

Zachary Albert Noel

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Michigan State University

Department of Plant Soil and Microbial Sciences

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RESEARCH & SCHOLARSHIP

Professional experience

Education Ph.D. Plant Pathology & Ecology, Evolutionary Biology and Behavior, Michigan State University, Matriculated July 2014

B.S. Ecological Agriculture, University of Vermont, Graduated May 2014
(Distinct Undergraduate Research)

Ph.D. Candidate/Research Assistant. July 2014 to present.

Michigan State University, PI: Dr. Martin Chilvers

Dissertation title: Ecology and evolution of oomycete communities to soybean seed treatments

Specific dissertation projects:

- Practical statistical considerations in fungal and oomycete dose-response analysis (*Plant Disease* 102:708–714) <https://github.com/noelzach/fungalEC>
- High-throughput fungicide phenotyping platform for oomycete communities (*Manuscript submitted: Phytopathology*) https://github.com/noelzach/Community_Fungicide_Sensitivity
- Molecular and evolutionary mechanism of ethaboxam resistance in oomycetes (*Manuscript in preparation: Molecular Plant Pathology*)
- Ecological impact and chemical management of oomycete communities
- High-throughput amplicon sequencing of fungal and oomycete communities

Collaborative research:

- Evolution of *Pythium* oxythiopiprolin sensitivity via oxysterol binding proteins
- Resource for tandem repeat-containing effectors in fifty fungi (*Manuscript submitted*)
- Prediction of soybean sudden death development via qPCR (*Manuscript in revision*) https://github.com/noelzach/SDS_Risk_Assessment
- Fungicide sensitivity of Clade 2 *Fusarium* to fluopyram
- Fungal sequencing from apple roots <https://github.com/noelzach/Fungal-ITS-Apple-Roots>

Skills:

- Isolation and characterization of oomycete and fungal pathogens
- Fungicide resistance evaluation and monitoring
- Molecular characterization of fungicide resistance

- Phylogenetics
- Community ecology
- Next generation sequencing
- Directed evolution
- Experimental design: field, greenhouse and laboratory
- Assay design
- DNA/RNA extraction, PCR, and sequencing
- Cloning
- RT-qPCR
- Dose response, ecological, evolutionary and general statistical analysis with R
- Python

Student Research Assistant and Field Intern Leader. May 2011 to May 2014.
University of Vermont, PI: Dr. Lorraine Berkett & Dr. Terrence Bradshaw

Thesis title: Efficacy of Natural Resistance of ‘Honeycrisp’ Apples to Reduce Fungicide Applications for *Venturia inaequalis*, 2012-2013. (*Plant Disease Management Reports*. 9:PF004)

Conducted original research, data collection, entry, pest scouting, and general upkeep of University orchards and vineyard with general supervision of seasonal field interns. Specific responsibilities include:

Publications

Under Revision:

1. Roth, M.G., **Noel, Z.A.**, Wang, J., Byrne, A.M., TerAvest, D., Kramer, D.M., Chilvers, M.I. *Submitted, requires revision prior to resubmission Sep, 2017.* Assessment and utilization of risk factors in predicting soybean yield and sudden death syndrome development. *Phytopathology*
2. **Noel, Z.A.**, Sang, H., Chilvers, M.I. *Under Revision.* Parallel evolution of C239S mutation in *Pythium sensu lato* β -tubulin coincides with ethaboxam resistance. *Mol. Plant Pathology*

Submitted:

1. Chang, H-X., **Noel, Z.A.**, Sang, H., Chilvers, M.I. *Submitted Apr 25, 2018.* Annotation resource of tandem repeat-containing effectors in fifty fungi. *Fungal Genetics and Biology*
2. **Noel, Z.A.**, Rojas, A.J., Jacobs, J.L., Chilvers, M.I. *Submitted, requires revision prior to resubmission Sep, 2017.* A high-throughput microtiter fungicide phenotyping platform for oomycetes using Z'-factor. *Phytopathology*

Accepted:

1. **Noel, Z. A.**, Wang, J., Chilvers, M. I., and Sciences, M. 2018. Significant influence of EC₅₀ estimation by model choice and EC₅₀ type. *Plant Disease*102:708–714.
2. **Noel, Z.A.**, Bradshaw, T.L., Kingsley-Richards, S., Berkett, L.P. 2015. Efficacy of Natural Resistance of ‘Honeycrisp’ Apples to Reduce Fungicide Applications for *Venturia inaequalis*, 2012-2013. *Plant Disease Management Reports*. 9:PF004

Conference proceedings and abstracts:

1. **Noel Z.A.**, Rojas, J.A., Jacobs, J.L., D., Chilvers, M.I. 2017. Managing an oomycete community: fungicide sensitivity and evolution of resistance to ethaboxam. *Phytopathology*

