

Multistate Research Project Annual Report

Project Number: NC-1178

Project Title: Land use and management practice impacts on soil carbon and associated agroecosystem services

Period Covered: 6/1/2025 - 5/31/2026

Date of this Report: August 20, 2026

Annual Meeting Dates: 6/25/2026 – 6/26/2026

A. Participants

In person:

Larry Cihacek (North Dakota State University)

Yichao Rui (Purdue University)

Kristopher Osterloh (South Dakota State University)

Srinivasulu Ale (Texas A&M AgriLife Research, Vernon)

Humberto Blanco (University of Nebraska–Lincoln)

Sayantana Samanta (Mississippi State University)

Kirsten Butcher (North Dakota State University)

Online:

Rattan Lal (The Ohio State University)

Felipe Aburto (Texas A&M University)

Cristina Lazcano (University of California, Davis)

B. Brief Summary of Annual Meeting

The meeting was hosted and presided over by Kristopher Osterloh, South Dakota State University. Presentations were delivered according to the meeting agenda, with representatives providing updates on research activities, major findings, publications, and outreach accomplishments from their respective institutions. The presentations generated engaging questions and productive discussion among project members.

During the business meeting, the group reviewed the progress of NC-1178 and discussed plans for future collaborative activities. Major topics included the proposed symposium at the 2026 ASA-CSSA-SSSA Annual Meeting in Portland (led by Larry Cihacek), the special-topic journal issue (led by Kristopher Osterloh), and opportunities for joint manuscripts and cross-institutional research (led by Humberto Blanco). Members discussed potential article topics, authorship, timelines, and strategies for avoiding overlap. The group agreed to continue using a shared document to coordinate proposed topics and identify opportunities for synthesis papers and meta-analyses.

The remaining presentations continued according to the agenda and were followed by additional discussion and feedback. Members exchanged ideas about future research priorities, collaborative funding opportunities, and approaches for increasing the visibility and impact of the project's work. The meeting concluded with a group dinner/networking event.

The group participated in a field tour of a South Dakota State University research farm on the second day of the annual meeting (06/26/2026). The tour highlighted ongoing research related to soil carbon, soil health, conservation management, and agroecosystem services and included presentations from faculty, research staff, graduate students, and/or local agricultural partners. The tour provided participants with an opportunity to observe current experiments and discuss their practical and regional applications.

The next annual meeting of the NC-1178 group will be hosted by Yichao Rui at Purdue University in West Lafayette, Indiana in June 2027.

C. Accomplishments

Research Activities: During the 2025–2026 reporting year, NC-1178 committee members reported dozens of peer-reviewed publications and numerous scientific and Extension presentations related to soil carbon, soil health, and the effects of agricultural management on ecosystem services. The committee investigated a wide range of practices, including reduced tillage, crop-residue management, cover crops, crop rotations, organic amendments, nitrogen and irrigation management, prescribed burning, and adaptive grazing. This work encompassed diverse environmental and production systems, including row crops, rice, vineyards, forests, rangelands, pastures, and organic farming systems across multiple U.S. regions (Table 1). Team members advanced a shared goal of developing conservation production systems that improve soil carbon storage, nutrient and water-use efficiency, agricultural productivity, and climate resilience. The committee's broad interdisciplinary expertise supported research collaboration, student training, stakeholder engagement, and the exchange of scientific guidance across institutions. The team met its 2025–2026 milestones and will continue implementing the planned research. Members also continued developing collaborative synthesis papers, a potential special-topic journal issue, and a symposium for the 2026 ASA-CSSA-SSSA Annual Meeting to increase the visibility and public accessibility of NC-1178 research.

Table 1. Select major research activities and findings by NC-1178 participants during 2025-2026.

State	PI	Select major research activities conducted by NC-1178 participants during 2025-2026.
TX	Ale	The research team used the Agricultural Policy/Environmental eXtender (APEX) model to assess the long-term effects of regenerative agricultural practices in the Double Mountain Fork Brazos Watershed in the Texas High Plains. The evaluated practices included no-tillage, no-tillage with a rye cover crop, and no-tillage with cotton–sorghum or cotton–winter wheat–fallow rotations. The study quantified how these regenerative practices affected surface runoff, sediment loss, nitrogen and phosphorus loading, and cotton yield under both irrigated and rainfed conditions. The analysis also evaluated how watershed-scale outcomes changed with the proportion of cropland managed using regenerative practices. Modeling results showed that regenerative practices substantially reduced runoff and sediment and nutrient losses compared with conventional tillage. Benefits increased as the proportion of cropland under regenerative management increased, while cotton yields were not significantly affected.
ND	Cihacek / Butcher	The research team completed a 31-year assessment of soil carbon dynamics by resampling 11 paired cropland and undisturbed grassland sites originally sampled in 1991–1992 and again in 2010 and 2023. The study quantified changes in total soil carbon, soil organic carbon, and soil inorganic carbon under semiarid conditions and evaluated the effects of long-term conversion from crop–fallow systems to continuous no-till production. A complementary study examined acid phosphatase activity in the corn phase of two 36-year crop-rotation systems. The research evaluated the effects of conventional tillage versus no-till, nitrogen fertilization, and repeated manure applications on phosphatase activity, soil-test phosphorus, and soil health. Additional research on the effects of tillage on phosphorus stratification is underway. The team also investigated how soil carbon availability and microbial nutrient limitation influence suppression of potato common scab. The study evaluated relationships among carbon inputs, microbial community structure, microbial physiology, carbon-to-nitrogen balance, biogeochemical cycling, and disease severity. The results showed that increasing soil carbon alone did not consistently suppress disease; effective suppression occurred only when microbial communities shifted toward relative nitrogen limitation.
TX	Noormets	The research team evaluated how prescribed burning affects forest structure, plant productivity, belowground carbon allocation, root dynamics, microbial respiration, and annual soil carbon balance in mature shortleaf and loblolly pine forests. The work compared unburned stands with stands receiving annual, biennial, or intermittent prescribed fire and quantified the decomposition of coarse roots relative to stemwood as potential long-term soil carbon inputs.

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		The team used isotopic measurements to investigate how recently assimilated plant carbon is allocated among biomass production, respiration, nonstructural carbon storage, root exudation, and soil microbial processes. The research examined diurnal and seasonal controls on carbon transfer from leaves to roots and soil, with particular attention to water availability, temperature, plant sink strength, and the relative responses of root and heterotrophic respiration. The research also compared adaptive multipaddock grazing with conventional intensive grazing across paired rangeland sites. Measurements included grazing-rest periods, standing biomass, net primary production, manure inputs, soil moisture, belowground carbon allocation, microbial respiration, and annual soil carbon balance. The study assessed whether longer recovery periods under adaptive grazing improve vegetation growth, belowground carbon inputs, microbial activity, and soil carbon outcomes.
KY	Grove	The research team conducted a two-year field study at 13 locations to evaluate early-season soil nitrogen supply and subsequent nitrogen nutrition in corn. Treatments included nitrogen applications of 75, 150, or 225 lb N/acre at the V4 growth stage, followed by either 0 or 75 lb N/acre as a late rescue application at the VT/R1 stage. The study quantified corn yield, ear-leaf nitrogen status, grain nitrogen concentration, kernel number, and kernel weight to determine when very late nitrogen applications could alleviate crop nitrogen stress. It also examined how soil organic matter and fertilizer nitrogen interact to support corn productivity across environments with site-average yields ranging from approximately 90 to 260 bu/acre. The results showed a low probability of benefit from VT/R1 nitrogen application when soil and fertilizer nitrogen supplies were adequate. However, when nitrogen stress occurred, the late rescue application prevented approximately 70–90% of the potential yield loss, primarily by increasing kernel size. The research also demonstrated that soil organic matter contributes to soil nitrogen-supply resilience and provides greater flexibility in the timing of corn nitrogen management.
SC	Ye	The research team evaluated conservation management practices for improving soil organic matter, nutrient cycling, microbial diversity, and crop production in sandy agricultural soils. The studies examined grass, legume, and mixed-species cover crops, as well as manure compost, to determine how their chemical composition and physical characteristics influence soil carbon and nitrogen processes. The team measured gaseous nitrogen losses, soil water-filled pore space, rainfall, and fertilizer effects under different cover-crop systems. The research also quantified root-derived carbon inputs and turnover rates from grass and legume cover crops and evaluated changes in microbial communities and functional groups associated with carbon and nitrogen cycling. Results showed that rainfall and soil moisture conditions were stronger drivers of nitrogen losses than fertilization, with losses increasing rapidly above a water-filled pore-space threshold. Legume-derived root carbon turned over more rapidly than

