen DNA. US Geological Survey. Project cost **$67,402**.

Mirza BS (2021) Assessment of potential bacterial pathogens within Sequiota spring using Next-Gen DNA. Source: Ozarks Environmental and Water Resources Institute. Funding **$3,000**.

Pavlowsky RT, **Mirza BS**, Owen M (2019-2020) Bacteria source tracking assessment of Sequiota spring, Springfield Missouri. Source: Environmental Services Department: City of Springfield, MO. Total funding **$12,815**; Mirza BS lab share **$10,260**.

Mirza BS (2020) Course reassignment fund provided by the Office of Research Administration for submitting a major external funding proposal, Funding **$3,000**.

Mirza BS (2018-19) The diversity of rhizobia and non-rhizobia endophytes within the root nodules of soybean. Missouri State University Faculty Research Grant, Funding **$7,500**.

Mirza BS (2020) Bacteria source tracking of Sequiota cave and wastewater samples. City of Springfield Southwest Wastewater Treatment Plant, Funding **$1,800**.

Mirza BS (2018) Bacteria source tracking to support watershed planning (Federal 319 Grant), MSU-OEWRI via Watershed Committee of the Ozarks/MDNR/USEPA, Funding **$6,000**.

Manoj F, **Mirza BS** (2018-19) The diversity of *Bradyrhizobium* and non-rhizobia endophytes within the root nodules of soybean. Tri-Beta Biological Society, Funding **$750**.

Mirza BS (2018-19). Soil and plant-associated bacterial identification and *nifH* gene amplification. Soils Biodyne, USA, Funding **$2,400**.

Pavlowsky RT, **Mirza BS**, Owen M (2018) Pearson Creek bacteria source tracking assessment. Total funding: **$9,975**, Mirza BS lab share **$6,230**.

Mirza BS (PI), Mclean JE (2013-15) Biogeographic distribution of the dissimilatory arsenate reductase gene (*arrA*) in association with the increased arsenic contamination in the groundwater of Northern Utah. Mineral Lease Fund from the State of Utah, Funding **$147,870**.

Nüsslein K, Rodrigues JLM, Bohannan BJM, Brown CT, **Mirza BS**, Tiedje JM, Chain P (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**.

Major Research Grants Submitted (but not funded)

Mirza BS (2023) Assessment of Cyanobacteria diversity and their toxigenic potential within Lake Springfield and Sequiota spring. US Geological Survey. Project cost **$50,303**.

Mirza BS (PI), Owen M, Pavlowsky RT (2022) Investigating sources of fecal contamination and distribution of bacterial pathogens in springs and rivers within the city of Springfield Missouri. US Geological Survey. Funds requested **$142,834.**

Maher S and **Mirza BS** (2022). Molecular methods for monitoring the movement of wildlife through concrete barrier gaps. Missouri Department of Natural Resources (MoDOT research project). Funds requested **$199,579**.

Mirza BS (2020) Career: Investigating the sources of bacterial contamination of Little Sac Watershed; bacterially impaired karst water system. National Science Foundation. Funds requested **$500,305**.

Mirza BS (PI), Kim K, Lupfer C, Qiu W, Ulbricht R (2019) MRI/RUI: Acquisition of a NextSeq 550 sequencing instrument for research and education at Missouri State University. National Science Foundation. Funds requested **$414,196**.

Burton M, **Mirza BS** (2018) Next-Gen analysis of soil organisms and their contributions to soybean and soil health in diverse cropping sequences. Missouri Soybean Merchandising Council. Funds requested **$50,740**.

Mirza BS (PI), Kim K, Lupfer C, Qiu W, Ulbricht R (2018) MRI/RUI: Acquisition of a NextSeq 550 sequencing instrument for research and education at Missouri State University. National Science Foundation. Funds requested **$383,626**.

Mirza BS (PI), Dupont R, Mclean J (2017). Active bacterial community and *Dehalococcoides mccartyi* strain composition at transitional stages of vinyl chloride transformation to ethane. National Science Foundation. Funds requested **$300,000**.

