

Isaac J. Madsen
Postdoctoral Research and Teaching Associate
Washington State University
Crop and Soil Sciences
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EDUCATION AND EXPERIENCE

Education

PhD, Washington State University, 2017.
Major: Soil Science
Dissertation Title: Nitrogen-Plant-Soil Interactions at the Root-Rhizosphere,
Cropping System, and National Scales

BS, Washington State University, 2011.
Major: Integrated Plant Science

Experience

Postdoctoral Research and Teaching Associate (January 2017 – Present)
Agricultural Scientist, Sustainable Idaho LLC. (January 2017 – Present)
Agricultural Scientist, Shepherd's Grain LLC. (April 2016 – December 2018)
Crop Production Intern, AgriNorthwest Inc. (May 2011 – November 2011)

RESEARCH

Refereed Publications

Published

Madsen, I. J., and Pan, W. L. Assessment of Relative Potencies of Nitrogen Sources on Seedling Root Systems. *Agronomy Journal* 111, no. 5. 2019: 2445–52.
<https://doi.org/10.2134/agronj2019.01.0039>.

Maaz, T. M., Schillinger, W. F., Machado, S., Brooks, E., Johnson-Maynard, J. L., Young, L. E., Young, F. L., Leslie, I., Glover, A., **Madsen, I. J.**, Esser, A., Collins, H. P., Pan, W. L. Impact of Climate Change Adaptation Strategies on Winter Wheat and Cropping System Performance across Precipitation Gradients in the Inland Pacific Northwest, USA. *Frontiers in Environmental Science*, 5.
<http://dx.doi.org/10.3389/fenvs.2017.00023>

Pan, W. L., Schillinger, W. F., Young, F. L., Kirby, E. M., Yorgey, G. G., Borrelli, K. A., Brooks, E. S., McCracken, V. A., Maaz, T. M., Machado, S., **Madsen, I. J.**, Johnson-Maynard, J. L., Port, L. E., Painter, K., Huggins, D. R., Esser, A., Collins, H. P., Stockle, C. O., Eigenbrode, S. D. Integrating Historic Agronomic and Policy Lessons

with New Technologies to Drive Farmer Decisions for Farm and Climate: The Case of Inland Pacific Northwestern U.S. *Frontiers in Environmental Science*, 5. <http://dx.doi.org/10.3389/fenvs.2017.00076>

Pan, W. L., **Madsen, I. J.**, Bolton, R. P., Graves, L., Sistrunk, T. (2016). Ammonia/Ammonium Toxicity Root Symptoms Induced by Inorganic and Organic Fertilizers and Placement. *Agronomy Journal*, 108(6), 2485. <http://dx.doi.org/10.2134/agronj2016.02.0122>

In Preparation

Madsen, I. J., Pan, W. L. Use of Geographic Information Systems in Analyzing Root System Fertilizer Band Interactions.

Madsen, I. J., Pan, W. L., Collins, H. Potato-Winter Wheat-Sweet Corn Nitrogen Use Efficiency under Conservation Tillage and Cover Crop Management Practices. *American Journal of Potato Research: An Official Publication of the Potato Association of America*.

Madsen, I. J., Pan, W. L., Maaz, T. M., Taylor, B. Subsoil Nutrient Availability as a Soil Quality Factor in the Dryland Growing Region of the Inland Pacific Northwest.

Presentations Given

Madsen, I. J. (Author & Presenter), Pan, W. L. (Author), Soil Science Society of America Annual Meeting, "Spatiotemporal Development of *Rhizoctonia solani* Infections on Wheat Roots.," SSSA, San Diego, CA, United States of America. (January 7, 2019).

Madsen, I. J. (Author & Presenter), Pan, W. L. (Author), Far west Agribusiness Annual Meeting, "Root System Architecture Response to N Fertilizer Source and Rate," Far west Agribusiness Association, Kennewick, WA, United States of America. (December 11, 2018).

Madsen, I. J. (Author), Pan, W. L. (Author), Tao, H. (Author), Far west Agribusiness Annual Meeting, "Soil Health Parameters for Improving Crop productivity." Far west Agribusiness Association, Kennewick, WA, United States of America. (December 11, 2018).

Madsen, I. J. (Author & Presenter), Pan, W. L. (Author), Tao, H. (Author), Far West Agribusiness Annual Meeting, "Subsoil Health Parameters in E. WA for Improving Crop Productivity," Far west Agribusiness Association, Kennewick, WA, United States of America. (December 11, 2018).