107:S5.1. <https://doi.org/10.1094/PHYTO-107-12-S5.1>

2. Roth M.G., **Noel Z.A.**, Wang J., Byrne A., Chilvers M.I. 2017. Assessment and utilization of risk factors in predicting the development of soybean sudden death syndrome. *Phytopathology* 107:S5.1. <https://doi.org/10.1094/PHYTO-107-12-S5.1>
3. **Noel Z.A.**, Roth M.G., Wang J., Chilvers, M.I. 2016. Mining of biotic and abiotic factors for prediction of soybean sudden death syndrome (SDS) symptoms. *Phytopathology* 106:S4.1. <http://dx.doi.org/10.1094/PHYTO-106-12-S4.1>
4. **Noel Z.A.**, Rojas, J.A., Jacobs, J.L., D. McDuffe, Chilvers, M.I. 2016. The evaluation of a high throughput microtiter plate assay to examine the sensitivity of a soybean oomycete community to mefenoxam and ethaboxam. *Phytopathology* 105(Suppl. 4):S4.102
5. **Noel, Z.A.**, Rojas A., Jacobs J.L., McDuffee D., Chilvers, M.I. 2015. Development of a high throughput screening method to examine the fungicide sensitivity of an oomycete soybean community. *Phytopathology* 106(Suppl. 1):S1.7
6. **Noel, Z.A.**, Bradshaw T.L., Kingsley-Richards S.L., Berkett L.P., 2013. Evaluation of the efficacy of natural resistance in ‘Honeycrisp’ to reduce fungicide applications for *Venturia inaequalis* (Cooke) Wint. *Phytopathology* 104(Suppl. 1):S1.5

Funded Projects

Efficacy of natural resistance of ‘Honeycrisp’ apples to reduce fungicide applications for *Venturia inaequalis*.

- University of Vermont Undergraduate Summer Mini-Grant. 2012. \$564.48
- American Phytopathological Society: Frank L. Howard Undergraduate Fellowship. 2013. \$1,000.

Job solicitations

Ph.D. Student: Washington State University. PI: Dr. Mark Mazzola

Academic Awards and Honors

Oomycete Molecular Genetic Network (OMGN)

- 2018 recipient, **Travel award**

American Phytopathological Society

- 2016 recipient, **Phytobiomes poster award**

American Phytopathological Society North Central Division

- 2015 recipient, **Oral presentation award – 3rd place**

OSCAP/PhytophthoraCAP Project Meeting

- 2015 recipient, **Travel Award**. Award given to graduate students to for travel to a meeting.

Department of Plant Soil and Microbial Sciences, Michigan State University

- 2015, 2016, 2017, 2018 recipient, **Paul Taylor Scholarship**. Travel award
- 2015 recipient, **A.L. Rogers Endowed Research Scholarship**. Scholarship awarded to graduate students to support their graduate program.

- 2018 and 2015 recipient, **Everett “Tex” Beneke fund Scholarship**. Scholarship awarded to a graduate student studying mycology or mycology related area.

OSCAP Project Meeting

- 2015 recipient, **Travel Award**. Award given to graduate students to for travel to a meeting.

Soybean Root Rot Workshop.

- 2014 recipient, **Travel Award**. Award given to graduate students to for travel to workshop.

American Phytopathological Society

- 2013 recipient, **Frank L. Howard Undergraduate Research Fellowship**. National competitive award presented to an undergraduate student who is conducting original research in phytopathology.

American Society for Horticultural Science

- 2014 recipient, **Outstanding Horticultural Student Award**. Award recognizing academic achievement, leadership ability, participation in campus activities and service to the department.

College of Agriculture and Life Sciences, University of Vermont

- 2013 recipient, **Distinct Undergraduate Research (DUR) Award**. Presented to an undergraduate student at the University of Vermont that recognizes superior achievement in original research. This is one of the highest honors conveyed by the College of Agriculture and Life Sciences.
- 2013 inductee, **Alpha Zeta Honors Fraternity**. Members are invited to join this honorary agricultural fraternity if they are in the top 2/5 of their class.

Department of Plant and Soil Science, University of Vermont

- 2013 recipient, **Seymour Horticultural Prize**. Presented to a student who has conducted original research in horticultural sciences.
- 2013 recipient, **American Society For Horticultural Sciences Colligate Scholars Award**. Presented to a student who are in the top 15% in there junior or senior class and are active in campus organizations, clubs, and/or provide service to their department.
- 2013 recipient, **W. H. Darrow Horticulture Prize**. Presented to a student who has shown superior performance in horticultural science
- 2013 recipient, **Vermont Vegetable and Berry Growers Award**. Presented to a student who has shown interest in vegetable or berry production.
- 2012 recipient, **University of Vermont Undergraduate Summer Mini-Grant**. Competitive grant awarded to undergraduate students at the University of Vermont who are conducting undergraduate research.

