

Hannah M Goemann

507-383-6573 | hannah.goemann@montana.edu | Helena MT, USA
www.linkedin.com/in/hmgoemann/

Education

Doctorate of Philosophy: Microbiology & Cell Biology Dec. 2023
Montana State University, Bozeman MT
GPA 3.96
Thesis Title: Rhizobiome Dynamics in Plant Growth Promotion and Abiotic Stress
Deciphering the intricate relationships between plants and microbes and their responses to environmental perturbations is critical for fundamental ecology and innovative biotechnology in a changing world.
Leveraged next-generation sequencing techniques, soil biogeochemistry analyses and plant physiological assessments to investigate belowground plant-microbe interactions in natural and agricultural ecosystems.

Bachelor of Arts: Biochemistry, Minor: Biology May 2017
University of Minnesota Morris, Morris MN
GPA: 3.89
Capstone Title: The chemistry behind and feasibility of on-campus biodiesel production from waste oils

Professional Experience

Postdoctoral Researcher Jan. 2025 – Present
Plant Pathology Department (Soil Viromics), University of California Davis, Davis CA
• Lead field collection and processing of soil viromes to understand impacts of organic matter composition on viral community diversity and viral-bacterial interactions in organic tomato production systems.
• Synthesize findings for publication as peer-reviewed manuscripts and for stakeholder dissemination

Postdoctoral Researcher Jan. 2024 – Dec. 2024
Ecology Department, Montana State University, Remote
• Designed and implemented multi-omics exploration of plant rhizobiome responses to drought stress
• Developed manuscripts and proposals on plant-microbe interactions and drought stress
• Managed project outputs and operations including meetings, budgets, timelines, and findings dissemination

Graduate Research Assistant Jun. 2017 – Dec. 2023
Department of Microbiology and Cell Biology, Montana State University, Bozeman MT
• Spearheaded design and execution of multiple field-based and greenhouse experimental studies investigating plant-microbe interactions under drought and heat stress
• Formulated experimental findings with bioinformatics and advanced statistics utilizing command line-based programming tools including python and R.
• Mastered Illumina MiSeq next-generation sequencing platform operating procedures and sample preparation
• Optimized microbial DNA and RNA extraction procedures from complex soil samples
• Isolated, characterized, and cultivated native soil cyanobacteria for pilot-scale biofertilizer production
• Facilitated project management and communication between collaborators

Research Assistant May 2016 – May 2017
Department of Bioproducts and Biosystems Engineering, University of Minnesota, Morris MN
• Quantified algal growth in dairy wastewater with the goal of decreasing dairy effluent nutrient loads
• Engineered custom laboratory photobioreactors including both design and construction

Biodiesel Assessment Intern**Jan. 2016 – May 2016**

Office of Sustainability, University of Minnesota Morris, Morris MN

- Assessed potential for an on-campus biodiesel program
- Performed benchtop synthesis of biodiesel from campus waste oils

Research Assistant**Jan. 2016 – May 2016, Jan. 2015 – May 2015**

Department of Biology, University of Minnesota Morris, Morris MN

- Undergraduate Research Opportunity Program Scholarship
- Studied effects of environmental factors such as nutrient limitation and viral infection on algal cultures.

Research Assistant**Jan. 2014 – May 2015**

Department of Chemistry, University of Minnesota Morris, Morris MN

- Chemistry Undergraduate Research Fund Scholarship
- Investigated varying protonation states of curcumin dye using Raman spectroscopy
- Created educational laboratory exercises for General Chemistry and Physical Chemistry