Oral and Poster Presentations (* my lab students)

* Durstock W, Urushidani S, **Mirza BS** (**Won first place poster presentation award**) A microbial source tracking study to identify fecal contamination in karst water system. American Society of Microbiology Missouri Branch Meeting, October 28, 2023. University of Missouri Columbia, Missouri

*Roman C. Selection of *Bradyrhizobium* and *Sinorhizobium* in soybean root nodules with differing pH environments. 60th Annual Missouri Academy of Science Meeting, April 21, 2023. Missouri Southern State University, Joplin, Missouri

*Edwards B, **Mirza BS** (**Won outstanding poster presentation award**) Effect of soil pH and indigenous bacterial populations in selecting rhizobial endophytes within soybean root nodules. 30th Frank Einhellig Graduate Interdisciplinary Forum, April 29, 2023. Missouri State University, Springfield, MO

*Durstock W, **Mirza BS** (poster) A microbial source tracking study to identify fecal contamination in karst water system. 30th Frank Einhellig Graduate Interdisciplinary Forum, April 29, 2023. Missouri State University, Springfield, MO

*Roman C, Edward B, Selection of *Bradyrhizobium* and *Sinorhizobium* in soybean root nodules with differing pH environments. 30th Frank Einhellig Graduate Interdisciplinary forum, April 29, 2023. Missouri State University, Springfield, MO

*****Edwards B, **Mirza BS** (poster) Selection of *Bradyrhizobium* and *Sinorhizobium* in soybean root nodules with differing pH environments. 60th Annual Missouri Academy of Science Meeting, April 21, 2023. Missouri Southern State University, Joplin, Missouri

*****Durstock W, Urushidani S, **Mirza BS** (poster) A microbial source tracking study to identify fecal contamination in karst water system. 60th Annual Missouri Academy of Science Meeting, April 21, 2023. Missouri Southern State University, Joplin, Missouri

Stewart C, Russel R, Mirza BS, Afagwu R (poster) How flower longevity affects epiphytic bacteria abundance and community composition. 60th Annual Missouri Academy of Science Meeting, April 21, 2023. Missouri Southern State University, Joplin, Missouri

*Roman C, Edward B, Selection of *Bradyrhizobium* and *Sinorhizobium* in soybean root nodules with differing pH environments. 60th Annual Missouri Academy of Science Meeting, April 21, 2023. Missouri Southern State University, Joplin, Missouri

*****Edwards B, **Mirza BS** (poster) Role of soil pH in driving selection rhizobial endophytes within soybean root nodules. American Society of Microbiology Missouri Valley Branch Meeting, March 11, 2023, Kansas State University, Manhattan, Kansas

*Durstock W, Urushidani S, **Mirza BS** (poster) A microbial source tracking study to identify fecal contamination in a Karst water system. American Society of Microbiology Missouri Valley Branch Meeting, March 11, 2023, Kansas State University, Manhattan, Kansas

Mirza BS (Invited speaker) Microbial communities associated with N-cycle. Bacterial Identification & Metagenomics conference, March 20, 2023. National Institute of Biotechnology and Genetic Engineering, Faisalabad, Pakistan

Urushidani S and **Mirza BS** (oral) A microbial source tracking study to identify fecal contamination in a karst water system. Eighteenth annual joint meeting of the Missouri Water Environment Association (MWEA) and the Missouri Section of the American Water Works Association (MO-AWWA), March 24-27, 2023. Osage Beach, Missouri

Mirza BS (Invited keynote speaker) Bacterially impaired watersheds: Distribution of Cyanobacteria and bacterial pathogens. 22nd Annual Missouri Environmental Health Association Conference, April 04-07, 2022. Springfield, Missouri

Mirza BS (Oral) Distribution of potential bacterial pathogens in bacterially impaired watersheds. Annual Meeting of the MV Branch of ASM, March 18-19, 2022. Oklahoma State University Stillwater, OK

Mirza BS (Invited keynote speaker) Soybean root nodule and rhizosphere microbiome: Distribution of rhizobial and non-rhizobial endophytes. 1st International Electronic Conference on Biological Diversity, Ecology and Evolution, March 15, 2021. Basel, Switzerland (Virtual)

*****Kincaid J, **Mirza BS** (**Won outstanding poster presentation award**) Detection of Anatoxin-a and diversity of Cyanobacteria in Greene County water systems. 28th Frank Einhellig Graduate Interdisciplinary Forum, May 04, 2021. Missouri State University, Springfield, MO

