Mitchell G. Roth

Curriculum vitae

Professional website: rothmi12.github.io

University of Wisconsin–Madison
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RESEARCH AND SCHOLARSHIP

EDUCATION

2019 – 2021 **Postdoctoral Research Associate**
University of Wisconsin – Madison — Co-advisor: Dr. Mehdi Kabbage
Department of Plant Pathology — Co-advisor: Dr. Damon Smith

2014 – 2019 **Ph.D. – Genetics and Plant Pathology**
Michigan State University — Advisor: Dr. Martin Chilvers
Dissertation Title: Investigating Management and Genetics of Soybean Sudden Death Syndrome Pathogens *Fusarium virguliforme* and *F. brasiliense*

2010 – 2014 **B.S. – Cell and Molecular Biology**
Grand Valley State University — Advisor: Dr. Margaret Dietrich
Minor: Applied Statistics

EMPLOYMENT

Beginning Fall 2021 **Assistant Professor, Molecular Mycology – The Ohio State University**
Propose, design, and guide experiments with undergraduates, graduate Students, and postdocs with interests in molecular plant pathology

2019 – present **Postdoctoral Research Associate – University of Wisconsin–Madison**
Metabolic and genetic rewiring of soybean to improve resistance to *Sclerotinia sclerotiorum*

2014 – 2019 **Graduate Research Assistant – Michigan State University**
Addressed fundamental questions regarding the management and genetics of soybean sudden death syndrome

2013 **Student Summer Scholar – Grand Valley State University**
Examined the role of CBL10 in stamen development in *Arabidopsis*

2012 **Student Orientation Leader – Grand Valley State University**
Assisted freshmen in registering for classes and navigating campus

2008 – 2011 **Farmhand – Roth Brothers Farms Inc.**
Operated large farm equipment during planting and harvest

GRANTS AND FELLOWSHIPS

Year	Funding Opportunity, "Title"	$ (Requested) Received
TOTAL GRANT + FELLOWSHIP FUNDING GARNERED		$53,000
2020	USDA NIFA – Education and Workforce Development Postdoctoral Fellowship "Coopting soybean metabolites and susceptibility genes to achieve resistance to *Sclerotinia sclerotiorum*"	($153,032) *Under Review*
2017	MSU Graduate School Writing Fellowship	($2,000) $2,000
2018	Michigan State University – Terry N. & JoAnn L. Turk Endowed Fellowship	($2,000) $2,000
2017	Michigan State University – Project GREEEN "Deciphering the Molecular Mechanism of Sudden Death Syndrome Foliar Symptom Development in Soybean"	($75,761) $0
2016	Illumina – Agricultural Greater Good Initiative Grant "Sequencing Global Sudden Death Syndrome and Bean Root Rot Pathogens for Global Food Security"	(Sequencing) $0
2015	Kellogg Biological Station LTER Small Grant "The Soybean Microbiome and Correlations to Sudden Death Syndrome Incidence"	($2,000) $2,000
2015	Michigan State University – Plant Science Fellowship	(NA) $8,000
2014	Michigan State University – BMS Gateway Program Fellowship	(NA) $39,000
2013	Grand Valley State University – Focus on the Finish Grant	$1,000
2013	Grand Valley State University – Student Summer Scholars Grant	$3,000

HONORS, AWARDS, AND SCHOLARSHIPS

Year	Award Name	$ Awarded (if applicable)
TOTAL SCHOLARSHIP FUNDING GARNERED		$16,900
2019	Paul Taylor Travel Award (APS, Cleveland, OH)	
2018	Paul Taylor Travel Award (APS, Boston, MA)	
2017	Paul Taylor Travel Award (APS, San Antonio, TX)	
2017	Everett S. "Tex" Beneke Mycology Graduate Student Scholarship	$1,000
2016	Paul Taylor Travel Award (MPMI, Portland, OR)	
2015	Syngenta Agricultural Scholarship, National winner	$5,000
2015	Syngenta Agricultural Scholarship, Regional winner	$1,000
2015	Paul Taylor Travel Award (APS, Pasadena, CA)	
2015	Buckley Creek Ag Services Scholarship	$1,000
2015	Everett S. "Tex" Beneke Mycology Graduate Student Scholarship	$900
2014	Outstanding CMB Student Award	
2013	Howard and Rose Stein Biology Scholarship	$1,000
2013	Waddell Treanor Native Plants Endowment – John Shontz Scholarship	$3,000
2013	Grand Valley Award for Excellence	
2013	Outstanding CMB Student Award	
2012	Outstanding CMB Student Award	