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		grass-derived carbon, while manure compost and different cover-crop combinations altered microbial communities through distinct mechanisms. These findings support the development of soil-management guidelines that improve nutrient-use efficiency, soil health, and agronomic productivity in sandy soils.
MS	Dhakal	The research team compared continuous flooding with furrow-irrigated rice using tailwater recirculation to determine how irrigation management affects greenhouse gas emissions, evapotranspiration, crop water use, and rice productivity. Eddy covariance measurements, gas sampling, and crop assessments were used to quantify carbon dioxide, methane, and nitrous oxide emissions, seasonal evapotranspiration, water-use efficiency, biomass production, and grain yield. The study evaluated whether alternate wetting and drying created by tailwater recirculation could reduce crop water demand and the global warming potential of rice production. Tailwater recirculation reduced seasonal evapotranspiration by approximately 19% and improved water-use efficiency by 18% without reducing rice yield. However, increased nitrous oxide emissions from aerobic portions of the furrow-irrigated system offset reductions in methane emissions, resulting in global warming potential comparable to that of continuously flooded rice. The team also conducted on-farm research evaluating polysulfate fertilizer as a strategy for reducing methane production in flooded rice. Polysulfate application reduced estimated methane emissions from 17.1 to 3.4 kg CH₄/ha over a 53-day flooding period, potentially by stimulating sulfate-reducing microorganisms that compete with methanogens for acetate. These studies provide information for improving water conservation while identifying additional management practices needed to reduce greenhouse gas emissions from rice production.
TX	Dou	The research team evaluated how crop selection, nitrogen fertilization, and residue production affect soil carbon sequestration in the warm, humid subtropical environment of southeastern Texas. Field studies focused on biomass sorghum and energycane, examining how cultivar selection and nitrogen-management rates influence biomass production, residue inputs, soil disturbance, and the potential for long-term soil carbon accumulation. The team investigated alternate wetting and drying irrigation strategies for reducing water use and methane emissions from rice production. Continuous flooding was compared with irrigation triggered when the water table declined to 15 or 30 cm below the soil surface. The study also compared hybrid and inbred rice cultivars and tested newly developed soil redox sensors for monitoring soil conditions. Moderate drying to 15 cm maintained yields comparable to continuous flooding, whereas drying to 30 cm reduced yield; the hybrid cultivar showed greater tolerance to water stress. A greenhouse study evaluated zinc oxide nanoparticles, their transformation products, and conventional ionic zinc as nutrient sources for rice grown in clay soil. The research measured rice growth, root morphology, nutrient uptake, grain yield, and zinc-use efficiency. Conventional zinc sulfate produced the highest zinc uptake,

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		increased grain yield by 19%, and achieved a zinc-use efficiency of 144.5, while zinc phosphate increased root surface area by 330% and root volume by 497% but provided less plant-available zinc.
IN	Rui	During 2025-2026, the Purdue team led by Dr. Rui completed and published research on decade-long cereal rye cover cropping, demonstrating measurable improvements in soil carbon and physical properties. The team also published findings on soil organic matter persistence across soil depths and long-term cropping systems, contributing new knowledge about the mechanisms controlling carbon stabilization in agricultural soils. Two complementary studies were completed on the belowground performance of short-stature maize. These studies evaluated how maize hybrid selection, soil type, and nitrogen fertilization affect root development, plant carbon allocation, root exudation, and root-derived carbon inputs. This research expanded interdisciplinary collaboration among soil scientists, crop physiologists, agronomists, and agricultural engineers. The team also expanded the Indiana Organic Network into a statewide, farmer-engaged soil-health research platform. Soil-health assessments were completed across 91 organic field sites, and baseline measurements were established at newly developed resilient agriculture research sites across Purdue Agricultural Centers. Findings were shared with scientists, crop advisers, farmers, and other stakeholders through peer-reviewed publications, professional conferences, Extension programs, and producer field days.
MA	Naughton	The research team completed the second year and began the third year of a field experiment evaluating drought-tolerant summer cover crops in New England silt loam soil. The study compared sunn hemp, forage soybean, pearl millet, teff, and selected biculture mixtures under tilled and no-till management to determine how differences in plant biochemistry and root architecture affect soil carbon and nitrogen availability and the productivity of a subsequent fall turnip crop. The team collected soil, root, shoot, and root-exudate samples following the summer cover crops, fall turnips, and winter rye. Plant materials were analyzed for carbon and nitrogen, while soils were collected for biological, chemical, and physical soil-health measurements, including enzyme activity, respiration, microbial biomass, soil organic carbon and nitrogen, water-holding capacity, aggregate stability, compaction, and bulk density. A root- and shoot-decomposition study is also being incorporated to evaluate the availability of cover-crop carbon and nitrogen to the following cash crop. Initial results showed that pearl millet produced consistently high aboveground and belowground biomass and provided the greatest improvement in soil water-holding capacity. Teff, sunn hemp, and their bicultures produced substantial dry biomass and may contribute strongly to soil organic matter formation and nutrient cycling. The project also trained one Ph.D. student and five undergraduate researchers in field and laboratory methods for assessing soil and plant nutrients.

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CA	Lazcano	The research team applied vermifiltration-derived vermicompost across 10 commercial fields representing diverse crops in California and Washington. The study evaluated how this organic amendment affects soil health, microbial functioning, nutrient cycling, greenhouse gas emissions, and crop performance across annual and perennial production systems. The team completed four-year field trials examining the effects of regenerative management on soil carbon, hydrological health, and crop yield in vineyards across California, Oregon, and Washington. Researchers also analyzed soil carbon fractions and physical properties in 28 Napa Valley vineyard blocks to assess how management history, tillage, grazing, organic amendments, and other regenerative practices influence soil health and microbial communities. Additional field research compared compost and vermicompost materials for their effects on nitrogen cycling and processing-tomato productivity. The team also evaluated water-saving irrigation, compost safety, environmental contaminants, and multi-omics approaches for characterizing soil microbiomes. During the reporting period, the program produced 12 accepted peer-reviewed publications, submitted seven additional manuscripts, delivered 17 scientific presentations and four Extension presentations, and graduated four Ph.D. students and one M.S. student.
MA	Hestrin	The research team investigated how agricultural management, soil mineralogy, and plant–microbe interactions affect the size, composition, accessibility, and nitrogen-supplying potential of soil organic matter. The work focused particularly on particulate organic matter and mineral-associated organic matter nitrogen across soils representing different geochemical characteristics and land-management histories. The team conducted greenhouse experiments to determine how mycorrhizal fungi and root-associated fungal endophytes influence soil organic matter formation, mineral–organic associations, and crop nitrogen nutrition. Sequential chemical extractions were used to evaluate the potential mobilization of mineral-associated organic nitrogen by water and plant- and microbe-derived compounds. The results indicated that approximately 20% of mineral-associated organic nitrogen may be mobilizable and potentially available to plants and soil organisms. The team also developed customized greenhouse growth chambers integrated with a dual carbon-isotope analyzer for $^{13}\text{CO}_2$ labeling and tracing carbon movement through plant–soil systems. This research infrastructure supported studies of rhizosphere carbon dynamics and expanded institutional capacity for isotope-based research. During the reporting period, the project trained six graduate students and two undergraduate researchers in soil biogeochemistry, greenhouse experimentation, isotope tracing, and analytical methods.
TN	Jagadama / Zhang	The research team combined sampling from 22 producer-managed crop and pasture farms with multiyear field experiments to determine how land use and management affect soil organic carbon from the surface to a depth of 60 cm. The studies evaluated long-term no-till, crop rotations, cover crops, residue retention, organic amendments,

