Siwook Hwang

PhD Candidate
Graduate Degree Program in Ecology
Soil and Crop Sciences Dept.
Colorado State University

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Education

Colorado State University, CO 2019-present

Ph.D. in Ecology, graduation in Dec 2024

International Sustainable Development Studies Institute, Chiang Mai, Thailand 2015-2016

Undergraduate Study Abroad

Kalamazoo College, MI 2013-2017

B.A. in Biology, with honors

Awards and Honors

Lee Sommers Excellence in Leadership Award 2024

Foundation for Food and Agriculture Research Fellowship 2020-2023

Perennial Agriculture Project Research Fellowship 2019-2022

Programs of Research and Scholarly Excellence Fellowship 2019

Research and Work Experiences

Graduate Research Assistant, Dept of Soil and Crops Sciences, Colorado State University, CO 2019-present

Planned and organized greenhouse and field studies

Designed, built, and created a protocol for ^{13}C-CO_2 pulse labeling chamber.

Performed soil DNA extraction, processed and analyzed 16S/ITS amplicon sequencing data, modified a protocol for root exudate collection, processed and analyzed untargeted metabolomics data resulting from LC-MS/MS, performed integrated statistical analysis of multi-omics dataset, performed estimation of legume N transfer via the ^{15}N leaf-feeding method

Research Associate, Natural Resources Ecology Laboratory, Colorado State University, CO 2017-2019

Performed microbial biomass extraction, soil enzyme assays, and size-based fractionation of soil samples for various projects

Managed analyzed data generated from lab assays

Intern, The Land Institute, KS 2017

Supported establishing field studies, collecting phenotypic data, maintaining plots, and processing samples

Participated in seminars lead by TLI scientists

Research Assistant, Grossman Lab, University of Minnesota, MN 2016

Performed general lab and field duties including soil sieving, glassware cleaning, soil sampling

Carried out a summer undergraduate research project including soil enzyme assays and PLFA analysis

Publications

Hwang, S., Koziol, L., Mason, L., Grant, L., Wrighton, K.C., Crews, T.E., Fonte, S.J., *in prep*. Soil labile carbon pools of perennial and annual cereals respond differently to legume intercropping – ^{15}N leaf labeling study.

Hwang, S., Brummer, J.E., Crews, T.E., Grant, L., McGivern, B.B., Wrighton, K.C., Fonte, S.J., *in prep*. Perennialization and intercropping effects on wheat rhizosphere communities.

Hwang, S., Grant, L., McGivern, B.B., Wrighton, K.C., Mathews, P., Boot, C.M., Crews, T.E., Fonte, S.J., *in prep*. Fine root production and specific exudation rate are enhanced in a novel perennial cereal hybrid compared to its annual and perennial parents.

Hwang, S., Machmuller, M.B., Gaudin, A.C.M., Fonte, S.J., 2024. A teosinte and modern maize hybrid use different carbon allocation strategies in response to cover crop residue nitrogen. Plant and Soil. doi:10.1007/s11104-024-06494-0

Osborne, B.B., Soper, F.M., Nasto, M.K., Bru, D., Hwang, S., Machmuller, M.B., Morales, M.L., Philippot, L., Sullivan, B.W., Asner, G.P., Cleveland, C.C., Townsend, A.R., Porder, S., 2021. Litter inputs drive patterns of soil nitrogen heterogeneity in a diverse tropical forest: Results from a litter manipulation experiment. Soil Biology and Biochemistry 158, 108247. doi:10.1016/j.soilbio.2021.108247

Presentations

Hwang, S., Brummer, J., Crews, T., Grant, L., McGivern, B., Wrighton, K., Fonte, S.J., Novel perennial cereal grains Kernza and perennial wheat harbor distinct rhizosphere microbial communities compared to annual durum wheat, presented at biennial Soil Ecology Society meeting 2024, Grand Rapids, MI.

Hwang, S., Machmuller, M.B., Gaudin, A.C.M., Fonte, S.J., Teosinte and Modern Maize Increase Belowground C Allocation in Different Ways in Response to Organic N Amendment, presented at ASA, CSSA, SSSA International Annual Meeting 2023, St. Louis, MO.

Hwang, S., Root exudate update, presented at the October 2022 Perennial Agriculture Project meeting, Salina, KS.

Osborne, B.B., Soper, F., Nasto, M., Hwang, S., Machmuller, M., Sullivan, B.W., Asner, G., Cleveland, C.C., Townsend, A., Porder, S., Litterfall inputs drive patterns of soil nitrogen heterogeneity in a diverse tropical forest, presented at the December 2019 American Geophysical Union Fall meeting, San Francisco, CA.

Hwang, S., Grain Crop Hybridization, Root Exudates, and Soil Microbes: A Nitrogen Story, presented at the October 2019 Perennial Agriculture Project meeting, Lawrence, KS.

Hwang, S., Machmuller, M.B., Wallenstein, M.D., Going Back to the Roots: Evaluating the influence of ancient and modern maize on microbial nutrient cycling, presented at the May 2019 Soil Ecology Society meeting, Toledo, OH.

Hwang, S. and Machmuller, M.B., Going Back to the Roots: Evaluating the influence of ancient and modern maize on microbial nutrient cycling, presented at the February 2019 Front Range Student Ecology Symposium, Fort Collins, CO.

Outreach and Teaching

Introduction to Soil Science — Fall 2024

Guest lecture, "Nitrogen cycling: where does it come from where does it go?"

ECOL 592: Academia for Ecologists — Spring 2024

Organizing instructor. Created the syllabus, selected reading materials, arranged for guest speakers, and led in-class discussions on academic career paths within the field of ecology.

SOCR 421: Agroecosystem Management — Spring 2023

Teaching assistant. Helped with course logistics, writing and grading exams and lecturing.

SOCR 681: Graduate Foundations for Soil and Crop Sciences — Spring 2023

Guest lecture, “Managing finances in grad school”

Mentoring

FFAR fellowships program — Fall 2024-present

Mentoring a PhD student as part of their FFAR fellowship program, including quarterly meetings, career/ professional development advice.

Undergraduate research assistant — Spring 2024

Mentored an undergraduate research assistant while supervising their lab work. Trained them in microbial biomass extraction and helped them analyze the data for their class project.

Professional Societies

Soil Ecology Society — 2019-present

Soil Science Society of America — 2023-present