PEER REVIEWED PUBLICATIONS

* indicates co-first author
† indicates corresponding author

2021 Webster, R.W., **Roth, M.G.**, Reed, H., Mueller, B., Groves, C.L., McCaghey, M., Chilvers, M.I., Mueller, D.S., Kabbage, M., and Smith, D.L. Determination of Soybean Check Lines for Evaluating Genetic Resistance to Sclerotinia Stem Rot. Plant Disease. DOI: 10.1094/PDIS-10-20-2193-RE

2021 Geiser, D.M, **et al.** Phylogenomic analysis of a 55.1 kb 19-gene dataset resolves a monophyletic Fusarium that includes the Fusarium solani Species Complex. Phytopathology. DOI: 10.1094/PHYTO-08-20-0330-LE

2021 †**Roth, M.G.**, Mourtzinis, S., Gaska, J.M., Mueller, B., Roth, A., Smith, D.L., and Conley, S.P. Wheat grain and straw yield, grain quality, and disease benefits associated with increased management intensity. Agronomy Journal. DOI: 10.1002/agj2.20477.

2020 ***Roth, M.G.**, *Webster, R.W., Mueller, D.S., Chilvers, M.I., Faske, T.R., Mathew, F.M., Bradley, C.A., Damicone, J.P., Kabbage, M., and Smith, D.L. Integrated Management of Important Soybean Pathogens of the United States in Changing Climate. J. Integr. Pest Manage. DOI: 10.1093/jipm/pmaa013.

2020 **Roth, M.G.**, Jacobs, J.L., Napieralski, S., Byrne, A.M., Stouffer-Hopkins, A., Warner. F., Chilvers, M.I. Fluopyram Suppresses Population Densities of *Heterodera glycines* in Field and Greenhouse Studies in Michigan. Plant Disease. DOI: 10.1094/PDIS-04-19-0874-RE.

2020 **Roth, M.G.**, Sang, H., Oudman, K., Jacobs, J.L., Griffin, A., and Chilvers, M.I. Diagnostic qPCR Assay to Detect *Fusarium brasiliense*, a causal agent of soybean Sudden Death Syndrome and Root Rot of Dry Bean. Plant Disease. DOI: 10.1094/PDIS-01-19-0016-RE.

2019 *McCoy, A.G., ***Roth, M.G.**, *Shay, R., *Noel, Z.A., Jayawardana, M.A., Longley, R.W., Bonito, G., and Chilvers, M.I. Next Generation Sequencing Identification of Fungal Communities Within the Tar Spot Complex of Corn in Michigan. Phytobiomes. DOI: 10.1094/PBIOMES-03-19-0017-R.

2019 **Roth, M.G.**, and Chilvers, M.I. A Protoplast Generation and Transformation Methods for Soybean Sudden Death Syndrome Causal Agents *Fusarium virguliforme* and *F. brasiliense*. Fungal Biology and Biotechnology. DOI: 10.1186/s40694-019-0070-0.

2019 **Roth, M.G.**, Noel, Z.A., Wang, J., Byrne, A.M., Chilvers, M.I. Predicting Soybean Yield and Sudden Death Syndrome Development using At-planting Risk Factors. Phytopathology. DOI: 10.1094/PHYTO-02-19-0040-R.