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		and strategic grazing across three Tennessee Major Land Resource Areas while accounting for precipitation, vegetation, soil texture, and sampling depth. The team examined how soil aggregates and the quality and placement of organic inputs regulate soil carbon, nitrogen, and overall soil health. Field and laboratory studies compared cover-crop sequences, poultry litter combined with soil amendments, different rates of wheat-straw return, and leaf and root residues under contrasting fertility conditions. Measurements included bulk and aggregate-associated carbon and nitrogen, microbial biomass, enzyme activity, microbial-community composition, soil quality indicators, and stable-isotope tracing of carbon transformations. Additional studies evaluated microbial and soil-carbon responses to crop diversification, drought, mixed-species residues, and biodegradable microplastics. The research assessed fungal pathogens, arbuscular mycorrhizal fungi, carbon priming, mineral-associated organic carbon formation, and the decomposition of different biodegradable plastics. These integrated studies identified how soil depth, environmental conditions, residue quality, microbial seasonality, and emerging stressors influence soil carbon storage, nutrient retention, and agroecosystem resilience.
OH	Lal	The research team continued a long-term field study evaluating the effects of corn-residue retention on crop productivity and soil properties at South Charleston and Hoytville, Ohio. Residue-retention rates ranged from 0% to 200%, and measurements included corn grain and stover yields, total biomass, harvest index, soil organic carbon stocks, aggregate stability, bulk density, and soil water retention at depths of 0–10 and 10–20 cm. The study compared responses in the silt loam soil at South Charleston with those in the clayey soil at Hoytville. Grain and stover yields were higher at Hoytville, largely because its clayey soil retained more water and nutrients, but crop yields and harvest index generally did not differ among residue treatments. These results indicate that approximately 25–33% of corn residue could potentially be removed for other uses without an immediate yield penalty. Although partial residue removal did not reduce short-term crop yield, retaining more residue generally increased surface-soil organic carbon and aggregate size. Average soil organic carbon stocks at 0–10 cm were approximately 42.2 Mg C/ha at Hoytville and 36.4 Mg C/ha at South Charleston. The findings demonstrate that residue removal decisions must balance short-term opportunities for residue use against possible long-term effects on soil carbon storage, soil health, water relations, and sustainable productivity.

Outputs: During the 2025–2026 reporting period, the NC-1178 team produced over 70 peer-reviewed publications and delivered more than 100 scientific and conference presentations. Members also conducted multiple Extension presentations, field days, workshops, and other stakeholder-engagement

activities. These outputs communicated project findings to scientists, producers, agricultural advisers, conservation professionals, policymakers, and the public and met or exceeded the output expectations established in the project outline.

Short-term outcomes: Findings generated by the team demonstrate how land use and management practices can improve soil organic carbon, soil health, nutrient cycling, water-use efficiency, and agroecosystem resilience while maintaining crop productivity (Table 1). Results were disseminated through peer-reviewed and open-access publications, scientific conferences, Extension programs, field days, and direct engagement with producers. Major findings included: 1) conservation practices—including cover crops, reduced tillage, crop rotations, residue retention, organic amendments, and regenerative management—improved soil carbon and soil functions across diverse production systems (CA, IN, MA, OH, SC, TN, and TX); 2) irrigation, drainage, and nitrogen-management strategies influenced crop productivity, water-use efficiency, nutrient losses, and greenhouse gas emissions (KY, MS, and TX); 3) soil microbial communities and mineral-associated organic matter played important roles in carbon persistence, nutrient availability, disease suppression, and crop nitrogen nutrition (CA, IN, MA, ND, SC, TN, and TX); 4) prescribed burning and grazing intensity altered vegetation carbon allocation and microbial activity, although annual soil carbon responses were comparatively small or required longer periods to detect (TX); and 5) soil texture, depth, climate, residue quality, and management history strongly influenced soil carbon storage and should be considered when developing site-specific soil-health recommendations (CA, IN, MA, ND, OH, TN, and TX).

Milestones: The team completed major 2025–2026 milestones related to field and laboratory data collection, long-term site resampling, treatment evaluation, soil and plant analyses, modeling, and dissemination of findings. Several multiyear experiments reached important analytical or publication stages, and participants expanded research capacity through new instrumentation, student training, and producer-engaged research networks. The team also began coordinating collaborative synthesis manuscripts, a potential special-topic journal issue, and a symposium for the 2026 ASA-CSSA-SSSA Annual Meeting. These activities will integrate results across locations, increase the visibility of NC-1178 research, and support the project’s future milestones for collaboration, outreach, and scientific synthesis.

D. Impacts

The research accomplishments summarized in Tables 1 address the broader objectives of NC-1178 and demonstrate the value of the committee’s interdisciplinary and multistate structure. The committee brings together expertise in soil science, agronomy, hydrology, microbiology, biogeochemistry, crop production, forestry, and rangeland management. Research and Extension activities conducted across the United States generated scientific, environmental, economic, and societal benefits. Collectively, these findings provide a data-driven foundation for predicting how land use and management affect soil organic carbon, soil health, agricultural productivity, water quality, greenhouse gas emissions, and climate resilience across diverse environments.

Demonstrating the importance of soil health. Committee members demonstrated that healthy soils support crop productivity, nutrient cycling, water retention, disease suppression, and resilience to drought and other environmental stresses. Long-term cover cropping, reduced tillage, crop rotation, residue retention, organic amendments, and regenerative management generally improved soil carbon and biological or

physical soil-health indicators. However, responses depended on soil texture, climate, drainage, land use, management history, and sampling depth. These findings emphasize the need for site-specific soil-health assessments rather than uniform recommendations.

Highlighting the role of organic carbon in soil functions. Soil organic carbon is fundamental to nutrient availability, aggregate stability, water relations, microbial activity, and long-term productivity. NC-1178 researchers demonstrated that soil carbon formation and persistence are controlled by interactions among plant carbon inputs, root traits, microbial processes, mineral associations, residue quality, and environmental conditions. Findings showed that mineral-associated organic matter can cycle more rapidly than previously recognized and may supply nitrogen to crops. The research also demonstrated that management practices affecting belowground carbon allocation do not always produce immediate changes in annual soil carbon balance, highlighting the importance of long-term studies.

Promoting sustainable soil and crop management. The project generated practical information for improving conservation and production systems. Regenerative practices were projected to reduce runoff by 29–57%, sediment loss by 38–58%, nitrogen loss by 48–81%, and phosphorus loss by 29–52% in a Texas watershed without significantly reducing cotton yield. Tailwater recirculation improved rice water-use efficiency by 18%, while polysulfate application reduced estimated methane emissions from flooded rice by approximately fivefold. Research also demonstrated that cover crops, crop residues, organic amendments, drainage, irrigation, and nitrogen-management strategies must be integrated with local soil and climatic conditions.

Improving nutrient-use efficiency and environmental quality. Research conducted by the committee improved understanding of how soil organic matter, fertilizer management, irrigation, microbial nutrient balance, and crop genetics affect nutrient availability and loss. Very late nitrogen application prevented approximately 70–90% of potential corn-yield loss when nitrogen stress occurred, while soil organic matter increased the resilience and timing flexibility of corn nitrogen supply. Other studies demonstrated that rainfall and soil water-filled pore space strongly regulated gaseous nitrogen losses and that managing carbon and nitrogen together may enhance microbial processes involved in suppressing soilborne diseases.

Supporting climate-resilient agricultural and natural systems. Studies in croplands, rice systems, vineyards, forests, pastures, and rangelands showed that climate-resilient management must consider water availability, soil depth, residue quality, plant species, and disturbance intensity. Prescribed burning and intensive grazing reduced belowground carbon allocation and microbial activity, although annual soil carbon responses were comparatively small. Adaptive grazing increased standing biomass, soil moisture, belowground carbon inputs, and microbial activity. These findings help land managers evaluate tradeoffs among productivity, carbon storage, greenhouse gas mitigation, and ecosystem resilience.

Social and economic benefits to society. Improved soil health, fertilizer-use efficiency, water conservation, and greenhouse gas management can reduce production costs while protecting soil, air, and water resources. The project's findings support more efficient use of fertilizer and irrigation water, reduce nutrient and sediment losses, and provide producers with greater flexibility in managing crops under variable weather conditions. Training graduate and undergraduate students and engaging farmers, agricultural advisers, Extension educators, and conservation professionals also strengthened the workforce and expanded public access to research-based management information.

Grant and Resources Obtained

Committee members strengthened research capacity through competitive grants, institutional investments, student scholarships, collaborative research support, and specialized equipment. Reported resources supported research on soil carbon sequestration, mineral-associated organic matter, plant–microbe interactions, soil health, nutrient and water-quality analysis, greenhouse gas emissions, and climate-resilient crop production. Because funding amounts were not consistently reported by all participating institutions, an aggregate funding total was not calculated for 2025–2026.