Publications

^equal contributions

1. **Goemann HM**, Ulrich DEM, Peyton BM, Mueller RC. 2024. Increased divergence between heat-adapted rhizosphere and bulk soil microbiomes with increasing temperatures across a natural soil thermal gradient. *In review*
2. **Goemann HM**, Ulrich DEM, Peyton BM, Gallegos-Graves LV, Mueller RC. 2024. Severe and mild drought cause distinct phylogenetically linked shifts in the blue grama (*Bouteloua gracilis*) rhizobiome. *Frontiers in Microbiomes* 2:1310790. doi: [10.3389/fmibi.2023/1310790](https://doi.org/10.3389/fmibi.2023/1310790)
3. Mettler MK[^] **Goemann HM[^]**, Mueller R, Vanegas OA, Lopez G, Singh N, Venkateswaran K, Peyton BM 2023. Development of Martian saline seep models and their implications for planetary protection. *Biofilm*, 5. <https://doi.org/10.1016/j.biofilm.2023.100127>
4. Gay JD, **Goemann HM**, Currey B, Stoy PC, Miller P, Poulter B, Peyton BM, Brookshire ENJ 2022. Climate mitigation potential and soil microbial response of cyanobacteria-fertilized bioenergy crops in a cool semi-arid cropland. *GCB Bioenergy*, 14 (12). <https://doi.org/10.1111/gcbb.13001>
5. Ulrich DEM, Clendinen CS, Alongi F, Mueller RC, Chu RK, Toyoda J, Gallegos-Graves LV, **Goemann HM**, Peyton BM, Sevanto S, Dunbar J 2022. Root exudate composition shifts with drought severity in blue grama (*Bouteloua gracilis*). *Scientific Reports*, 12:12581. doi: [10.1038/s41598-022-16408-8](https://doi.org/10.1038/s41598-022-16408-8)
6. Goemann CLC, Wilkinson R, Henriques W, Bui H, **Goemann HM**, Carlson RP, Viamajala S, Gerlach R, Wiedenheft B 2022. Genome sequence, phylogenetic analysis and structure-based annotation reveal metabolic potential of Chlorella sp. SLA-04. *Algal Research*, 69. <https://doi.org/10.1016/j.algal.2022.102943>
7. **Goemann HM**, Gay JD, Mueller RC, Brookshire ENJ, Miller P, Poulter B, Peyton BM 2021. Aboveground and belowground responses to cyanobacterial biofertilizer supplement in a semi-arid, perennial bioenergy cropping system, *GCB Bioenergy*, 00:116. <https://doi.org/10.1111/gcbb.12892>
8. Ahmed S, Warne T, Smith E, **Goemann H**, Linse G, Greenwood G, Kedziora J, Sapp S, Kraner D, Roemer K, Haggerty J, Jarchow M, Swanson D, Poulter B, Stoy P. 2021. Systematic Review on Effects of Bioenergy from Edible vs Nonedible Feedstocks on Food Security. *npj Science of Food*, 5:9. <https://doi.org/10.1038/s41538-021-00091-6>
9. Alvarez, AL, Weyers, SL, **Goemann, HM**, Peyton BM, Gardner, RD 2021. Microalgae, soil, and plants: A critical review of microalgae as renewable resources for agriculture. *Algal Research*, 54. <https://doi.org/10.1016/j.algal.2021.102200>

10. Epstein K, Wood DJA, Roemer K, Currey B, Duff H, Gay JD, **Goemann HM**, Loewen S, Milligan MC, Wendt JAF, Brookshire E, Maxwell BD, McNew L, McWethy DB, Stoy PC and Haggerty JH. 2021. Toward an urgent yet deliberate conservation strategy: sustaining social-ecological systems in rangelands of the Northern Great Plains, Montana. *Ecology and Society*, 26 (1):10. <https://doi.org/10.5751/ES-12141-260110>