New England Apples

- 2013 recipient, **New England Apples Young Growers Award**. Presented to individuals younger than twenty-five to travel to and attend an International Tree Fruit Growers Association (IFTA) annual meeting.

Professional presentations

Research presentations: 14 total presentations

Noel, Z.A., and Chilvers M.I. Ecology and evolution of oomycete communities to soybean seed treatments. International Congress of Plant Pathology (ICPP). July 29-August 3, 2018. *Oral presentation*

- Noel, Z.A., and Chilvers M.I. Ecological significance of soybean seed treatments on oomycete communities. International Congress of Plant Pathology (ICPP). July 29-August 3, 2018. **Poster presentation**
- Noel, Z.A., and Chilvers M.I. Ecology and evolution of oomycete communities to soybean seed treatments. Oomycete Molecular Genetics Network (OMGN) Annual Meeting. April 8-12, 2018. **Oral presentation**
- Noel, Z.A., and Chilvers M.I., Managing an oomycete community: fungicide sensitivity, evolution, and ecological significance of ethaboxam resistance. International Legume Root Rot Disease Workshop. November 1, 2017. **Invited presentation**
- Noel Z.A., Rojas, J.A., Jacobs, J.L., D., Chilvers, M.I., Managing an oomycete community: fungicide sensitivity and evolution of resistance to ethaboxam. American Phytopathological Society Annual Meeting. July 31 – Aug. 3 2017. **Oral Presentation**
- Noel Z.A., Roth M.G., Wang J., Chilvers, M.I. Mining of biotic and abiotic factors for prediction of soybean sudden death syndrome (SDS) symptoms. American Phytopathological Society Annual Meeting. July 31 – Aug. 3 2016. **Poster Presentation**
- Noel Z.A., Rojas, J.A., Jacobs, J.L., D., Chilvers, M.I. Evaluation of a high throughput microtiter plate assay to examine the sensitivity of soybean oomycete community to mefenoxam and ethaboxam. OSCAP-PhytophthoraCAP Project Meeting. Dec. 11-12, 2015. **Oral Presentation**
- Noel Z.A., Rojas, J.A., Jacobs, J.L., D., Chilvers, M.I. Molecular diagnostics and community composition. OSCAP-PhytophthoraCAP Project Meeting. Dec. 11-12, 2015. **Oral Presentation**
- Noel Z.A., Rojas, J.A., Jacobs, J.L., D., Chilvers, M.I. Evaluation of a high throughput microtiter plate assay to examine the sensitivity of soybean oomycete community to mefenoxam and ethaboxam. 1st International Soilborne Oomycete Conference. Dec. 8-10, 2015. **Poster Presentation**
- Noel Z.A., Rojas, J.A., Jacobs, J.L., D. McDuffe , Chilvers, M.I. The evaluation of a high throughput microtiter plate assay to examine the sensitivity of a soybean oomycete community to mefenoxam and ethaboxam. American Phytopathological Society Meeting. August 1-5, 2015. **Poster Presentation**
- Noel, Z.A., Development of a high throughput microtiter plate assay to examine the sensitivity of a soybean oomycete community. North-Central American Phytopathological Society Meeting. June 10, 2015. **Oral Presentation**
- Noel, Z.A., Development of a high throughput microtiter plate assay to examine the sensitivity of a soybean oomycete community. OSCAP Project Meeting. May 21, 2015. **Oral Presentation**
- Noel, Z.A., Chilvers, M.I. and Evaluation of the fungicide sensitivity of *Pythium oopapillum*. Soybean Root Rot Workshop. November 18-19, 2014. **Oral Presentation**
- Noel, Z.A., Bradshaw, T.L., Efficacy of Natural Resistance of ‘Honeycrisp’ Apples to Reduce

Fungicide Applications for *Venturia inaequalis*. UVM Student Research Conference. April 23, 2013. *Poster Presentation*

Professional Meetings Attended

- International Congress of Plant Pathology, Boston MA, July 29-August 3, 2018
- Oomycete Molecular Genetics Network Annual Meeting, Tai'an, China, April 8-12, 2018
- Michigan Agri-Business Association Meeting, January 9-13, 2017
- American Phytopathological Society Annual Meeting. Tampa, FL, July – Aug. 2016
- OSCAP-PhytophthoraCAP Project Meeting, Key West, FL, Dec. 11-12, 2015
- 1st International Soilborne Oomycete Conference, Key West, FL, Dec. 8-10, 2015
- American Phytopathological Society Annual Meeting, Pasadena, CA, Aug. 2015
- North Central American Phytopathological Society Annual Meeting, East Lansing, MI, June 2015
- OSCAP Project Meeting, Chicago, IL, May 2015
- Soybean Root Rot Workshop, Key West, FL, Nov. 18-19, 2014
- 75th New England, New York and Canada Fruit Pest Management Workshop, Burlington, VT, Oct. 2013
- American Phytopathological Society Annual Meeting, Austin, TX, Aug. 2013
- American Phytopathological Society Annual Meeting, Providence, RI, Aug. 2012

TEACHING ACTIVITIES

Teaching Experiences and Mentoring

Lectures

Introduction to R programming for statistics. Chilvers lab lunch-and-learn. Materials available: https://github.com/Chilverslab/Lunch_and_Learn/tree/master/01_BasicR

Planned Lectures

Ecology, evolution and biology of oomycetes. Fall Semester 2018. Advanced Mycology.