Equipment

Butcher and Cihacek: An elemental analyzer–isotope ratio mass spectrometer and a trace-gas isotope ratio mass spectrometer were acquired for the new Bolley Agricultural Laboratories at North Dakota State University. The instruments will increase capacity for soil, atmospheric carbon, and nitrogen measurements.

Dhakal: Incubation chambers were designed for research on cadmium immobilization and carbon sequestration using magnesium phosphate-modified fir biochar. An evacuation pump was purchased for preparing gas-sampling vials, and six photosynthetically active photon flux-density sensors were added to existing eddy-covariance systems.

Dou: Newly developed soil-redox sensors were tested for monitoring alternate wetting and drying conditions in paddy soils.

Hestrin: Customized greenhouse growth chambers were further developed and integrated with a dual carbon-isotope analyzer for $^{13}\text{CO}_2$ labeling and carbon-flux measurements.

Lal: A mass spectrometer for stable-isotope analysis of carbon and nitrogen was purchased and used to analyze soil samples from the South Charleston and Hoytville residue-management sites.

Lazcano: A Picarro G5131-i analyzer was purchased to expand capacity for greenhouse gas and isotope measurements.

Naughton: An elemental analyzer was maintained for carbon and nitrogen analysis of solid soil and plant samples.

Noormets: A LI-7825 $^{13}\text{CO}_2$ isotope and trace-gas analyzer and a LI-COR Smart Chamber system were acquired to support carbon-allocation and soil-respiration research.

Funding and Other Resources Reported

- Hestrin: Larsen, I. (PI), T. Cook, M. Winnick, A. Keiser, H. Naughton, and R. Hestrin. “Quantifying the Magnitude of the Soil Carbon Sink in Agricultural Landscapes.” UMass Amherst Center for Food, Agriculture, and the Environment.
- Hestrin: Hestrin, R. (PI). “Harnessing Mycorrhizal–Microbial Synergies for Agricultural Resilience and Health.” Foundation for Food & Agriculture Research New Innovator Award.

- Hestrin: Jilling, A. (PI), A. S. Grandy, M. Keiluweit, and R. Hestrin. “Mineral-Associated Organic Matter: An Overlooked Source and Mediator of Bioavailable Nitrogen.” National Science Foundation, Division of Environmental Biology.
- Naughton: A \$6,500 CAFE Scholar award supported the training of a summer undergraduate intern.
- Naughton: The Lotta Crabtree Agricultural Scholarship provided two semesters of tuition and stipend support for a Ph.D. student working on the project.
- Naughton: A USDA Equipment Grant proposal for an automated discrete analyzer for agricultural nutrient and water-quality analyses was submitted and remained pending. The requested amount was \$91,746.
- Naughton: A Northeast SARE proposal addressing heat-tolerant tomato rootstocks, root exudates, and rhizosphere microbial communities was submitted for \$197,457 but was not funded.

E. Publications

1. Wang, T., A. Okyebanji, T. Steffens, **S. Ale**, B. Singh, M. Stotz, and H. Singh. 2026. Benefits and challenges of pasture cropping: Perceptions of grazing producers in the United States. *Rangelands*. 48 (2): 49-55. <https://doi.org/10.1016/j.rala.2025.11.005>
2. Saasan, N., A. Mirchi, Z. Xiang, M.U. Akbar, K. Wagner, **S. Ale**, L. Doro, S. Alian, T. Propst, L. Gregory, and B. Wyatt. 2026. Modeling the field scale effects of regenerative agricultural practices in a semi-arid cotton production system. *Journal of the ASABE*. 69(4): 571-587. <https://doi.org/10.13031/ja.16657>
3. Samanta, S., **S. Ale**, C.L.S. Morgan. 2025. Evaluating the potential of no-tillage in enhancing resilience of agricultural watersheds to extreme climatic conditions. *Science of the Total Environment*. 1001, October 2025, 180495. <https://doi.org/10.1016/j.scitotenv.2025.180495>.
4. Mvuyekure, R.F.S., J. Singh, **S. Ale**, J. Burke, K. Lewis, C. Cobos, R. Mohtar. 2025. Assessing the effects of no-tillage with rye and mixed cover crops on soil water and nitrogen dynamics and soil carbon sequestration in semi-arid irrigated cotton production systems. *Soil and Tillage Research*. 254, December 2025, 106746. <https://doi.org/10.1016/j.still.2025.106746>.
5. Malimbayeva, A., M. Batyrbek, **L. Cihacek**, J. Bell, and E. Aberle. 2026. Effects of soil tillage and fertility management on phosphatase activity in corn (*Zea mays* L.) in two long-term crop rotations. *Agrosystems, Geosciences & Environment*. 2026; 9e70305. <https://doi.org/10.1002/agg2.70305>.
6. Senturklu, S., D. Landblom, and **L. J. Cihacek**. 2026. Effect of a long-term integrated multi-crop rotation and cattle grazing on no-till hard red spring wheat (*Triticum aestivum* L.) production, soil health and economics. *Agriculture*, 16:73. <https://doi.org/10.3390/agriculture16010073>.
7. Batool, M., **L. J. Cihacek**, and R. S. Alghamdi. 2025. Coarse carbonate fragments (CCFs) and their contribution to the soil carbon stocks in the northern Great Plains, USA. *Geoderma* 463 (2025) 117568. <https://doi.org/10.1016/j.geoderma.2025.117568>.
8. Ajayi-Banji, A. A., **L. Cihacek**, S. Rahman, S. Sunoj, and C. Igathinathane. 2025. Mineral nitrogen availability from co-digested biodigester products as affected by feedstock pretreatment. *Soil Science Society of America Journal* 2025:89:e70005. <https://doi.org/10.1002/saj2.70005>.
9. Cabello-Leiva, S., M. T. Berti, D. W. Franzen, **L. Cihacek**, T. Peters, D. Samarappuli, and A. Wick. 2025. Do fall-seeded cover crops affect sugarbeet establishment, production, and nutrient cycling? In Hatano, R Baggs, E.M. (eds) *Nitrogen Cycling and Soil health*. NCHS 2022. *Progress in Soil Science*. Springer, Singapore. https://doi.org/10.1007/978-981-96-1132-4_10
10. Zhou J, Liu J, Hungate BA, Smith P, Sinsabaugh RL, Kuzyakov Y, **Noormets A**, Chen J (2026) Digging deeper into microbial carbon use efficiency in soil: Perspectives from microbial growth and respiration. *The Innovation Geoscience* 4: 100183. <https://doi.org/10.59717/j.xinn-geo.2026.100183>