2019 Noel, Z.A., Sang, H., **Roth, M.G.**, and Chilvers, M.I. Convergent evolution of C239S mutation in *Pythium* spp. β-tubulin coincides with inherent insensitivity to ethaboxam. Phytopathology. DOI: 10.1094/PHYTO-01-19-0022-R.

2019 Strock, C.F., Schneider, H.M., Galindo-Castañeda, T., Hall, B.T., Van Gansbeke, B., Mather, D.E., **Roth, M.G.**, Chilvers, M.I., Guo, X., Brown, K., and Lynch, J.P. Laser Ablation Tomography for Visualization of Root

Colonization by Edaphic Organisms. Journal of Experimental Botany. DOI: 10.1093/jxb/erz271.

2018 Sang, H., Witte, A., Jacobs, J.L., Chang, H.-X., Wang, J., **Roth, M.G.**, and Chilvers, M.I. Fluopyram sensitivity and functional characterization of SdhB in the *Fusarium solani* species complex causing soybean sudden death syndrome. Frontiers in Microbiology. DOI: 10.3389/fmicb.2018.02335.

2018 Wang, J., Jacobs, J.L., **Roth, M.G.**, Chilvers, M.I. Temporal dynamics of *Fusarium virguliforme* colonization of soybean roots. Plant Disease. DOI: 10.1094/PDIS-03-18-0384-RE.

2018 Chang, H.-X., **Roth, M.G.**, Wang, D., Lightfoot, D.A., Hartman, G.L., Cianzio, S.R., Chilvers, M.I. Integration of Sudden Death Syndrome Resistance Loci in the Soybean Genome. Theoretical and Applied Genetics. DOI: 10.1007/s00122-018-3063-0.

2016 Kuhlgert, S., Austic, G., Zegarac, R., Osei-Bonsu, I., Hoh, D., Chilvers, M.I., **Roth, M.G.**, Bi, K., TerAvest, D., Weebadde, P., Kramer, D.M. MultispeQ Beta: a tool for large-scale plant phenotyping connected to the open PhotosynQ network. Royal Society Open Science. DOI: 10.1098/rsos.160592.

PUBLICATIONS UNDER REVIEW OR IN PREPARATION

* indicates co-first author
† indicates corresponding author

20XX Zambrana-Echevarría, C., **Roth, M.G.**, Dasgupta, R., German, T.L., Groves, C.L., and Smith, D.L. Sensitive and specific qPCR and nested RT-PCR assays for the detection of *Tobacco streak virus* in soybean. PhytoFrontiers. *Submitted 11/20/2020.*

20XX Shao, D., Kabbage, M., and **†Roth, M.G.** Effectors of Plant Necrotrophic Fungi. Invited review for Frontiers in Plant Science. *Submitted 3/29/2021.*

20XX **Roth, M.G.**, Westrick, N.M., Shao, D., and Kabbage, M. Targeted silencing of the phenylpropanoid pathway in soybean increases resistance to *S. sclerotiorum*. *In prep.*

20XX Webster, R.W., **Roth, M.G.**, Mueller, B., Gaska, J., Mueller, D.S., Chilvers, M.I., Conley, S., and Smith, D.L. Evaluation of Soybean Management Practices for Integrated Sclerotinia Stem Rot Control. *In prep.*

FORMAL PRESENTATIONS AND POSTERS

Represents first / presenting author only.
Total of 22 presentations.

2021 **Roth, M.G.** Tapping into the Information Buried in the Soil for Disease Management Decisions. The Ohio State University, Columbus, OH, USA. ***Online Invited Presentation***

2021 **Roth, M.G.** Dissecting Genetic Mechanisms of Pathogenicity and Resistance for Soybean Yield Protection. The Ohio State University, Columbus, OH, USA. ***Online Invited Presentation***

2020 **Roth, M.G.** R-Gene mediated susceptibility to *Sclerotinia sclerotiorum* in soybean (*Glycine max*). Plant Cellular and Molecular Biology Supergroup. Madison, WI, USA. ***Online Oral Presentation***