Madsen, I. J. (Author & Presenter), Pan, W. L. (Author), Agronomy Society of America Annual Meeting, "Canola Root System Architecture Response to Urea, Urea

- Ammonium Nitrate, and Ammonium Sulfate.," Agronomy Society of America, Baltimore, MD, United States of America. (November 6, 2018).
- Madsen, I. J. (Author & Presenter), Pan, W. L. (Author), World Congress of Soil Science, "Canola Root System Architecture Response to Urea, Urea Ammonium Nitrate, and Ammonium Sulfate.," Rio de Janeiro, Brazil. (August 14, 2018).
- Madsen, I. J. (Author & Presenter), Pan, W. L. (Author), Bolton, R. (Author), Soil Science Society of America Annual Meeting, "High Resolution Imaging of Rhizoctonia Solani Infestation of Wheat Roots. Soil Science Society of America Annual Meeting." ASA-CSSA-SSSA, Phoenix, AZ, United States of America. (November 8, 2016).
- Madsen, I. J. (Author & Presenter), Pan, W. (Author), Far west Agribusiness Annual Meeting, "Ammonia Toxicity of Wheat and Canola Roots. Far West Agribusiness Annual Meeting," Far west Agribusiness Association, Kennewick, WA, United States of America. (December 9, 2015).
- Madsen, I. J. (Author & Presenter), Pan, W. L. (Author), Bolton, R. (Author), Agronomy Society of America Annual Meeting, "Detecting Moisture Change in Fertilizer Microsites through Soil Color-Moisture Calibrations," ASA-CSSA-SSSA, Minneapolis, MN, United States of America. (November 17, 2015).
- Madsen, I. J., Agronomy Society of America Annual Meeting, "Understanding Fertilizer Toxicity Symptom Development through High Resolution Imaging." ASA-CSSA-SSSA, Minneapolis, MN, United States of America. (November 17, 2015).
- Madsen, I. J. (Author & Presenter), Pan, W. (Author), Bolton, R. (Author), Soil Science Society of America Annual Meeting, "Impacts of Banding Ammonium Fertilizer on Canola and Wheat Seedling Root and Root Hair Growth and Development." ASA-CSSA-SSSA, Long Beach, CA, United States of America. (November 4, 2014).
- Madsen, I. J. (Author & Presenter), Pan, W. L. (Author), Bolton, R. (Author), Randall, J. (Author), Soil Science Society of America Annual Meeting, "Colorimetric Detection of Moisture Change In Rhizotron Studies Using a Flatbed Scanner," SSSA-ASA-CSSA, Tampa, FL, United States of America. (November 4, 2013).

Research Funding

Federal Contract

- Tao, H. (Principal Investigator), Pan, W. (Co-Principal Investigator), Madsen, I. (Co-Investigator), Naasko, K. (Co-Investigator), "Soil Health Assessment for PNW Cropping System," Federal, \$200,000.00. (May 2018 - May 2019). **Funded.**

Fellowship

NSF-IGERT-NSPIRE Fellowship, (August 31, 2012 - April 1, 2014).

Internal WSU Funding

Madsen, I. (Principal Investigator), Pan, W. (Co-Principal Investigator), "Water, Land, and Nutrient Use Efficiency for Intercropping Systems in the Dryland Pacific Northwest," Non-Federal, \$33,789.71. (July 2019 - June 2021). **Funded.**

Madsen, I. (Principal Investigator), Pan, W. (Co-Principal Investigator), "Subsoil nutrient supply and micronutrient balance of six different spring canola varieties," Non-Federal, \$42,000.00. (July 2017 - August 2019). **Funded.**

Non-Federal Grant

Madsen, I. (Principal Investigator), "Winter Canola Stand Establishment and Winter Survival," Non-Federal, \$12,750.00. (July 2019 - June 2021). **Funded.**

Madsen, I. (Principal Investigator), Lewis, R. (Co-Principal Investigator), Sullivan, T. (Co-Principal Investigator), Hulbert, S. (Co-Principal Investigator), Ermita, C. J. (Co-Principal Investigator), "Imaging and Microbial Analysis of Wheat Seedlings Experiencing Root Rot Caused by *Rhizoctonia solani* AG8," Non-Federal, \$5,911.00. (July 2019 - June 2020). **In Review.**

EXTENSION

Field Day Presentations

Madsen, I.J., 2018 Impact of Grazing on Stand Establishment and Survival of Winter Canola. WSU Field Day, Dusty WA.

Madsen, I.J., 2018. Nutrient Management in spring and Winter Canola. Canola Field Days (75 growers reached annually)

Madsen, I.J., 2017. Nutrient Management in spring and Winter Canola. Canola Field Days (75 growers reached annually)

Madsen, I.J., 2017 Alternative Crops for the Dryland Pacific Northwest. PNW Coop Field Day Genesee, ID, Shepherd's Grain Field Day, Colton, WA, Reardan Seed Co. Field Day, Reardan, WA. (75 Growers Reached)

Madsen, I.J., 2016. Nutrient Management in spring and Winter Canola. Canola Field Days (75 growers reached annually)

Madsen, I.J., 2016. Alternative Crops for the Dryland Pacific Northwest. PNW Coop Field Day Genesee, ID, Shepherd's Grain Field Day, Colton, WA, Reardan Seed Co. Field Day, Reardan, WA. (75 Growers Reached)