11. Ono M, Mitra B, *Baniya B, *Kim D, **Noormets A** (2025) The use of newly assimilated photosynthates by soil autotrophic and heterotrophic respiration on a diurnal scale. *Biogeosciences* 22: 5833-5848. <https://doi.org/10.5194/bg-22-5833-2025>
12. Aguilos M, Bulluck J, Shi, M, Han M, Carter X, Brannum K, Middlebrough B, Watts J, Webb J, Whitley M, Liu N, *Baniya B, Mitra B, Prajapati P, Minick K, Sun G, McNulty SG, **Noormets A**, King JS (2025) Tree mortality provides early warning sign of ecosystem functional transition in coastal freshwater forested wetlands. *Environmental Research Letters* 20: 104019 <https://doi.org/10.1088/1748-9326/ae0057>
13. Ono M, **Noormets A**, Mitchell S (2025) The effect of the frequency of prescribed burning on annual soil carbon balance in a loblolly-shortleaf pine forest in East Texas. *Frontiers in Forests and Global Change*: <https://doi.org/10.3389/ffgc.2025.1602557>
14. Reed DE, Chu H, Peter BG, Chen J, Abraha M, Amiro B, Anderson RG, Arain MA, Arruda P, Barron-Gafford GA, Bernacchi C, Beverly DP, Biraud SC, Black TA, Blanken PD, Bohrer G, Bowler R, Bowling DR, Bret-Harte MS, Bretfeld M, Brunsell NA, Bullock SH, Celis G, Chen X, Classen AT, Cook DR, Cueva A, Dalmagro HJ, Davis K, Desai A, Duff AJ, Dunn AL, Durden D, Edgar CW, Euskirchen E, Bracho R, Ewers B, Flanagan LB, Florian C, Foord V, Forbrich I, Forsythe BR, Frank J, Garatuza-Payan J, Goslee S, Gough C, Green M, Griffis T, Helbig M, Hill AC, Hinkle R, Horne J, Humphreys E, Ikawa H, Iwahana G, Jassal R, Johnson B, Johnson M, Kannenberg SA, Kelsey E, King J, Knowles JF, Knox S, Kobayashi H, Kolb T, Kolka R, Krauss KW, Kutzbach L, Lamb B, Law B, Lee S-C, Lee X, Liu H, Loescher HW, Malone SL, Matamala R, Mauritz M, Metzger S, Meyer G, *Mitra B, Munger JW, Nesic Z, **Noormets A**, O'Halloran TL, O'Keeffe PT, Oberbauer SF, Oechel W, Oikawa P, Olivas PC, Ouimette A, Pastorello G, Perez-Quezada JF, Phillips C, Posse G, Qu B, Quinton WL, Reba ML, Richardson AD, Risso VP, Rocha AV, Rodriguez JC, Ruzol R, Saleska S, Scott RL, Schreiner-McGraw AP, Schuur EAG, Silveira M, Sonntag O, Spittlehouse DL, Staebler R, Starr G, Staudhammer C, Still C, Sturtevant C, Sullivan RC, Suyker A, Trejo D, Ueyama M, Vargas R, Viner B, Vivoni ER, Wang D, Ward EJ, Wiesner S, Windham-Myers L, Yannick D, Yezpe EA, Zenone T, Zhao J, Zona D (2024) Network of Networks: Time-Series Clustering of AmeriFlux Sites. *Agricultural and Forest Meteorology* 372: 110686 <https://doi.org/10.1016/j.agrformet.2025.110686>
15. Oliveira FCC, Bacon A, Fox TR, Jokela EJ, Kane MB, Martin TA, **Noormets A**, Ross CW, Vogel J, Markewitz D (2025) Do soil enzymes respond to silvicultural management in pine plantations of the southeastern United States? *Forest Ecology and Management* 585: 122651. <https://doi.org/10.1016/j.foreco.2025.122651>
16. **Noormets A** (2025) Why not all productivity leads to carbon sequestration: The role of plant carbon surplus, allocation and the Gadgil effect. *Bioscience* 75: 212-216. <https://doi.org/10.1093/biosci/biaf018>
17. Liu P, Zha T, Black TA, Jassal RS, Jia X, **Noormets A**, Ouimette A, Tian Y, Li X (2025) Seasonal warming responses of the ecosystem CO₂ sink of northern forests are sensitive to stand age. *Communications Earth & Environment* 6: 43. <https://doi.org/10.1038/s43247-025-02008-7>
18. Madrid, L.B., Sehgal, A., **Ye, R.**, Siddique, K.H.M., Hein, K., Topp, C., Narayanan, S., 2026. Cover crop root attributes and their contribution to soil processes and agroecosystem sustainability. *Agriculture, Ecosystems & Environment* 407, 110468.
19. Wang, Z., Saski, C., Campbell, B., Huang, L., **Ye, R.**, 2025. Cover crops and manure compost shift microbial functions and diversity in Southeastern sandy soils. *Soil Science Society of America Journal* 89, e70149.
20. Wang, Z., Saski, C., Campbell, B., Oliver, F., **Ye, R.**, 2026. Legume and Non-legume Cover Crops Shape Distinct Soil Microbial Communities and C-cycling Functional Traits. *Journal of Soil Science and Plant Nutrition*.doi: 10.1007/s42729-026-03241-5.
21. **Dhakal, M.**, M.A. Locke, K.N. Reddy, M.T. Moore, R W. Steinriede Jr., T.P. Kharel, L J. Krutz. (2025). Soil-plant-water relations and water footprint of cover crop-based no-till cotton and sorghum productions in humid region. *Soil Sci. Soc. Ame. J.* DOI: 10.1002/saj2.70166

22. Pandey, D., B. Acharya, **M. Dhakal**, T. Caton, C. Lapham, A. Smith, A. Ghalehgalabbehbahani. (2025). Industrial hemp yield and chemical composition as influenced by row spacing, fertilization and environmental conditions. *Agrosyst. Geosci. Environ.* 8:e70093. DOI: 10.1002/agg2.7009
23. Ghalehgalabbehbahani, A., G. Zinati, S. Hamido, N. Bhusal, **M. Dhakal**, R. Afshar, J.B. Contina, R. Caetani, A.H. Smith, D. Panday. (2025) Integrated Control of Powdery Mildew Using UV Light Exposure and OMRI Certified Fungicide for Greenhouse Organic Lettuce Production. *Horticulturae* 11, 246. <https://doi.org/10.3390/horticulturae11030246>
24. Kharel, T., H. Tyler, P. Mubvumba, Y. Huang, A. Bhandari, R. Fletcher, S. Anapalli, D. Joshi, A. Mengistu, G. Birru, K. Adhikari, **M. Dhakal**, M. Maskey, K. Reddy, D. Clay. (2025). Machine learning on multi-spectral imagery to estimate nutrient yield of mixed-species cover crops. *Agric. Environ. Letters* 10:e70009. <https://doi.org/10.1002/ael2.70009>
25. Li, S., Y. Yang, J. Zhang, L. T. Wilson, S. O. P. B. Samonte, **F. Dou**, T. Bera, X. Zhou, D. Sanchez, and J. Wang. UAV image analysis for detecting rice seedling gaps and gap effect on grain yield. 2025. *Smart Agricultural Technology* 10: 100753. <https://doi.org/10.1016/j.atech.2024.100753>.
26. Lasar, H., S. Lamichhane, **F. Dou**, and T. Gentry. 2025. The environmental trade-offs of applying soil amendment: Microbial biomass and greenhouse gas emission dynamics in organic rice paddy soils. *Applied Soil Ecology* 208:105977. <https://doi.org/10.1016/j.apsoil.2025.105977>.
27. Yang, Y., T. Bera, H. Araji, **F. Dou**, LT Wilson, WL Rooney, J. Morrison, B. Baldwin, J. Knoll, J. Jifon, A. Wright, D. Odero, H. Sandhu, A. Hale, H. Mula-Michel, and J. Wang. 2025. Ground-active arthropod diversity under energycane and biomass sorghum production. *Insects* 16 (5), 442.
28. Lamichhane, S., A. McClung, and **F. Dou**. 2025. Effect of soil amendments on grain yield, yield components, and milling quality in organic rice production. *Agrosystems, Geosciences & Environment* 8 (2), e70127.
29. Cao, Z., **F. Dou**, Y. Deng, and X. Ma. 2025. Sequestration and degradation of per- and polyfluoroalkyl substances in soil: Opportunities and challenges. *Soil & Environmental Health*, 100175.
30. Joshi, B., Ordóñez, R.A., Quinn, D., Penn, C., Pearl, C., Vyn, T., and **Rui, Y.** (2026). Belowground performance of novel short-stature maize under varying nitrogen rates across contrasting soil types. *Field Crops Research*, 342, 110482.
31. Pearl, C., Ordóñez, R.A., Prescott, C., Quinn, D., Wilhelm, R., Penn, C., Joshi, B., and **Rui, Y.** (2026). Impacts of hybrid selection and nitrogen fertilization on root-derived carbon inputs in maize. *Plant and Soil*, 519, 1609-1625.
32. Jaya, P., **Rui, Y.**, Navya, M., and Sandeep, S. (2026). Soil organic carbon dynamics: Influences of land-use change in natural and plantation forests of the Western Ghats, India. *PLOS ONE*, 21(2), e0342399.
33. Pearsons, K.A., **Rui, Y.**, and Kladvko, E.J. (2025). Decade-long cereal rye cover cropping improved soil carbon and physical properties of a poorly structured silt loam. *Soil Science Society of America Journal*, 89(6), e70165.
34. Zong, T., Ma, J., Guan, X., Lin, Y., Chen, Y., Wang, M., Lv, J., **Rui, Y.**, Chen, Y., Wu, L., and Lu, S. (2025). Decreased net N nitrification rate constrains soil N availability during long-term *Camellia oleifera* cultivation. *Applied Soil Ecology*, 206, 105840.
35. Judd, T.C., Ruark, M.D., **Rui, Y.**, Sanford, G.R., and Freedman, Z.B. (2025). Mechanisms of soil organic matter persistence vary across time and soil depth in long-term cropping systems of the North Central US. *Agriculture, Ecosystems & Environment*, 393, 109769.
36. Chen, Y., Zhang, Z., **Rui, Y.**, Pearl, C., Lu, S., Wang, F., Ekelund, F., Hao, Y., and Cui, X. (2025). Nitrogen addition and rhizosphere effects differentially shape prokaryotic and fungal communities in peanut-maize cropping systems. *Rhizosphere*, 34, 101084.
37. B. Emerson, David A. Lipson, **Cristina Lazcano**, Kate M. Scow, Jorge L. Mazza Rodrigues. Multi-omics resolved integration reveals microbial niche separation in soil aggregates. *ISME Communications*, 6(1): ycag161.