Mirza BS (Invited keynote speaker) Insight into soybean root nodule. Missouri and Missouri Valley ASM Branch Meeting. Mar 19-20, 2021. William Jewell College, Liberty, MO (Virtual)

*****Jamroch M, *****Scott A, *****Kincaid J, **Mirza BS (2nd place award in the poster presentation)** Anatoxin-A detection in Springfield water systems. CNAS Undergraduate Research Symposium, May 2021. Missouri State University, Springfield, MO

Mirza BS (Radio interview) Distribution of waterborne pathogens. KSMU Ozark Public Radio, Apr 05, 2021. Missouri State University, Springfield, MO https://www.ksmu.org/post/stem-spots-identifying-pathogens-aquatic-environments#stream/0

*****Kincaid J, **Mirza BS (Oral)** Pathogen detection of bacterially impaired water systems in the Karst ecosystems of Greene and Polk counties. Missouri and Missouri Valley ASM Branch Meeting. Mar 19-20, 2021. William Jewell College, Liberty, MO (Virtual)

Mirza BS (Served as a panelist to discuss) Experiences of teaching international students online. Globally Responsive Education and Teaching, Nov 19, 2021. Missouri State University, Springfield, MO

*****Kincaid J, Pavlowsky RT, Owen M, **Mirza BS (Oral)** Bacterial source tracking and pathogen diversity in Green and Polk county streams. The Missouri Natural Resources Conference, Feb 04-06, 2020. Tan-Tar-A Resort, Osage Beach, MO

Mirza BS (Invited keynote speaker) Diversity of rhizobial and non-rhizobial endophytes within soybean root nodules. Humboldt Kolleg International Conference on Microbes for Sustainable Agriculture, Mar 25-26, 2019. Forman Christian College University, Lahore, Pakistan

Mirza BS (Guest speaker) Impact of land-use changes on the diazotrophic microbial communities in a tropical forest ecosystem. Public Seminar, Jul 15, 2019. College of Plant Protection, Southwest University, China

Mirza BS (Guest seminar speaker) Role of plant endophytes in improving plant growth. Public Seminar, Jul 18, 2019. College of Biotechnology, Southwest University, China

*****Kincaid J, Owen M, Pavlowsky RT, **Mirza BS (Oral)** Bacterial source tracking of human, bovine, dog, and goose fecal contamination and pathogens in the Green and Polk County streams. 26th Frank Einhellig Graduate Interdisciplinary Forum, May 04, 2019. Missouri State University, Springfield, MO

*****Kincaid J, **Mirza BS (Poster)** Bacterial source tracking of human, bovine, dog, and goose fecal contamination and pathogens in Greene and Polk county streams. 55th Annual Missouri Academy of Sciences meeting, Apr 12-13, 2019. Northwest Missouri State University, Maryville, MO

*****Mayhood P, *****Ellison M, Burton M, **Mirza BS (Poster)** Diversity of rhizobial and non-rhizobial endophytes within soybean root nodules of the same soybean root system. 55th Annual Missouri Academy of Sciences meeting, Apr 12-13, 2019. Northwest Missouri State University, Maryville, MO

*****Mayhood P, **Mirza BS (Oral)** Diversity of rhizobial and non-rhizobial endophytes within soybean root nodules of the same plant. 26th Frank Einhellig Graduate Interdisciplinary Forum, May 04, 2019. Missouri State University, Springfield, MO

*****Manoj F, Burton M, *****McElveen S, **Mirza BS (Poster)** The diversity of *Bradyrhizobium* and non-rhizobial endophytes within the root nodules of soybean. 55th Annual Missouri Academy of Sciences Meeting, Apr 12-13, 2019. Northwest Missouri State University, Maryville, MO

*****Manoj F, **Mirza BS (Poster)** The diversity of *Bradyrhizobium* and non-rhizobial endophytes within soybean root nodules. NC-2 District Conference, Mar 30, 2019. Missouri Western State University, Saint Joseph, MO

*****Manoj F, *****Kleiman S, **Mirza BS (Poster)** The diversity of Bradyrhizobium and non-rhizobial endophytes within soybean root nodules. Undergraduate Research Day, Apr 26, 2019. Missouri State University, Springfield, MO

*****Kincaid J, Owen M, Pavlowsky RT, **Mirza BS (Won the first-place award)** Bacterial source tracking of human, bovine, dog, and goose fecal contamination in the little sac watershed. 9th Annual CNAS Undergraduate Research Day, May 03, 2018. Missouri State University, Springfield, MO

Mirza BS (Invited seminar speaker) Ecology of nitrogen-fixing and trichloroethylene degrading microbial communities. Biological Seminar Series, Nov 12, 2018. Missouri University of Science and Technology, Rolla, MO.