Teaching Assistant

University of Vermont: UVM PSS 138 Commercial Plant Propagation. Spring 2014

University of Vermont: UVM PSS 112 Weed Ecology and Management. Fall 2013

University of Vermont: UVM CALS 002/085 Foundations: Information Technology. Fall 2011

SERVICE ACTIVITIES

Professional Service and Affiliations

President: Students Phytopathological Organization for Research and Extension (SPORE)
March 2018-present

Secretary: Students Phytopathological Organization for Research and Extension (SPORE)
March 2017-March 2018

Reviewer: *Phytopathology* (1 manuscript)

Current Member: American Phytopathological Society: Student Member, North Central Division

Past Member: American Phytopathological Society: Northeast Division
Alpha Zeta Academic Fraternity: Green Mountain Chapter

Professional development

Adviser/Mentor: Mentored Alex Witte (undergraduate) on fungicide sensitivity of Clade 2
Fusarium spp.
Direct Marissa Dallas (undergraduate) implementing research protocols

Outreach: Held workshop for visiting graduate students wishing to learn how to perform
fungicide sensitivity assays and analyze data
Helped develop and hold a mushroom growing workshop

Website

Development: Developing personal website using Rstudio and Github
Chilvers Lab website maintenance/updates on WordPress

Safety

Coordinator: Chilvers Lab Fire Safety point person

Server

Maintenance: Maintained Linux OS lab server for bioinformatics analysis

EXTENSION ACTIVITIES

Extension presentations; 5 presentations

Audience: growers and industry professionals

Noel, Z.A., and Chilvers M.I. Ecology and evolution of oomycete communities to soybean seed treatments. Michigan Agri-Business Association Meeting. January 9-13, 2018. ***Oral presentation***

Noel, Z.A., and Roth M.G., Chilvers, M.I., Soybean sudden death prediction. Michigan Agri-Business Association Meeting. January 9-13, 2017. ***Oral Presentation***

Noel, Z.A., and Rossman, D. Chilvers, M.I. Making Every Seed Count: Prescription Seed Treatments. Michigan Agri-Business Association Meeting. January 12-14, 2015. ***Oral Presentation***

Noel, Z.A., Chilvers, M.I. Efficacy of Natural Resistance of ‘Honeycrisp’ Apples to Reduce Fungicide Applications for *Venturia inaequalis*. Vermont Tree Fruit Growers Annual Meeting. February 13, 2014. **Oral Presentation**

Noel, Z.A., Bradshaw, T.L., Efficacy of Natural Resistance of ‘Honeycrisp’ Apples to Reduce Fungicide Applications for *Venturia inaequalis*. Plant and Soil Science Faculty Endorsement for Distinct Undergraduate Research Award. September 23, 2013. **Oral Presentation**

Noel, Z.A., Bradshaw, T.L., Preliminary Observations: Efficacy of Natural Resistance of ‘Honeycrisp’ Apples to Reduce Fungicide Applications for *Venturia inaequalis*. Vermont Tree Fruit Growers Annual Meeting. February 14, 2013. **Oral Presentation**

Extension focused meetings attended

- Michigan Agri-Business Association Winter Conference and Trade Show. Lansing, MI. Jan. 12-14, 2015
- Vermont Tree Fruit Growers Association Annual Meeting. Middlebury, VT. Feb. 2014
- Vermont Grape and Wine Council Annual Conference. Randolph, VT. June 2013
- Vermont Apple Industry Strategic Planning Summit. Montpelier, VT. March 2013
- 56th International Fruit Tree Association Annual Conference. Boston, MA. Feb. 2013
- Vermont Tree Fruit Growers Association Annual Meeting. Middlebury, VT. Feb. 2013

Professional licensure

Vermont State Pesticide Applicator’s License: Issued 2012–Expired 2016

- Private applicator for commodity groups 2) tree fruit and 3) vegetables and small fruit.

Past responsibilities

Field Supervisor/Experienced Farm-hand LaValley Farms. Hooksett, NH. June 2008 to Sept. 2010

- Responsible for harvesting vegetable crops to fill orders
- Management of labor crews, for efficiency and proper harvest techniques.