38. Decock, C., Rodriguez-Paiatsyka, A., Pressler, Y., **Lazcano, C.** Wilson, Stewart. Building soil health: Lessons learned from seven field trials on the California Central Coast. 2026. California Agriculture, 80(1).
39. Kefang Nie, LaZaria McWright, Joanna G. Rothwell, Mariel Mondragon-Becerra, Halima Malal, **Cristina Lazcano**, Daniel Geisseler, Layla Scott, J. Elliott Campbell, Jorge Gomez-Ortega, Hannah Waterhouse, Alexie Leauthaud, Shrijana Duwadi, Rebecca Ryals, Alda F. A. Pires. Microbial Food Safety Risk in Finished Compost: A Statewide Cross-sectional Study of Composting System in California. Journal of Food Protection, 89(8): 100844.
40. Halima Malal, Gregg T. Stephenson, **Cristina Lazcano**, Katharine R. Watts, Ashraf M. Tubeileh. Soil management legacy drives the response of the soil microbiome to compost applications. 2026, Applied Soil Ecology, 222: 106998.
41. Yu Huang, Yuqi Zhou, Xiaowei Huang, Haojie Shena, **Cristina Lazcano**, Caixian Tang, Jianming Xu. Cadmium-containing straw addition obstructs carbon sequestration and aggravates nitrogen deficiency in paddy soils. 2026, Environmental Research, 302: 124564.
42. Joshua Garcia, Mariel Mondragon-Becerra, Ivan Martinez, Connie Wong, Zoe Caron, Katherine Kravitz, Elaine Owyang, Kayode Jegede, Rebecca Ryals, **Cristina Lazcano**. Can Regenerative Agriculture Support Urban Soil Health? A Case Study in the San Francisco Bay Area. Discover Sustainability, 7(587).
43. Axel Herrera, Ellen Bruno, Kerri Steenwerth, Alexandra Everson, **Cristina Lazcano**. Evaluating the Economic Viability of Regenerative Viticulture. American Journal of Viticulture and Enology 77 (1).
44. Gonzalez-Maldonado, Noelymar; Steenwerth, Kerri; Nocco, Mallika A.; Yao, Erika; Zaragoza, Luisa Robles; Moonilall, Nall I.; **Lazcano, Cristina**. 2026. Grower-defined ideal winegrape vineyard soils diverge from traditional soil health paradigm. European Journal of Soil Science 77 (1).
45. Lauren Picone, Priya Verma, Corinne Butler, Kerri Steenwerth, Matthew J. Grieshop, **Cristina Lazcano**, Charlotte Decock. 2025. On-farm assessment of long-term impacts of regenerative management on vineyard soil health. European Journal of Soil Science 76 (5).
46. Halima Malal, Joshua A. Garcia, Anna Marrs, Mohamed AIT HAMZA, Courtney Emerson, Mallika Nocco, Hicham Lakhtar and **Cristina Lazcano**. 2025. Organic and inorganic fertilizers modulate the response of the soil microbiome to salinity stress. Frontiers in Microbiology, 1551586, 2025.
47. Logan A. Ebert, Mallika Arudi Nocco, Andrew Gal, Wesley Brooks, Thomas Turini, Gaurav Jha, **Cristina Lazcano**, Amélie C.M. Gaudin, and Kate Scow. 2025. Tapered Deficit Irrigation Strategies to Reduce Water Use in Processing Tomatoes. California Agriculture. 2025.
48. Sangeeta Bansal, Noelymar Gonzalez-Maldonado, Erika Yao, Connie Wong, Irene Adamo, Marta Acin, Beatriz Garcia-Jimenez, Alberto Acedo, **Cristina Lazcano**. 2025. Regenerative soil management practices no-till and sheep grazing induce significant but contrasting short-term changes in the vineyard soil microbiome. 2025. Plants People Planet, 7 (1) 1-18.
49. Vazquez, R. S. C., Allen, K. S., **Hestrin, R.**, Wick, R., & *Keiser, A. D. (2026). Plants and mycorrhizal fungi reduce mineral-associated organic matter nitrogen formed from decomposing litter. Plant and Soil. (Drafted and submitted during the project period, but published afterwards)
50. Griffen, G., Whitaker, A., Bergh, E., Carrell, M., Knatvold, E., Konya, A., Grandy, A. S., Jilling, A., Keiluweit, M., & **Hestrin, R.** (2026). Mineral-associated organic nitrogen pool size, composition, and accessibility mediated by agricultural management and soil geochemical characteristics. Geoderma, 465, 117627.
51. Gomes-Neto, J. C., Crook, A., **Hestrin, R.**, Li, G., Liew, C.-S., Rosa, G., Singh, K. D., Tuggle, C. K., Summers, K. L., Valdes, C., Fahlgren, N., & Clarke, J. (2026). Challenges and opportunities: Computational biology and the future of agriculture. Bioinformatics Advances, 6, vbag003.
52. Bolscher, T., Cardon, Z., Garcia Arredondo, M., Grand, S., Griffen, G., **Hestrin, R.**, Imboden, J., Jamoteau, F., Lacroix, E. M., Perez Castro, S., Persson, P., Riley, W., & Keiluweit, M. (2025). Vulnerability of mineral-organic associations in the rhizosphere. Nature Communications, 16, 5527.

53. Jilling, A., Grandy, A. S., Daly, A., **Hestrin, R.**, Possinger, A., Abramoff, R., Annis, M., Cates, A., Dynarski, K., Georgiou, K., Heckman, K., Keiluweit, M., Lang, A. K., Phillips, R. P., Rocci, K., *Shabtai, I. A., Sokol, N. W., & Whalen, E. (2025). The ecological relevance of fast-cycling mineral-associated organic matter—a dynamic pool of "persistent" soil carbon and nitrogen. *Communications Earth & Environment*, 6, 690.
54. Wooliver, R., Neupane, A., DeBruyn, J.M., Hayes, D.G., Astner, A.F., and **Jagadamma, S.** 2026. Organic carbon loss from agricultural soil is accelerated by biodegradable microplastics and mitigated by mineral nitrogen addition. *Journal of Environmental Quality* 55 (1), e70135.
55. Eeswaran, R., Lazicki, P.A., Mengistu, A., and **Jagadamma, S.** 2026. Biophysical and management drivers of soil organic carbon accumulation in operational farms across Tennessee, USA. *Soil and Tillage Research* 257, 106977.
56. Wooliver R, Kivlin S, and **Jagadamma S.** 2025. Combined legacy effects of drought and diverse plant residues: Fate and priming effects of glucose. *Soil Biology and Biochemistry*. 211:109983.
57. Wooliver R, Kivlin S, and **Jagadamma S.** 2025. Microbial communities and their association with soil health indicators under row cash crop and cover crop diversification: a case study. *Frontiers in Microbiology*. 16: 1664417.
58. Jarecke, K., R. Keen, K. Singha, J. Nippert, S. Billings, **X. Zhang**, K. Sadayappan, M. Kirk, D. Hirmas, L. Li, H. Ajami, M. Dumont, A. Flores and P. Sullivan. 2025. Woody encroachment intensifies deep soil drying at daily, seasonal, and decadal scales. *Ecosystems* 28: 64.
59. Dai, W., G. Feng, A. Adeli, J.P. Brooks, J.N. Jenkins and **X. Zhang**. 2025. Effects of cover crops on soil aggregate-associated organic carbon and nitrogen characteristics in a cotton-corn rotation system. *Soil Science Society of America Journal* 89: e70137.
60. Shi, Y., W. Dai, G. Chen, **X. Zhang**, N. Li and W. Fu. 2025. Improved soil moisture mapping using an integrated cyclic modeling and bias correction approach. *Remote Sensing Applications: Society and Environment* 40: 101741.
61. Hirmas, D., H. Ajami, M. Sena, **X. Zhang**, X. Cao, B. Li, K. Jarecke, S. Billings, J. Pachon, L. Li, J. Nippert, L. Souza, A. Flores and P. Sullivan. 2025. Predicting soil interpedal macroporosity and hydraulic conductivity dynamics: a model for integrating laser-scanned profile imagery with soil moisture sensor data. *Water Resources Research* 61: e2024WR039836.
62. Dai, W., P. Lu and **X. Zhang**. 2025. Wheat straw incorporation enhances paddy soil quality: evidence from a pot experiment. *Agrosystems, Geosciences & Environment* 8 (3): e70159.
63. Dai, W., G. Feng, A. Adeli, J. Brooks, C. Jeong and **X. Zhang**. 2025. Impact of winter cover crop and soil amendments on total and aggregate-associated nitrogen in a no-till corn field. *npj Sustainable Agriculture* 3 (1): 39.
64. Xie, N., L. Sun, T. Lu, **X. Zhang**, N. Duan, W. Wang, X. Liang, Y. Fan and H. Liu. 2025. Effects of adding different corn residue components on soil and aggregate organic carbon. *Agriculture* 15 (10): 1050.
65. Huang, J., V. Sehgal, L. Alvarez, L. Brocca, S. Cai, R. Cheng, X. Cheng, J. Du, B. El Masri, A. Endsley, Y. Fang, J. Hu, M. Jampani, G. Kibria, G. Koren, L. Li, L. Liu, J. Mao, H. Moreno, A. Rigden, M. Shi, X. Shi, Y. Wang, **X. Zhang** and J. Fisher. 2025. Remotely sensed high-resolution soil moisture and evapotranspiration: bridging the gap between science and society. *Water Resources Research* 61: e2024WR037929.
66. Han, S. W., Luo, Q., Qin, Z. H., Liu, W. S., Li, H. R., **Lal, R.**, et al. 2025. Aridity drives the response of soil organic carbon and inorganic carbon to drought in cropland. *Global Change Biology* 31(11): e70622. <https://doi.org/10.1111/gcb.70622>.
67. Karki, S., Shrestha, R., **Lal, R.**, Lorenz, K., and Lindsey, L. E. 2025. Effects of biochar and cover crops on physical properties of two soils in Ohio. *Soil Science Society of America Journal* 89(2): e70041. <https://doi.org/10.1002/saj2.70041>.
68. **Lal, R.** 2025. Soil organic matter: The heart of soil health. *Journal of Soil and Water Conservation*, 1-7. <https://doi.org/10.1080/00224561.2025.2572280>.