Mirza BS (Oral) Next-Gen analysis of soil organisms and their contributions to soybean and soil health in diverse cropping sequences. Missouri Soybean Merchandising Council Annual Meeting, Jan 31, 2018. Jefferson City, MO

Mirza BS, Sorensen DL, Dupont RR, McLean JE **(Poster)** General community and *Dehalococcoides* populations' characterization from differentially trichloroethene dechlorinating, large flow-through columns. American Society for Microbiology Annual Meeting, Jun 16-21, 2016. Boston, MA

Mirza BS, Meng X, Sorensen DL, Dupont RR, McLean JE **(Poster)** Characterization of depth-related changes in the structural and functional microbial community associated with arsenic reduction in soil profile of Northern Utah. 9th International Society of Subsurface Microbiology Meeting, Oct 05-10, 2014. Pacific Grove, CA

Mirza BS, Meng X, Breon W, Sorensen DL, Dupont RR, McLean JE **(Poster)** Metagenomic characterization of arsenate reducing microbial community associated with the arsenic contaminated sediments of Northern Utah. 6thAnnual Argonne Soil Metagenomics Meeting, Oct 01-03, 2014. Charleston, IL

Mirza BS, Muruganadam S, McGlinn D, Sorensen DL, Dupont RR, McLean JE **(Poster)** Characterization of the microbial community and environmental variables associated with trichloroethylene reducing large flow columns. 114th American Society for Microbiology Annual Meeting, May 17-20, 2014. Boston, MA

Mirza BS (Oral) Evaluation of solid medium based methods for the isolation of free-living nitrogen-fixing microorganisms. 43rd annual Texas Branch Meeting of the American Society for Microbiology, Nov 10-12, 2011. University of Texas Arlington, TX

Tiedje JM, Bohannan BJM, Nüsslein K, Pellizari VH, Baek KH, Feigl BJ, Jesus EC, **Mirza BS**, Muller R, Paula FS, Tsai SM, Rodrigues JLM **(Poster)** Amazon rainforest microbial observatory: Deforestation of the largest CO_2 sequestration terrestrial ecosystem in the world causes losses in microbial community spatial structure. 6th Annual DOE JGI User Meeting on Genomics of Energy and Environment, Mar 22-24, 2011. Walnut Creek, City, CA

Mirza BS (Oral) *Frankia* in soil. Genome Biology Group, Feb 26, 2010. University of Texas Arlington, TX

Mirza BS, Nüsslein K, Bohannan BJM, Tiedje JM, Pellizari VH, Feigl BJ, Rodrigues JLM **(Poster)** Understanding the effects of deforestation on the diversity of nitrogen fixing populations in the Amazon Forest. 13th International Symposium on Microbial Ecology, Aug 21-28, 2010. Seattle, WA

Nüsslein K, Baek KH, Hamaoui G, Rodrigues JLM, **Mirza BS**, Bohannan BJM, Tiedje JM, Jesus EC, Pellizari VH, Feigl BJ **(Poster)** Amazon rainforest microbial observatory: The effects of land use change on diversity and microbial community composition. 13th International Symposium on Microbial Ecology, Aug 21-28, 2010. Seattle, WA

Mirza BS (Oral) Fate of *Frankia* strains in soil and in the rhizosphere of a non-actinorhizal plant. 15th International Frankia and Actinorhizal Plants Meeting, Oct 19-23, 2008, Bariloche, Argentina

Non-peer Reviewed Technical Reports (*MSU graduate students)

Mirza BS (2023) Next-Gen DNA sequencing of Sequiota Spring for the City of Springfield, Missouri, Environmental Service Department.

Mirza BS (2022) Assessment of Cyanobacteria diversity and their toxigenic potential with the Little Sac watershed ecosystem using Next-Gen DNA sequencing. USGS Project Technical Report. Submitted to USGS through Missouri Water Resources Research Center.