Presentations

1. International Society for Microbial Ecology:19 (2024, Cape Town, SA) Poster Presentation: Active rhizobiome dynamics in response to drought and heat stress in *Bouteloua gracilis*.
2. Ecological Society of America annual meeting (2024, Long Beach, CA, USA). Oral presentation: Active rhizobiome dynamics in response to drought and recovery.
3. Joint Genome Institute, Microbial Genomics and Metagenomics Workshop (2024, Berkely, CA, USA). Poster Presentation: Ecophysiology at Montana State University.
4. Ecological Society of America annual meeting (2023, Portland, OR, USA). Oral presentation: Increasing drought severity elicits a gradient response in the plant physiology, root exudation, and rhizosphere community composition of blue grama grass
5. Center for Biofilm Engineering Montana Biofilms Meeting (2023, Bozeman, MT, USA). Oral Presentation: 16S Ratios Method for Analysis of Active Microbial Communities
6. Montana State University Student Research Fair (2021, Bozeman, MT, USA), Poster Presentation: Persistence of a locally isolated cyanobacterial biofertilizer and its effects on the soil crust microbiome
7. Center for Biofilm Engineering Regulatory Meeting (2021, virtual), Poster Presentation: Persistence of a locally isolated cyanobacterial biofertilizer and its effects on the soil crust microbiome
8. Ecological Society of America Annual Meeting (2020, virtual), Oral presentation: Above and belowground effects of cyanobacterial biofertilizer in a bioenergy cropping system
9. Algae Biomass Summit (2020, virtual), Oral presentation: Plant growth, nutrient cycling, and microbial community response to cyanobacterial biofertilizer in a bioenergy cropping system
10. Algae Biomass Summit (2019, Orlando, FL, USA), Poster Presentation: Cyanobacterial biofertilizer in a perennial bioenergy cropping system
11. Algae Biomass Summit (2018, Houston, TX, USA), Poster Presentation: Cyanobacterial biofertilizer in a perennial bioenergy cropping system
12. American Chemical Society Annual Meeting (2017, San Francisco, CA, USA), Poster Presentation: Optimization of Mangosteen Dye-Sensitized Solar Cells
13. American Chemical Society Regional Meeting (2016, Anchorage, AK, USA), Poster Presentation: Optimization of Mangosteen Dye-Sensitized Solar Cells
14. Undergraduate Research Symposium, University of Minnesota Morris (2015, Morris, MN, USA), Poster Presentation: Viral infection of green algae and its effects on lipid accumulation
15. Undergraduate Research Symposium, University of Minnesota Morris (2014, Morris, MN, USA), Poster Presentation: ¹HNMR analysis of H₂O and Ethanol

International Academic and Research Experience

Germany: Leading the Renewables Revolution

Jan. 2017

Institute on the Environment, University of Minnesota, Minneapolis MN

- Explored topics of climate change and renewable energy with government officials, researchers, educators and German university students across North Rhine-Westphalia, Germany

Thailand Inbound Research Scholarship

Jun. 2015 – Aug. 2015

- Developed laboratory practicum curricula for an undergraduate chemistry exchange program

- Engaged with global scientists in a Mahasarakham University international student leadership program

Funded Proposals

1. Molecular Observation Network (MONet) Sampling Proposal, Environmental Molecular Science Laboratory (EMSL). 2023. Primary Investigator. Award DOI: [10.46936/mone.proj.2023.60929/60008856](https://doi.org/10.46936/mone.proj.2023.60929/60008856) \$10,000
2. EMSL Limited Scope. Title: Towards a mechanistic understanding of plant-soil feedbacks under heat and drought stress using metabolomics of root exudates. 2022. Co-Investigator. \$10,000
3. USDA NIFA Predoctoral Fellowship. Title: Budgeting for climate change: carbon cost of a healthy root microbiome under environmental stress. 2021. Primary Investigator. \$120,000
4. Montana State University Graduate School Community Building Mini Grant 2022-2023, (4, \$500 each)
5. Montana State University Library Publication Scholarship 2021, \$2500

Awards

International Society for Microbial Ecology (ISME) Early Career Researcher Poster Award (2024)
 ISME Student Travel Award (2024)

MSU Center for Biofilm Engineering W.G. Characklis Award for Outstanding Ph.D. Students (2023)

AlgalBBB Annual Meeting Student Poster Award (2019)

NSF Graduate Research Fellowship Program Honorable Mention (2019)

Montana State University Bozeman Student Travel Award (2019)

Graduation with Distinction, UM Morris (2017)

Sustainability Leader award, UM Morris (2017)

Scholar of the College, UM Morris (2016)

Morris Scholars Award (2013-2017)

Dean's list, UM Morris (Fall 2013-Spring 2017)

Andrew Kaufman Scholarship, UM Morris (2016)

Discovery Scholarship, UM Morris (2015)

Workshops and Trainings

- Joint Genome Institute Microbial Genomics and Metagenomics Workshop, Berkely CA 2024
- Environmental Molecular Sciences Laboratory Molecular Observation Network Program, Remote 2024
- Mental Health Support Certificate Program, Montana State University, Bozeman MT 2022-2023
- Environmental Molecular Sciences Laboratory Summer School, Remote 2021
- Intermountain Leadership Academy, Montana State University, Remote 2020-2021
- Introduction and Advanced R Workshops, Montana State University, Bozeman MT 2018-2019

