DARIAN N. SMERCINA

Pacific Northwest National Lab ◆ Biological Sciences Division

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EDUCATION

Defended *04/2020* — Ph.D. Crop and Soil Sciences, Michigan State University
Thesis: Environmental and Biological Controls on Free-living Nitrogen Fixation
Graduate Advisor: Lisa K. Tiemann

Completed *05/2015* — B.S. Biology (Ecology Concentration), University of Toledo
Undergraduate Thesis: Characterization of High and Low Quality Dry Sand Prairie Soil for Restoration Assessment
Undergraduate Advisor: Michael N. Weintraub

APPOINTMENTS

Aug 2020 – Current — **Linus Pauling Distinguished Postdoctoral Fellow**
Pacific Northwest National Laboratory, Richland, WA
Mentor: Kirsten Hofmockel

Aug 2015 – July 2020 — **Graduate Assistant, Michigan State University**
Advisor: Lisa K. Tiemann

Microbially Mediated Perennial Rhizosphere Nitrogen Transformations (MMPRNT) project (Rhizosphere.msu.edu)

- Led development of methods including:
  - Measurement of free-living nitrogen fixation potential
  - Measurement of nitrogen mineralization potential
  - ^{13}C pulse-chase chamber for field deployment
- Field sampling including soil sampling and processing for biogeochemical assays, plant tissue and soil collection for metagenomic and metatranscriptomic analysis, use of *Photosynq*
- Routinely completing lab analyses – biogeochemical assays, extracellular enzyme assays, acetylene reduction assay, $^{15}N_2$ incorporation assay

Sep 2018 – March 2018 — **Dept. of Energy SCGSR Fellow, EMSL**
Mentor: Kirsten Hofmockel

- Designed and carried out independent research
- Networking and establishing collaborations
- Novel methods development:
  - Designed sterile growth system for switchgrass allowing pairing of omics techniques with advanced imaging techniques

- Designed and tested species-specific probes for fluorescent *in situ* hybridization (FISH)
- Sample processing techniques allowing pairing of FISH and NanoSIMS imaging techniques

Jan 2013 – May 2015 **Lab Technician, University of Toledo - ESE Lab**

- Lab management – project organization, supply inventory, time management
- Biogeochemical assays – ammonium, nitrate, phosphate, total reducing sugars, microbial biomass
- Instrument maintenance – Shimadzu total organic carbon analyzer, LI-COR respiration meter, BioTek plate reader
- Data analysis and archiving

Summer 2014 **REU – SURF Fellow, Boston University**
Advisor: Pamela Templer

- Question and hypothesis development
- Field sampling – soil sampling, LI-COR respiration meter measurements

Summer 2013 **USRCAP Undergraduate Researcher, University of Toledo**
Advisors: Michael N. Weintraub & Todd Crail

- Question and hypothesis development
- Field sampling – soil sampling
- Biogeochemical assays – ammonium, nitrate, ammonium, nitrate, phosphate, microbial biomass

PUBLICATIONS

Smercina, DN., Evans, SE., Friesen, ML., Tiemann, LK. Impacts of nitrogen addition on switchgrass root-associated diazotrophic community structure and function. *FEMS Microbiology Ecology*.

Norman, J.S., **Smercina, DN.**, Hileman, J.T., Tiemann, L.K., Friesen, M.L. 2020. Soil aminopeptidase induction is unaffected by inorganic nitrogen availability. *Soil Biology and Biochemistry*, 149, 107952.

Smercina, DN., Bowsher, AW., Hoyt, DW., Evans, SE, Friesen, ML., & Tiemann, LK. 2020. Switchgrass Rhizosphere Metabolite Chemistry Driven by Nitrogen Availability. Phytobiomes Journal. doi:10.1094/PBIOMES-09-19-0055-FI

Lin, VS., Rosnow, JJ., McGrady, MY., **Smercina, DN.,** Nuñez, J., Renslow, RS., & Moran, JJ. 2020. Non-destructive spatial analysis of phosphatase activity and total protein distribution in the rhizosphere using a root blotting method. *Soil Biology and Biochemistry*, 107820.