Owen M, **Mirza BS**, *Pursley TJ, Pavlowsky RT (2021) Bacteria source tracking assessment of Sequiota spring. Department of Environmental Services City of Springfield, MO

Mirza BS (2020) Bacteria source tracking of Sequiota cave and wastewater treatment plant Samples. Southwest Wastewater Treatment Plant Laboratory, Springfield, MO

Owen M, **Mirza BS**, *Pursley TJ, Pavlowsky RT (2020) Bacteria source tracking assessment of Sequiota spring, Springfield Missouri. OEWRI Technical Reports. Department of Environmental Services City of Springfield, MO

Mirza BS (2019) Identification and *nifH* gene sequencing from soil bacteria. Soils BioDyne USA

Owen M, **Mirza BS**, *Grace R, *John KC, Pavlowsky RT (2019) Bacteria source tracking to support watershed planning. Green County Resource Management Department, Springfield, MO

Mirza BS, Owen MR, *Kincaid JC, Pavlowsky RT (2018) Bacteria source tracking to support Watershed Planning, Little Sac River, Southwest Missouri State University. Watershed Committee of Ozarks

Courses Taught (Including Labs)

At Missouri State University

- **General Microbiology** (BIO-312) Fall 2018 to present (every semester, > 80 students)
- **Elements of Microbiology** (BIO-212) Fall 2023 (>100 students)
- **Environmental Microbiology** (BIO-508/608) Fall 2017 to present (every Fall semester)
- **Immunology lectures** (BIO-511/611) Fall 2023
- **Industrial Microbiology** (BIO 512/613). Spring 2018 to present (every spring semester)

- **General Microbiology Laboratory** (BIO-313). Fall 2017 to 2021 (fall or spring semester)
- **Undergraduate Research** (BIO-499). Fall 2017 to present (every semester)
- **Advanced Environmental Microbiology** (BIO730) Fall 2019-22 (1-3 graduate students)
- **Advanced Industrial Microbiology and Biotechnology** (BIO730) 2019-23 (1-3 graduate students)

At other universities

- **Introduction to Environmental Microbiology** (CEE-2620) Co-taught with Dr. Darwin Sorensen (2015 and 2017 spring semester), Department of Civil and Environmental Engineering, Utah State University, Logan, UT
- **General Microbiology** (BIO-2400), **Molecular Techniques in Microbial Ecology** (BIO-7360) and **Aquatic Microbial Ecology** (BIO-7410), as Doctoral Instructional Assistant (2006-2009, Texas State University San Marcos, TX

Teaching Awards

Master Online Course Recognition Award for "Best in Design and Layout" (2022) Online Microbiology Class, Missouri State University

Faculty Excellence in Teaching Award (2021) College of Natural and Applied Sciences, Missouri State University

Teaching and Advising Workshops/Certification (at MSU)

- Course-based Undergraduate Research Experiences (CUREs): Incorporating STEM Research into the Curriculum, Online, AAAS- Improving Undergraduate STEM Educational Initiative, 7, Oct 2023.
- CNAS DEI Committee and Division for Diversity, Equity, and Inclusion. Inclusive Excellence 101 Workshop (2023), Missouri State University
- Sear Training (conducting a legal and effective search), Missouri State University
- Master Advisor Workshop (2021)
- Career Advising: Faculty Panel on Best Practices (2021)
- Advising International Students from Latin America (2021)
- Online Course Development Boot Camp (2021)
- Showcase on Teaching and Learning organized by Faculty Center for Teaching and Learning (2017 to 2021)
- Accessibility Workshop to make class material accessible (2018)
- Master Advisor Workshop (2017)

Graduate Students (supervisor/co-supervisor at MSU)

Current.

Matthew Knoll. Variations in the rhizosphere microbiome with the age of the host plant. Will be graduating in fall 2025 (advisor)

Rubina Sherchan. Isolation and whole genome sequences analysis of phosphate accumulation bacteria. Will be graduating in fall 2025 (advisor)

William Dursock. Distribution of potential waterborne pathogens and cyanobacteria within impaired watersheds. Will be graduating in fall 2024 (advisor)

Cole Roman. Identification of key factors driving the selection of plant-associated microbiomes in root nodules and rhizosphere of soybean plants. Will be graduating in spring 2024 (advisor)

Previous.