Peer Review and Professional Services

- Ecological Society of America Annual Meeting Abstract Review Committee 2024
- Peer Reviewer, *Plant and Soil* (1) 2024-Present
- Peer Reviewer, *Algal Research* (5) 2023-Present
- Peer Reviewer, *Journal of Environmental Quality* (1) 2022
- Peer Reviewer, *Frontiers in Plant Science* (1), Co-reviewed with Dr. Brent Peyton 2021
- Peer Reviewer, *Biodegradation* (1), Co-reviewed with Dr. Brent Peyton 2021
- Student Poster Session and Young Innovators Lounge Organizer, Algal Biomass Summit, Orlando, FL 2019

Professional Affiliations

- International Society for Microbial Ecology Member 2024-Present
- American Society for Microbiology Member 2024-Present

- Ecological Society of America Student Member, Member 2020-Present
- American Chemical Society Student Member 2015-2017

Teaching Experience

Guest Lecturer 2023-2024
 Department of Chemical Engineering, Montana State University Bozeman MT
 EBIO591: Foundations in Extreme Biofilms, Introduction to Metagenomics

Graduate Teaching Assistant 2018-2023
 Department of Microbiology and Cell Biology Montana State University Bozeman MT
 BIOM103: Unseen Universe of Microbes

Mentored Five Undergraduate Students

Freshmen General Tutor 2016-2017
 Office of Student Success, University of Minnesota Morris, Morris MN

Spanish Tutor 2015-2016
 Office of Student Success, University of Minnesota Morris, Morris MN

Biology Tutor 2015-2017
 Office of Student Success, University of Minnesota Morris, Morris MN

Leadership and Outreach Activities

Skype a Scientist, Remote 2023-Present

Montana Science Center Volunteer, Bozeman MT 2023

Women in Science and Engineering Leadership Team, Montana State University, Bozeman MT 2020-2023

NASA Explore Earth and Space Science Camp Team Member, Bozeman MT 2021

Peaks and Potentials Youth Science Camp Leader, Montana State University, Bozeman MT 2019, 2021

Letters to a Pre-Scientist PenPal, Bozeman MT 2019-2020

Montana Science Olympiad Group Leader, Montana State University, Bozeman MT 2019

Expanding Your Horizons Group Leader, Montana State University, Bozeman MT 2018-2021

Family Science Night Team Leader, Montana State University, Bozeman MT 2018-2019

Community service

Board Member, Helena Vigilante Runners, Inc., Helena MT 2024-Present

Volunteer Garden Manager, Helena Community Gardens, Helena MT 2024-Present

Foster Volunteer, Lewis and Clark Animal Shelter, Helena MT 2023-Present

Foster Volunteer, Heart of the Valley Animal Shelter, Bozeman MT 2022-2023

Volunteer Pianist, Bozeman Lodge Rest Home, Bozeman MT 2022-2023

Food Rescue Volunteer, Gallatin Valley Food Bank, Bozeman MT 2020-2023

Team Coach, Girls on the Run, Bozeman MT 2017-2019

Team Captain Varsity Cross Country and Track & Field, UM Morris, Morris MN 2016-2017

Chapter Core Leader, Students Today Leaders Forever, UM Morris, Morris MN 2016-2017

President, Chemistry Club, UM Morris, Morris MN 2016-2017

Jane Addams Cohort Organizer, UM Morris, Morris MN 2015-2016

Freshmen Student Government Representative, UM Morris, Morris MN 2013-2014

President, 4H Club, Minnesota Extension Service, Foster Township MN 2010-2013

Additional work experience

Community Advisor

Office of Residential Life, University of Minnesota Morris, Morris MN

Aug. 2016 – May 2017

- Upheld and enforced University community living policies
- Encouraged positive living and learning through active and passive programming

Sustainability Liaison

Office of Residential Life, University of Minnesota Morris, Morris MN

May 2016 – May 2017

- Promoted sustainable living with campus residential halls
- Expedited communication between students and Office of Residential Life regarding Zero Waste