Smercina, DN., Evans, SE., Friesen, ML., & Tiemann, LK. (2019). To fix or not to fix: controls on free-living nitrogen fixation in the rhizosphere. *Applied and Environmental Microbiology.*, 85(6), e02546-18.

Smercina, DN., Evans, SE., Friesen, ML., Tiemann, LK. Optimization of ^{15}N-incorporation and Acetylene Reduction Methods for Free-Living Nitrogen-Fixation. *Plant and Soil*, doi: 10.1007/s11104-019-04307-3

In Prep

Smercina, DN., Hofmockel, KS., Bailey, VL. Micro on a Macroscale. In prep, Target journal: *Trends in Ecology and Evolution*

Smercina, DN., Evans, SE., Freisen, ML., Tiemann, LK. Temporal Dynamics of Free-living Nitrogen Fixation in the Switchgrass Rhizosphere. In prep, Target journal: *Global Change Biology Bioenergy*

Smercina, DN., Tiemann, LK., Hoyt, DW., Reid, ML., Friesen, ML., & Evans, SE. Switchgrass carbon allocation following 13C pulse. In prep, Target journal: *Soil Biology and Biochemistry.*

Reid, ML., Gonzalez, J., **Smercina, DN.,** Tiemann, LK. Bioenergy crop residues alter decomposition dynamics of soil organic matter. *In prep*, Target journal: *Global Change Biology*

GRANT, AWARDS, and HONORS

2020: **Smercina, DN.,** Hofmockel, KS. "Evaluating Spatial and Molecular Drivers of Microbial Function." DOE EMSL, 10/30/2020 – 09/30/2021, 11 mo.

Smercina, DN., Hofmockel, KS., Chrisler, WB., Markillie, L., Lipton, MS. "Spatial and Molecular Drivers of Microbial Function". PNNL LDRD, 3 yr., ($775, 000)

2019: Ecological Society of American Student Section Travel Grant ($75)

Tiemann, LK., Evans, SE., Friesen, ML., **Smercina, DN**. "Identifying and understanding the functional and importance of vertically transferred microorganisms within a bioenergy crop microbiome" DOE EMSL, 1 yr., ($61,167)

Hofmockel, KS., Tiemann, LK., Evans, SE., Friesen, ML., **Smercina, DN**. "*In situ* characterization of associations and resource exchange between free-living nitrogen-fixers and switchgrass" DOE EMSL, 01/11/2019 – 09/30/2021, 2 yr. 8 mo.

2018: Smercina, DN., Hofmockel, KS., Tiemann, LK. "*In situ* characterization of associations and nutrient exchange between free-living nitrogen-fixers and switchgrass" DOE SCGSR, 09/17/2018 – 03/15/2019, 6 mo. ($18,000).

2017: Kirk and Marjorie Lawton Graduate Student Support Award ($2700)

2015: Dept. of Environmental Sciences Outstanding Graduating Student Awards

2014: Jeffrey A. Black Scholarship ($1500)

2013: **Marinis, DN**., Crail, T., Weintraub, M. USRCAP Proposal. Characterization of High and Low Quality Dry Sand Prairie Soil for Restoration Assessment. ($3000)

Building Ohio's Sustainable Energy Future Scholarship ($4750)

Elliot J. Tramer Environmental Science Scholarship ($1200)

TEACHING AND MENTORING EXPERIENCE

Fall 2019 **Teaching Assistant, Michigan State University**
CSS 360: Soil Biology – Instructor: Lisa Tiemann

- Preparing lab materials – soil collection, biogeochemical assays, microbiology supplies
- Assisting with conducting lab sessions
- Answering student questions
- Grading course materials

Summer 2018 **GLBRC Summer Undergraduate Research Program**
Mentee: Jenifer Gonzalez, University of the District of Columbia

- Worked with student to develop questions, hypotheses, and research plan
- Supervised student in learning and conducting lab assays
- Guided student through data analysis
- Provided commentary of final report and presentation