Brianne Edwards. Role of soil pH in Selecting rhizobial and nonrhizobial endophytes in Soybean root nodules, Graduated in spring 2023 (advisor)

John Kincaid. Investigation into bacterial impairment of Greene and Polk County Water Systems, Graduated in Summer 2021 (advisor)

Parris Mayhood. Investigation of the individual Soybean root nodule microbiome, Graduated in Spring 2020 (advisor)

Charles Agbavor. The Effects of an applied phyllosphere-microbiome on gas exchange and growth of Soybean infected with *Pseudomonas Syringae*: Harnessing the power of the microbiome, Graduated in Spring 2020 (co-advisor)

Scott McElveen. Characterizing nodule endophyte communities in *Glycine Max* and *Lablab purpureus* using Next-Gen DNA sequencing, graduated in the summer 2019 (co-advisor)

Brad Culbertson. Insights into the business of craft beer and how bioprospecting methods for novel microbes provide a unique perspective into innovation, Non-thesis PSM program, Graduated in Spring 2020 (advisor)

Sijuade Otunomo. Isolation of nonrhizobial endophytes from Soybean root nodules, Spring 2018-23. Non-thesis PSM program (advisor)

Graduate Students' Theses Committee Member

Rita Afagwu (graduating spring 2024), **Parker Campbell** (graduating in fall 2023), **Devyn Worthley** (Summer 2023), **Ashok Dubey** (summer 2023), **Catherine Rippe** (spring 2023), **Riley Nadler** (fall 2022), **Gates Breedlove (**fall 2021), **Charles Agbavor** (spring 2020), **Oluwasegun Abolade** (fall 2019), **Scott McElveen** (summer 2019), **Orion Peterson,** (fall 2018), **Hazzar Abysalamah** (fall 2018).

Undergraduate Students Supervised at MSU

Mercedez Hanlon (fall 2022 to fall 2023), **Autumn Bellew** (spring 2023), **Tyler Neff** (spring 2023), **William Dursock (**Fall 2022), **Matthew Knoll (**Summer 2022 to spring 2023), **John Higgins (**Spring 2022), **Megan Keeler** (Spring 2022), **Erin Harrelson** (Spring 2022 to fall 2023), **Cole Roman (**Fall 2021), **Elias Ascencio (**Fall 2021), **Louis Brown (**Spring 2020 to Fall 2020), **Madoch Jamroch (**Spring 2021), **Kameron Porter (**Spring 2021), **Allison Scott (**Spring 2021), **Ellison Marina (**Spring 2019 to Summer 2019), **Emily Heaton (**Spring 2019 to Fall 2019), **Avery Tayler (**Fall 2020), **Zachary Drake (**Spring 2019 to Summer 2019), **Elizabeth Wyman (**Spring 2019 to Summer 2019), **Sohnya Kleiman** (Spring 2019 to Summer 2019), **Femila Manoj** (Fall 2018), **John Kincaid** (Fall 2018 to Fall 2019), **Matthew Sappington** (Fall 2018), **Allison Lambert** (Summer 2018 to 2019).

Student's presentations/research awards

William D (2023) **First place poster presentation award**, AMS-Midwest Meeting Oct 14-15, University of Missouri in Columbia, MO

Roman C (2023) **Outstanding presentation award, 3M Thesis Competition Award**, contested across the College of Natural and Aapplied Sciences

Edwards B (2023) **Outstanding poster presentation award**, 30th Frank Einhellig Graduate Interdisciplinary forum, MSU

Harrelson E (2023) USDA-Agriculture Research Service Award, Environmental Microbial and Food Safety Laboratory Summer Internship.

Edwards B (2022) First place in **3M Thesis Competition Award**, contested across Missouri State University

Edwards B (2022) **3M Thesis Competition Award**, contested across the College of Natural and Aapplied Sciences

Edwards B (2022) **Carl Morrow Scholarship** in the Soil and Water field (**$1,000**)

Edwards B (2022) **Summer graduate assistant award**, MSU (**$2,668)**

Kincaid J (2021) **Outstanding poster presentation award**, 28th Frank Einhellig Graduate Interdisciplinary forum, MSU

Jamroch M, Scott A (2021) S**econd-place award in a poster presentation**, CNAS Undergraduate Research Symposium,

Mayhood P (2019) **3M Thesis Competition Award**, CNAS

Kincaid J (2018) **First-place poster presentation award**, 9th Annual CNAS Undergraduate Research Day, MSU

Manoj F (2018) **Tri-Beta Biological Society** Research Award **$750**,

Mayhood P (2018) **Summer graduate assistant award**, MSU (**$2,668)**

Services Activities

External Services.