69. **Lal, R.**, Uphoff, N., and Bindraban, P. 2025. Precision agriculture using IoT and remote sensing: Enhancing productivity and resource efficiency. *International Journal of Agriculture Sustainable Farming* 1(1): 10-14.
70. Munna, M. N. H., and **Lal, R.** 2025. Impacts of cover cropping and organic amendments on soil physical quality under temperate climate. *Cogent Food & Agriculture* 11: 2467452. <https://doi.org/10.1080/23311932.2025.2467452>.
71. Priyadarshini, C., **Lal, R.**, Yuan, P., Liu, W., Adhikari, A., Bhandari, S., and Xia, Y. 2025. Plant disease suppressiveness enhancement via soil health management. *Biology* 14: 924. <https://doi.org/10.3390/biology14080924>.

F. Conference Presentations

1. Olowoyeye, O., **Ale, S.**, Lewis, K., and DeLaune, P. 2026. Soil carbon sequestration potential of cotton-sorghum rotation in cotton production systems. Beltwide Cotton Conferences, San Antonio, TX, January 7-9, 2026.
2. Simbi Mvuyekure, R. F., Boogades, N., **Ale, S.**, Cobos, C., Burke, J. A., Lewis, K. L., Mohtar, R., and Gentry, T. 2025. Assessing the effects of no-tillage with cover crops on greenhouse gas emissions from semi-arid irrigated cotton production systems. CANVAS (ASA, CSSA, SSSA International Annual Meeting), Salt Lake City, UT. November 9-12, 2025.
3. Simbi Mvuyekure, R. F., **Ale, S.**, Samanta, S., Mohtar, R., DeLaune, P., and Gentry, T. 2025. Evaluating the watershed-scale impacts of regenerative agricultural practices on hydrology, water quality, and soil organic carbon. CANVAS (ASA, CSSA, SSSA International Annual Meeting), Salt Lake City, UT. November 9-12, 2025.
4. Singh, H., Singh, B., **Ale, S.**, DeLaune, P. B., Kim, J., Samanta, S., Acharya, B., Bawa, A., and Mohtar, R. 2025. Pasture cropping as a regenerative practice on grazing lands: A field and modeling study in North Central Texas. CANVAS (ASA, CSSA, SSSA International Annual Meeting), Salt Lake City, UT. November 9-12, 2025.
5. **Ale, S.**, Samanta, S., and Mvuyekure, R.F.S. 2025. Evaluation of watershed-scale effects of regenerative agricultural practices on hydrology and water quality. Keynote presentation at the 59th Annual Convention of Indian Society of Agricultural Engineers, Bhopal, India, November 10-12, 2025.
6. Samanta, S., **Ale, S.**, Mvuyekure, R. F. S., DeLaune, P. B., Mirchi, A., Wagner, K., Gregory, L. 2025. Simulated impact of regenerative agricultural practices on stream flow characteristics in the Upper Middle-Brazos-Millers Watershed in Texas. ASABE Annual International Meeting, Toronto, Canada, July 13-16, 2025.
7. Mvuyekure, R.F.S., **Ale, S.**, Samanta, S., Gentry, T., DeLaune, P., Mohtar, R. 2025. Assessing the impacts of regenerative agricultural practices on watershed hydrology and water quality. ASABE Annual International Meeting, Toronto, Canada, July 13-16, 2025.
8. Singh, H., **Ale, S.**, Kim, J., Samanta, S., Singh, B., Mohtar, R. 2025. Simulating the effects of pasture cropping on runoff, sediment and nutrient losses in a North Central Texas watershed. ASABE Annual International Meeting, Toronto, Canada, July 13-16, 2025.
9. Saasan, N., Mirchi, A., Kaghazchi, A., Alian, S., Wagner, K., **Ale, S.** 2025. Watershed-scale modeling of regenerative agricultural practices in the North Fork Red River Watershed. 2025. ASABE Annual International Meeting, Toronto, Canada, July 13-16, 2025.
10. Singh, H., **Ale, S.**, Singh, B., Samanta, S., Bawa, A., DeLaune, P.B., Mohtar, R. 2025. Pasture cropping as a regenerative practice on grazing lands: Impacts on soil physical, chemical, and biological properties. ASABE Annual International Meeting, Toronto, Canada, July 13-16, 2025. (Poster).

