

## PATRICK WILLIAM SYDOW

Ph.D. Candidate Agricultural and Environmental Plant Science  
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### EDUCATION

**Ph.D. Agriculture and Environmental Plant Science,** 2022-Present, *GPA: 4.00*  
The Pennsylvania State University, State College, PA  
Dissertation: Fitness Landscapes of Root-Rhizosphere Interactions in Maize and *Medicago* spp.  
Advisors: Drs. Liana Burghardt and Ruairidh Sawers  
**B.S. Biology,** 2018-2022; Honors College, *GPA: 3.97*  
College of Charleston, Charleston, SC  
Honors Thesis: Auxin and Root System Variation in *Arabidopsis thaliana*: from Seedling to Reproductive Maturity  
Advisor: Dr. Courtney Murren

### HONORS AND AWARDS

**2023-2025 Penn State Walter Thomas Memorial Scholarship;** Annual College of Ag Scholarship Received 2023, 2024, and 2025  
**2022 College of Charleston EXPO Award;** Best of Biology  
**2022 College of Charleston Biology Department Awards;** Outstanding Student & Departmental Honors  
**2018 Scholarship;** College of Charleston Honors College Scholarship

### PUBLICATIONS

Kaste, J. A., Ji, R., **Sydow, P.**, ... & Matthews, M. L. (2025). Metabolic modeling reveals synergistic growth benefits of engineering maize symbiosis with rhizobia and arbuscular mycorrhizal fungi. *bioRxiv*.  
Burghardt, L., **Sydow, P.**, ... & Tiffin, P. (2025). Genetic variation in host selectivity and adaptive strain enrichment within legume-rhizobia symbiosis: processes are host-dependent, far from perfect, and correlate with nodule morphology. *bioRxiv*.  
**Sydow, P.**, Murren, C.J. (2024) Root Variation in Response to Auxin Across Genotypes: From Seedling to Maturity. *PeerJ*.

### RESEARCH PRESENTATIONS

#### GRADUATE ONLY

**Sydow, P.**, An Introduction to The Euler Characteristic Transform. *Center for Root and Rhizosphere Biology Symposium*, 2025 May 29; University Park, PA. **Talk**  
**Sydow, P.**, Sutherland J.P., Epstein, B., Tiffin, P., Burghardt, L.T., Genetic Variation in Mechanism of Partner Choice within Legume-Rhizobia Symbiosis. *North American Symbiotic Nitrogen Fixation Conference*, 2024 June 4; Burlington, VT. **Talk**  
**Sydow, P.**, Pérez-Limón, S., Li, M., Perryman, M.G., Ramírez-Flores, R.M., Balint-Kurti, P., Sermons, S., Sidhu, J.S., Sawers, R.J.H., Variation in Response to Arbuscular Mycorrhizal Fungi Across Maize Genotypes and Agroecosystems. *The One Health Microbiome Symposium*, 2024 May 30; State College, PA. **Talk**  
**Sydow, P.**, Sutherland J.P., Epstein, B., Tiffin, P., Burghardt, L.T., Genetic Variation in Mechanism of Partner Choice within Legume-Rhizobia Symbiosis. *Center for Root and Rhizosphere Biology Symposium*, 2024 May 9; University Park, PA. **Talk**  
**Sydow, P.**, Pérez-Limón, S., Li, M., Perryman, M.G., Ramírez-Flores, S., Sidhu, J.S., Sawers, R.J.H., Quantifying Mycorrhizal Benefit of Field Maize Across Heterogenous Soil Environments. *Enabling Nutrient Symbioses in Agriculture Spr24 Meeting*, 2024 April 23;

Aarhus, Denmark. **Talk**

**Sydow, P.**, Pérez-Limón, S., Li, M., Perryman, M.G., Ramírez-Flores, R.M., Balint-Kurti, P., Sermons, S., Sidhu, J.S., Sawers, R.J.H., Response to Arbuscular Mycorrhizal Fungi in Field Grown Maize. *Genetics of Maize Microbes Interactions Meeting*, 2024 March; Raleigh, NC.

**Talk**

**Sydow, P.**, Pérez-Limón, S., McLaughlin, C., Perryman, M.G., Sawers, R.J.H., Dissecting the Genetic Architecture of Root System Architecture in The MEXIMAGIC Population. 66<sup>th</sup> Annual Maize Genetics Meeting, 2024 March 2; Raleigh, NC. **Lightning Talk**

**Sydow, P.**, Pérez-Limón, S., McLaughlin, C., Perryman, M.G., Sawers, R.J.H., Dissecting the Genetic Architecture of Root System Architecture in The MEXIMAGIC Population. 66<sup>th</sup> Annual Maize Genetics Meeting, 2024 March; Raleigh, NC. **Poster**

**Sydow, P.**, Sutherland J.P., Gil-Polo, M.A., Epstein, B., Tiffin, P., Burghardt, L.T., Variation in Nodule Morphology and Strain Diversity in Legume-Rhizobia Symbiosis Across 202 *M. truncatula* Accessions. American Society of Plant Biologists Conference, 2023, Savannah, GA. **Poster**

**Sydow, P.**, Pérez-Limón, S., Sawers, R.J.H., Dissecting the Genetic Architecture of Root System Architecture in The MEXIMAGIC Population. Penn State University Center for Root and Rhizosphere Biology Symposium, 2023 May 23; University Park, PA. **Poster**

Arrington, K., ... **Sydow, P.**, White, C. From Spider Plots to Webs: Evolution of Interdisciplinary Cover Crop Research. What's Next? Penn State University Plant Science Departmental Seminar, 2023 January 20; University Park, PA. **Multiple Speaker Talk**

## UNDERGRADUATE TEACHING AND MENTORSHIP

**PSU Graduate Student Online Teaching Certificate** (SU25)

**Mentor**, Amanda Jason, 1<sup>st</sup> Place UG Plant Poster College of Ag. Expo (SP25) and Gwendolyn Fry, Honors Thesis and Poster - Bean-Rhizobia Symbiosis Domestication (SP24)

**Guest Lecturer**, AGRO 410 *Crop Physiology* (SP24) and HORT 497: *Plants, Genomes, and Agriculture* (SP24)

**Teaching Assistant**, HORT 497: *Plants, Genomes, and Agriculture* (SP23) and HORT 402W: *Plant Nutrition* (FA23+24)

## SYNERGISTIC ACTIVITIES

**2024-Present PSU TeachAg. Presenter** – Collaborated with Ag. Ed. Undergraduates to deliver a 50-minute lesson plan to >100 high school students in PA.

**2023-Present Department of Plant Science Graduate Student Representative** – Attend monthly faculty meetings and advocate for graduate students

**2023-2025 President, Penn State Plant Science Graduate Student Association** – Organized regular coffee hours, orientation tours and AEPS interview day; volunteer activities with Penn State Alumni orgs and farms; TA workshops

**2023-2025 Host, Plant Science Seminar Speaker** – Hosted Dr. Katilyn Beidler and Dr. Felix Fritsch to present in the Plant Science Dept Seminar.

**2023-2024 Center for Root and Rhizosphere Biology Symposium Planning Committee**— Supported networking for early career researchers (11 posters; 9 presentations; 40 attendees).