- Member of Scientific Review Committee for Ozarks Science and Engineering Fair (2017-present). Review microbiology-related projects (~10-15 per year) and approve safety rules and procedures.
- Disease Detectives event leader for Science Olympiad (2018-present). Prepare, conduct, and evaluate exams, and submit a list of selected students at the regional level competition (~40 students per year).
- Advisory Board Member of Missouri Water Resources Research Center (2017 to present). Attend annual board meetings and review major research grant proposals for the approval of funding.
- Contributing Member of the American Society of Microbiology (2018 to present). Review manuscript for Applied and Environmental Microbiology.
- Member of American Association for the Advancement of Science (2018-2021).
- Organized and conducted a class trip for students from Phelps Centre for Gifted Education (2019). Organized lab activities to demonstrate the importance of washing hands, ubiquity of microorganisms, and microscopic observation of bacterial and fungal cells.
- Prepared technical reports for several organizations such as USGS, OEWRI, WCO, Environmental Services Springfield MO, and SWTP (as described above).

Internal Services to the biology department at Missouri State University.

- Search Committee Chair (2023) for the position of a full-time tenure track assistant professor in microbiology at Missouri State University.
- Search Committee Chair (2023) for the position of a non-tenure track assistant professor in microbiology at Missouri State University.
- Per course instructor hiring committee (chair) for microbiology classes (Fall 2023)
- Biology department coordinator for the Master of Natural and Applied Sciences Graduate Program at MSU
- Member of the Graduate Student Committee (Spring 2022 to present): Reviewed applications of potential graduate students for admissions in the Biology department (~35 applications for a semester).
- Supervising and directing Microbiology lab teaching group (two instructors and 8 graduate students). On average 8-10 lab sections are taught every semester (~200 to 250 students).

- Reviewed research proposals for funding of biology "Summer Research Assistant" (2021-22; ~10-15 proposals per year).
- Committee Member of Course Load Equity Committee (2022). Review and comparison of the teaching load and development of new courses at MSU along with other departments as well as with other universities.
- Reviewed and Nominated Biology faculty applications for annual teaching awards (2022).
- Coordinated the purchase of QuantStudio 6 PCR machine (2019) for the Department of biology.
- Member of a Greenhouse Construction Committee (2018).

Review and Editorial Services

- For the Missouri Water Resources Research reviewed 10 major research grant proposals, provided detailed feedback for authors, and made recommendations for the approval of funding.
- Editorial Board Member of Diversity Journal (2019 to present). An initial screen of the microbial ecology-related manuscripts and approve or reject for a detailed review (~5 manuscripts per year).
- Peer-reviewed **research articles (~30)** in the last five years for several microbiology journals including Applied and Environmental Microbiology, Microbial Ecology, Symbiosis, Plant and Soil, Sustainability, Environmental Science Processes and Impacts, Agriculture Ecosystems and Environment, Environmental Science and Pollution Research, Soil Science Society of America Journal, Molecular Biology Reports, Journal of Basic Microbiology and Biodiversity, Soil Ecology, Mitochondrial DNA
- Evaluated the dissertation work of a Ph.D. student as an external examiner (2021) and provided a detailed review and suggested major revisions with additional experiments.
- Reviewed a grant proposal for NSF (2018)

References

1. **Dr. Laszlo G Kovacs** — Professor
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   Email: LaszloKovacs@MissouriState.edu
2. **Dr. Dittmar Hahn** (Ph.D. research advisor) — Professor and department chair
   Texas State University, Department of Biology, 601 University Drive, San Marcos, TX 78666, USA
   Phone: 512- 245-3372
   Fax: 512 245-8713
   Email: dh49@txstate.edu

3.	**Dr. Darwin Sorensen** (Postdoc research advisor)	Research professor Utah State University, Department of Civil and Environmental Engineering, Utah Water Research Laboratory, 8200 Old Main Hill, Logan, Utah 84322-8200 **Phone:** 435-797-3207 **Fax:** 435-797-3663 **Email:** darwin.sorensen@usu.edu