2019 **Roth, M.G.** Epidemiology and Emerging Technology: New Tools for Understanding Plant Pathogens. Colorado State University, Fort Collins, CO, USA. ***Invited Presentation***

2019 **Roth, M.G.** Integrating Prediction Models, Molecular Genetics, and "-omics" to Manage Diseases of Field Crops. Colorado State University, Fort Collins, CO, USA. ***Invited Presentation***

2019 **Roth, M.G.**, and Chilvers, M.I. Studying the *in vitro* interactions between *Fusarium virguliforme* and soil-borne nematodes using fluorescent microscopy. American Phytopathological Society Annual Meeting. Cleveland, OH, USA. ***Oral Presentation***

2019 **Roth, M.G.** Investigating management and genetics of soybean sudden death syndrome pathogens *Fusarium virguliforme* and *F. brasiliense*. PhD Defense Seminar, Michigan State University. ***Oral Presentation***

2019 **Roth, M.G.** Investigating Management and Genetics of Soybean SDS Pathogens. Friday at 4 Seminar, University of Wisconsin – Madison. ***Invited Presentation***

2018 **Roth, M.G.**, Jacobs, J.L., Napieralski, S., Byrne, A., Warner, F., and Chilvers, M.I. Investigating fluopyram as a seed treatment against soybean cyst nematode in the presence of *Fusarium virguliforme*. International Congress for Plant Pathology (ICPP). Boston, MA, USA. ***Poster Presentation***

2018 **Roth, M.G.**, Chilvers, M.I. Preventing Soybean Yield Losses Caused by *F. virguliforme* and soybean cyst nematode. Genetics and CMB Research Forum. East Lansing, MI, USA. ***Oral Presentation***

2017 **Roth, M.G.**, Chilvers, M.I. Risk Factors Associated with Sudden Death Syndrome in Soybeans. MSU Plant Pathology Seminar. East Lansing, MI, USA. ***Oral Presentation***

2017 **Roth, M.G.**, Chilvers, M.I. Root Infection of Soybean (*Glycine max*) and Dry Bean (*Phaseolus vulgaris*) by *Fusarium virguliforme*. International Legume Root Diseases Workshop. East Lansing, MI, USA. ***Invited Presentation***

2017 **Roth, M.G.**, Chilvers, M.I. Risk factors associated with the development of soybean sudden death syndrome. MSU BioMolecular Sciences Retreat. East Lansing, MI, USA. ***Invited Presentation***

2017 **Roth, M.G.**, Noel, Z.A., Wang, J., Byrne, A.M., Chilvers, M.I. Assessment and utilization of risk factors in predicting the development of soybean sudden death syndrome. American Phytopathological Society Annual Meeting. San Antonio, TX, USA. ***Oral Presentation***

2017 **Roth, M.G.**, Noel, Z.A., Chilvers, M.I. Assessment of risk factors for making predictions of soybean sudden death syndrome (SDS) symptom

development. Michigan Agri-Business Association Meeting. Lansing, MI, USA. ***Oral Presentation***

2016 **Roth, M.G.**, Wang, J., Noel, Z.A., Papenfuss, E., Austic, G., TerAvest, D., Yang, Y., Chen, J. Kramer, D.M., Chilvers, M.I. Photosynthesis measurements using PhotosynQ reflects soybean root health and helps predict sudden death syndrome (SDS) symptom development. IS-MPMI Congress. Portland, OR, USA. ***Poster Presentation***

2016 **Roth, M.G.** Wang, J., Noel, Z.A., Papenfuss, E., Austic, G., TerAvest, D., Yang, Y., Chen, J. Kramer, D.M., Chilvers, M.I. Photosynthesis measurements using PhotosynQ reflects soybean root health and helps predict sudden death syndrome (SDS) symptom development. MSU PhotosynQ Workshop. Michigan State University, East Lansing, MI, USA. ***Poster Presentation***