Summer 2017 **MSU Multicultural Apprenticeship Program Mentor**

- Worked with student to develop questions, hypotheses, and research plan
- Supervised student in learning and conducting lab assays
- Guided student through data analysis
- Provided commentary of final report and presentation

Fall 2016 **Teaching Assistant, Michigan State University**
CSS 360: Soil Biology – Instructor: Lisa Tiemann

- Preparing lab materials – soil collection, biogeochemical assays, microbiology supplies
- Assisting with conducting lab sessions
- Answering student questions

Mentored Undergraduates and Lab Technicians: Bana Abolibdeh, Madeline Anthony, Andrew Banitt, Laney Hult, Christina Jacobs, Katheryne Johnston, Chase Kasmerchak, Charity Mackie, Jake Nash, Expery Omollo, Chloe Page, Kristen Pranzo, Ethan Rocklin, Hannah Szuch, Milo Taylor, Evan Thomas, Matthew Uebbing, Megan Vanderploeg

PRESENTATIONS

2020: **PNNL Invited Speaker** (Richland, WA) – "Elucidating Spatial and Molecular Drivers of Microbial Function"
UCI Microbial Group (Virtual) – "Environmental and Biological Controls on Free-living Nitrogen Fixation"

2019: **Ecological Society of America** (Louisville, KY) – "Carbon and Nitrogen Exchange in the Rhizosphere: Interactions between Switchgrass and Diazotrophs"
Soil Ecology Society Meeting (Toledo, OH) – "Optimizing Methods for Assessing Free-Living Nitrogen Fixation in Soils and the Rhizosphere"
EMSL Invited Speaker (Richland, WA) **–** "In situ characterization of plant-microbe associations and nutrient exchange in the rhizosphere"

2018: **Goldschmidt Meeting** (Boston, MA) – "Free-living Nitrogen-Fixation Rates Driven by Nitrogen-Fixer Diversity Over Nitrogen Availability"

2017: **Soil Ecology Society Meeting** (Fort Collins, CO) – "Nitrogen Transformations in the Rhizosphere of Switchgrass grown on Marginal Lands"
Plant Science Graduate Research Symposium (Poster) (East Lansing, MI) – "Is there a link between free-living nitrogen fixation and nitrogen mineralization?"

2016: **AGU (Poster)** (San Francisco, CA) – "Is there a link between free-living nitrogen fixation and nitrogen mineralization?"

2014: **UROP Symposium (Poster)** (Toledo, OH) - "Effects of Climate Change on Stem Respiration"
SURF Symposium (Toledo, OH) - "Stem Respiration in a Northern Hardwood Forest"
Environmental Science Honors Luncheon (Toledo, OH) - Honors Thesis
Public Lecture (Toledo, OH) - "What do Northwest Ohio's Ecosystems do for you?"
Oak Openings Forum - Honors Thesis

2013: **University of Toledo Undergraduate Research Symposium - Summer Research**
Oak Openings Forum (Poster) (Toledo, OH) - "The Effect of Two Soil Organic Matter Removal Treatments at Southview Savanna"

SERVICE and OUTREACH

EEB Mentor Match Program – Mentor

- Mentor new graduate students through initial stages of graduate school and fellowship applications
- Provide feedback on application materials
- Provide support for challenges graduate students encounter during the first year of graduate school

Manuscript reviewer for *Food Microbiology* journal

Manuscript reviewer for *Plant and Soil* journal

Member of planning committee for Plant Science Graduate Research Symposium at MSU

- Responsible for contacting potential judges and scheduling judging times for student posters and oral presentations

2017 – 2019 Skype a Scientist participant

- Skyped into classrooms in New Mexico, Missouri and New York
- Talked with students at different education levels (3rd grade, 7-8th grade, 10-12th grade)

MSU Girls Math and Science Day: Volunteer, Group leader

- Responsible for guiding students to each session

World Food Prize Day, MSU: Soil Biology Lab Assistant

- Assisted with lab supply prep
- Assisted with conducting lab – answering questions and guiding students

College of Natural Sciences and Mathematics: Student Ambassador

Department of Environmental Sciences: Freshman Orientation Peer-Mentor