Workshop Presentations

Pan W.L., Sanguinet K., and Madsen I.J., 2018. Roots of the Future. WSU Wheat Academy. (30 growers reached)

Madsen, I.J. 2018. Causes of Soil Acidity. Soil Health Workshops (75 growers reached)

Madsen, I.J., 2018. Fertilizer Induced Ammonia/Ammonium Toxicity on Canola Seedling Roots. Winter Oilseed Workshops (150+ growers reached)

Madsen, I.J. 2017. The 4R's of Nutrient Management in Fertilizer Induced Ammonia/Ammonium Toxicity on Canola Seedling Roots. (10 growers reached)

Madsen, I.J., 2017. Fertilizer Induced Ammonia/Ammonium Toxicity on Canola Seedling Roots. Winter Oilseed Workshops (150+ growers reached)

Madsen, I.J., 2016. Fertilizer Induced Ammonia/Ammonium Toxicity on Canola Seedling Roots. Winter Oilseed Workshops (150+ growers reached)

Webinars

Madsen I.J., and Pan W.L., 2017 Advances in Dryland Agriculture in the Inland Pacific Northwest: Rotational Intensification and Diversification.
<https://www.reacchpna.org/webinar-series-advances-dryland-farming>

Madsen, I.J. 2014. Roots, Root Hairs, and Fertilizer Placement. REACCH webinar series.
<https://www.youtube.com/watch?v=eLxaKzqGc6s&t=1s>

Field Day Abstracts and Handouts

Madsen, I.J. 2019. Nitrogen Source and Rate to Minimize Damage Caused by Free Ammonia. Lind Field Day Abstracts.

Madsen, I.J. and S. VanVleet. 2019. Dual Purpose Winter Canola Grazing and Seed Harvest. Lind Field Day Abstracts.

Madsen, I.J. 2019. Tissue Test and Foliar Applications of Micronutrients to Winter Canola. Lind Field Day Abstracts.

Madsen, I.J. and W.L. Pan. 2018. Selecting Nitrogen Source to Minimize Damage Caused by Free Ammonia. Lind Field Day Abstracts.

Madsen, I.J. 2018. Effects of Grazing Winter Canola Grazing on Plant Roots. Lind Field Day Abstracts.

Madsen, I.J. 2017. Shepherd's Grain Spring Oat Research Report.

TEACHING

Courses Taught at Washington State University

SOIL_SCI 441, Soil Fertility, (classroom, online, and hybrid) 10 courses. (2017-2019)

SOIL_SCI 541, Soil-Plant-Microbial Interact, (classroom co-taught) 5 courses. (2017)

SOIL_SCI 547, Soil Fertility Management, (online) 2 courses. (2018)

Guest Lectures

1 Lecture, Soil Fertility. (2015, 2016).

1 Lecture, Soil-Plant-Microbial Interactions. (2015).

1 Lecture, Soil Microbiology. (2014).

7 Lectures, CCA Exam Prep. (2019)

Selected Instructor Ratings as Percentages					
	Enthusiasm	Difficulty		Overall Teacher Rating	
Always	91.1	Too difficult	7.7	Outstanding	21.3
Sometimes	7.6	Challenging	81.2	Above Average	37.3
Never	1.3	Not challenging	11.2	Average	32.6
				Below Average	8.8
n =	79		80		80

Directed Study for Credit

Research Supervisor, "Imaging of Wheat Seedlings Experiencing Root Rot." (January 7, 2019 - Present).

Advised: Katie McGourin

Undergraduate Summer Interns

Jake Manuel. (June – August, 2018)

Lauren Glaze. (June – August, 2018)

Justin Archibald. (June – August, 2017)

Katie McGourin. (June – August, 2016)

Tanya Valle. (June – August, 2016)

Jaqueline Huettenmoser. (June – August, 2015)

Mayra Nunez. (June – August, 2015)

Graduate Student Mentoring

Marissa Porter (August, 2017 – May, 2019)

Katherine Naasko (May, 2018 – present)

SERVICE

University Service

Assistant Faculty Adviser, Viticulture and Enology Club. (August 2018 – Present).

Contributed to Curriculum Planning Workshops for Agricultural Food Systems and Integrated Plant Sciences Degrees. (August 2018 – Present)

Graduate Student - Faculty Liaison Officer (August 2014 – May 2015)

Extramural Service

Advisory Committee for Inland Northwest Artisan Grains Conference (2019)

Invited speaker at Columbia Basin Master Gardener's Symposium (4/13/2019)

TECHNICAL SKILLS

Data Management and Analysis

Image Processing (ESRI ArcMap, Python (OpenCV and PIL), and ImageJ)
Spatial Data Management (ESRI ArcMap)
Data Analysis (R (dplyr, ggplot2, agricolae, drc), SAS (glm), SigmaPlot)

Field Skills

Planting (No-Till and Till)
Harvesting (Plot Combine)
Fertilizer Application
Pesticide Application
Irrigation management
Soil Sampling (Hand and Hydraulic)