2015 **Roth, M.G.**, Rojas, J. A., Wang, J., Chilvers, M.I. A rapid and reliable isothermal diagnostic assay for detecting soybean sudden death syndrome (SDS) pathogen *Fusarium virguliforme*. American Phytopathological Society Annual Meeting. Pasadena, CA, USA. ***Poster Presentation***

2015 **Roth, M.G.**, Rojas, J. A., Wang, J., Chilvers, M.I. A multiplexed diagnostic assay for detecting *Fusarium virguliforme* and other closely related soybean pathogens. North Central American Phytopathological Society Meeting. East Lansing, MI, USA. ***Oral Presentation***

2015 **Roth, M.G.**, Rojas, J. A., Wang, J., and Chilvers, M.I. Rapid and reliable isothermal detection of soybean sudden death syndrome (SDS) pathogen *Fusarium virguliforme*. Graduate Academic Conference. East Lansing, MI, USA. ***Oral Presentation***

2013 **Roth, M.G.**, and Dietrich, M. The role of CBL10 in stamen development in *Arabidopsis thaliana*. West Michigan Regional Undergraduate Science Research Conference. Grand Rapids, MI, USA. ***Poster Presentation***

2013 **Roth, M.G.**, and Dietrich, M. The role of CBL10 in stamen development in *Arabidopsis thaliana*. Student Summer Scholars Showcase. Allendale, MI, USA. ***Poster Presentation***

PROFESSIONAL DEVELOPMENT AND SOCIETY INVOLVEMENT

2020 **Climate change and its impact on the global food system**
Discussion forum held by MSU's "Our Table" program

2020 **The Pandemic Effect: Exposing Racism & Inequities,**
Diversity forum held by UW-Madison

2020 **Bystander Intervention: Stepping in with Care and Confidence**
Two-day workshop held by UW-Madison

2019 **Next Generation Leadership Essentials: Developing Effective Leadership Skills for All Levels**
Leadership Institute Workshop by APS

2018 **Certification in College Teaching Institute, MSU**
Two-day workshop covering three major core teaching competencies

2016-present **Molecular Plant-Microbe Interactions (MPMI)**

1 poster presentation at annual meetings

2014-present **American Phytopathological Society (APS)**
Biotechnology Committee Chairperson
2 oral presentations at annual meetings
3 poster presentation at annual meetings
1 Idea Café session organized
1 Special Session organized (APS 2021)

2014 – 2018 **American Association for the Advancement of Science**

2015 **Graduate Student Leadership Summit, MSU**

2015 **Introduction to Python, MSU ICER workshop**

2015 **Responsible Conduct of Research Certificate, MSU**

TEACHING AND LEADERSHIP ROLES

TEACHING

2020 **Plant Pathology Education Online: Best Practices in Developing and Delivering Courses**
Attended course offered by APS to gain advice on teaching strategies to build and deploy online classes in Plant Pathology

2019 **Certificate in College Teaching** (*pending approval*)
Generated teaching philosophy
Attended 2-day teaching institute workshop
Developed and implemented a mentored teaching project

2019 **Graduate Teaching Assistant – Michigan State University**
ZOL 341 – Fundamental Genetics
Course Objective: Demonstrate and clarify approaches to solving genetics problems that require critical thinking

2018 **Graduate Teaching Assistant – Michigan State University**
ZOL 341 – Fundamental Genetics
Course Objective: Demonstrate and clarify approaches to solving genetics problems that require critical thinking
Two guest lectures, >150 students each
Student Feedback: "The TA took over for a couple lectures and taught notably better [than the professor]." – anonymous student

2016 **Graduate Teaching Assistant – Michigan State University**
ZOL 341 – Fundamental Genetics
Course Objective: Demonstrate and clarify approaches to solving genetics problems that require critical thinking
Student Feedback: "Mitch the TA rocked. He was super easy to talk to and tried to make the material as easy to understand as possible." – anonymous student

LEADERSHIP AND COMMITTEE ROLES

2017-2020 **American Phytopathological Society (APS)**
APS Council Leadership Fellow (2019)

Bioengineering Applications Committee Immediate Past Chair (2020)
Biotechnology Committee Chair (2018-2019)
Biotechnology Committee Vice-Chair (2017-2018)

2015-2019 **MSU Genetics Graduate Student Organization (GSO)**
Outreach Co-Chairperson (2018–2019)
President (2017–2018)
Outreach Chairperson (2015-2017, 2018)
Founder of Outreach Program (2015)
2nd Year Student Representative (2015)

EXTENSION AND OUTREACH

EXTENSION

Publications

2021 Roth, M. G., Webster, R. W., Reed, H., Mueller, B., Groves, C. L., McCaghey, M., Chilvers, M. I., Mueller, D. S., Kabbage, M., and Smith, D. 2021. Improved Screening Method for Genetic Resistance to White Mold (Sclerotinia stem rot) in Soybean. Crop Protection Network. CPN 5006. DOI: 10.31274/cpn-20210318-1

2020 Grower-focused write-up related to publication: Wheat Grain and Straw Yield, Grain Quality, and Disease Benefits Associated with Increased Management Intensity

Events

2019 Michigan Soybean Promotion Committee Research Update
2018 Corn Working Group Meeting Presentation on Tar Spot
2018 Michigan Soybean Promotion Committee Promotional Video
2018 Michigan Soybean Promotion Committee Research Update
2017 Michigan Soybean Promotion Committee Research Update
2016 Michigan Soybean Promotion Committee Research Update
2015 Michigan Soybean Promotion Committee Research Update

OUTREACH

As Lead Presenter or Instructor

2018 MSU Science Festival
2017 Grandparents University (MSU)
2017 MSU Science Festival
2017 Lansing, MI Charter Academy Science Experience
2016 Grandparents University (MSU)
2016 Darwin Discovery Day (MSU)
2015 Soybean Pathogen Diagnostics Workshop (MSU)
2015 Ridge Park Charter Academy (Grand Rapids, MI)
2013 Grandparents, Grandkids, and Grand Valley Camp (GVSU)

As Volunteer

2019 Donley Elementary STEAM Night
2018 Red Cedar School Science Night
2018 Pinecrest School Science Night
2017 East Lansing Elementary School Science Night

STATEMENT OF DIVERSITY

An opportunity is one of the most important things anyone can give or receive. I love the academic setting on college campuses because everyone there is looking for an opportunity to make themselves a better person, make their world a better place, or both. The motivation to find these opportunities is common among students from all ethnicities and cultures. When this motivation is fostered, it can lead to unique collaborations and new solutions to complex problems. I have been given many opportunities in my career, and been mentored by both men and women, older and younger, from numerous cultures and ethnicities. Every opportunity I have been given has been because of someone's effort to include me, and I am proud of the things I have accomplished. However, I recognize that my accomplishments are a culmination of motivation, help, and support from others, in addition to my physical efforts.

Because of these experiences, I am committed to emphasizing inclusion in any position of leadership that I find myself in. I want to include others so that they can have similar experiences like I have and identify their personal skills and weaknesses, learn about new subjects, and find personal satisfaction in their work. I have been able to help others seize opportunities, watch them grow, and make significant advances in their learning and understanding along the way.

During graduate school, I was often approached for help troubleshooting and setting up qPCR experiments. Since PCR and qPCR were some of the first techniques I learned during my undergraduate research experience, I was comfortable talking to others about troubles they might be having with the technique. By taking time to help others with these techniques, I provided an opportunity for them to share their research motivations and articulate what they needed, while also providing guidance towards a solution to the hurdles they faced. Many of these cases moved projects forward and allowed other projects to be finished and written up for publication. I believe that these types of mentoring opportunities should be fostered at universities because they help drive projects forward for all people involved, and most people are at the university to better themselves and the world they live in. I will continue to seek funding to provide more opportunities like these for undergraduate students and under-represented graduate students. By providing opportunities to students, they can gain new perspectives and skills, and by working with them, I will gain new perspectives and skills too.