11. Saasan, N., Mirchi, A., Khodkar, K., Wagner, K., Wootten, A., **Ale, S.** 2025. Field-scale agro-hydrological effects of regenerative agriculture in Altus, Oklahoma, under projected future climate. 2025. ASABE Annual International Meeting, Toronto, Canada, July 13-16, 2025. (Poster).
12. Wang, T., Oyeibanji, A., Steffens, T., Singh, B., Stotz, M., Singh, H., **Ale, S.** 2025. Benefits and challenges of pasture cropping: Perception of grazing producers. America's Grasslands Conference. 24-26 June 2025. Kearney, NE.
13. Batool, M., and **L. Cihacek.** 2025. Long-term soil pH changes in southwestern North Dakota. North Dakota Cooperative Soil Survey Work Planning Conference, Mandan, ND. April 9. 2025. (Oral, invited)
14. **Cihacek, L.** 2025. Peat and muck soils in Minnesota. USDA-NRCS Agricultural Peat Soils Workshop, Cologne, MN. June 17, 2025. (Oral, invited)
15. Batool, M., and **L. Cihacek.** 2025. Long-term soil pH changes in southwestern North Dakota. 80th SWCS International Annual Conference. August 3-6, 2025, Costa Mesa, CA. (Oral)
16. **Cihacek, L.** 2025. The role of legumes in diverse cropping systems. NDSU Dickinson Research Extension Center 2025 Soil Health Workshop, September 19, 2025. Dickinson, ND. (Oral, invited)
17. Batool, M., **L. Cihacek,** N. Kalwar, and R. S. Alghamdi. 2025. Long-Term Soil Carbon and Morphological Evolution in Paired Land-Uses across Southwestern North Dakota. CANVAS 2025, November 9-12, 2025. Salt Lake City, UT. (Oral).
18. Malimbayeva, A., **L. J. Cihacek,** A. M Shibikeyeva, A. K. Umbetov, and A. K. Balgabayev. 2025. Anthropogenic influences on soil physical and chemical properties in the foothill zone of the Trans Ili Alatau, Kazakhstan. CANVAS 2025, November 9-12, 2025. Salt Lake City, UT. (Poster).
19. Biotto, E. F. M., A. Khaleel, C. Dutter, M. D. McDaniel, and **L. J. Cihacek.** 2025. Double sampling a 55-year CRP chronosequence to resolve soil organic carbon nuances. CANVAS 2025. November 9-12, 2025. Salt Lake City, UT. (Poster)
20. Clarkson, R., Zitnick-Anderson, K., Vanderhyde, MN., Longtin, S.M., and **Butcher, K.** 2025. Naughty vs. Nice: Does alleviating C limitation enhance native microbiome suppression of plant pathogens? Soils for Our Future Conference July 20-25, 2025, Winnipeg, Manitoba, Canada. (Oral)
21. Clarkson, R., Zitnick-Anderson, K., Vanderhyde, M., Longtin, S.M., and **Butcher, K.** 2025. Live vs. Legacy: RNA vs. DNA detection of *S. scabiei* in soils for pre-season diagnosis of common scab. CANVAS November 9-12, 2025. Salt Lake City, UT. (Poster)
22. Clarkson, R., Zitnick-Anderson, K., Vanderhyde, MN., Longtin, S.M., and **Butcher, K.** 2026. Presence $\neq$ Problem: The soil environment may decouple pathogenicity from active pathogen abundance. MSSS January 28-30, 2026, Winnipeg, Manitoba, CAN. (Oral)
23. Baniya B, *Kim D, *Nkrumah M, *Sarpong C, *Dong J, *Ono M, **Noormets A** (2025) Differentiating Structural and Non-Structural Carbon Using Ecosystem Carbon Flux Measurements. AGU Fall Meeting, New Orleans, LA. December 15-19, 2025.
24. Dong J, *Baniya B, *Kim D, *Nkrumah M, *Sarpong C, Miao G, **Noormets A** (2025) Incorporating a passive carbon allocation algorithm TIMBCA in CLM-FATES. AGU Fall Meeting, New Orleans, LA. December 15-19, 2025.
25. Kim D, *Baniya B, *Sarpong C, *Nkrumah M, **Noormets A** (2025) Diurnal dynamics of Carbon allocation and respiratory costs under water stress using isotopic flux partitioning. AGU Fall Meeting, New Orleans, LA. December 15-19, 2025.
26. Leite P, **Noormets A,** Wilcox B, Fuhlendorf SD, Neumann L (2025) Rethinking woody plant encroachment: can it improve soil health of formerly overgrazed rangelands? AGU Fall Meeting, New Orleans, LA. December 15-19, 2025.
27. Aguilos M, **Noormets A,** King JS, Belgado M (2025) In search of the perfect tower. Ameriflux Community Blog. 11/26/2025. <https://ameriflux.lbl.gov/in-search-of-the-perfect-tower/>
28. §**Noormets A** (2025) Taimede ökofüsioloogia arengusuunad maailmas (On the developments in plant ecophysiology in the world). Metsaökoloogia kaasaegsed arengusuunad maailmas ja olukord Eestis. XX Ökoloogiapäev, mis on pühendatud Olevi Kulli 70. sünni-aastapäevale. Tartu, Estonia, November 14, 2025.

29. §**Noormets A**, *Ono M, *Baniya B, *Kim D, Mitra B, *Simpson C, *Sarpong C, *Nkrumah M (2025) Carbon flow from plants to soil. New Phytologist Symposium - Microbes as hidden or prominent players in plant life. Tartu, Estonia, July 8-10, 2025.
30. Simpson C, Smith P, Kreuter U, **Noormets A** (2025). Quantifying carbon dynamics of Adaptive Multi-Paddock grazing across spatial and temporal scales in Northern Texas. Native Plant Society of Texas Symposium. Austin, TX. March 8, 2025.
31. Simpson CA, Smith AP, Tolleson D, Treadwell M, Kreuter U, **Noormets A** (2025) Quantifying carbon dynamics of adaptive multi-paddock grazing across spatial scales in northern Texas. Soil Survey and Land Resource Workshop, Bryan, February 5-6, 2025.
32. **Dhakal, M.**, M.A. Locke, K. N. Reddy, M.T. Moore, Jr. R. W. Steinriede, L. J. Krutz. (2025). Building resilient agroecosystem from the ground up: Soil and water benefits of cover cropping and conservation tillage in a humid region. CANVAS annual meeting, ASA-CSSA-SSSA. Nov 9-13, 2025, Salt Lake City, UT.
33. **Dhakal, M.**, M.A. Locke, K. N. Reddy, M.T. Moore, Jr. R. W. Steinriede, L. J. Krutz. (2025). Integration of regenerative management practices for improved soil health, water quality, and water use efficiency in cotton and sorghum cropping systems. Mississippi Water & Energy Conference. Oct 28-30, 2025, Starkville, MS.
34. Shrestha, A., T.P. Kharel, **M. Dhakal**, K.N. Reddy. 2025. Detecting soybean emergence and senescence with satellite remote sensing in the Lower Mississippi River Basin. CANVAS annual meeting, ASA-CSSA-SSSA. Nov 9-13, 2025, Salt Lake City, UT.
35. Panday, D., P. Heydar, C. Lapham, A. Pierce, **M. Dhakal**, A. Ghale, G. Fioravanti, R. Kander. (2025). Improving hemp fiber strength and flexibility with regenerative practices and minimal nitrogen. Annual CANVAS meeting, ASA-CSSA-SSSA meeting, Salt Lake City, Nov 9-12, 2025.
36. Oloyede, O., P.P. Joshi, G.D. Spencer, L.J. Krutz, P. Wagle, **M. Dhakal**. (2025). Effect of tailwater recirculation on water and methane fluxes in irrigated rice production system. Annual CANVAS meeting, ASA-CSSA-SSSA meeting, Salt Lake City, Nov 9-12, 2025 (Second place). <https://scisoc.confex.com/scisoc/2025am/meetingapp.cgi/Paper/167311>
37. Joshi, P.P., Oloyede, O., Spencer, D., & **Dhakal, M.** (2025). Effect of Regenerative Management Practices on Greenhouse Gases in Corn. Annual CANVAS meeting, ASA-CSSA-SSSA meeting, Salt Lake City, Nov 9-12, 2025.
38. Oloyede, O. E., Spencer, D., Joshi, P. P., Krutz, L. J., & **Dhakal, M.** (2025, October 30). Effect of tailwater recirculation on water and methane fluxes in irrigated rice production systems. Mississippi Water and Energy Conference, Mississippi Water Resources Research Institute, Mississippi State University, Mississippi.
39. Oloyede, O. E., Spencer, D., Joshi, P. P., Krutz, L. J., & **Dhakal, M.** (2025, October 18). Can tailwater recirculation in row rice reduce water and methane fluxes without a yield penalty? Graduate Research Fall Symposium, Graduate Student Association, Mississippi State University, Mississippi (Second Place winner).
40. **Dhakal, M.**, M.A. Locke, K. N. Reddy, M.T. Moore, Jr. R. W. Steinriede, L. J. Krutz. (2025). Impacts of cover cropping and tillage on soil health and root-zone water quality in cotton and sorghum production systems. Soil Water Conservation Society International Annual Conference, Aug 6-8, 2025. Costa Mesa, CA.
41. Joshi, P.P., **Dhakal, M.**, Reynolds, Z., & Spencer, D. (2025, February 15). Mitigating Greenhouse Gas Emissions Using Improved Nitrogen Management Strategies in Corn. Spring Graduate Research Symposium, Graduate Student Association, Mississippi State University, Mississippi.
42. Joshi, P.P., & **Dhakal, M.** (2025, March 20). Improved fertility management reduces greenhouse gas emissions in corn. Mississippi Academy of Sciences (MAS), Biloxi, Mississippi.
43. Joshi, P.P., Oloyede, O., Spencer, D., & **Dhakal, M.**, (2025, October 18). Mitigating Greenhouse Gas Emissions from Corn Through Protected Fertility Management. Fall
44. Graduate Symposium, Graduate Student Association, Mississippi State University, Mississippi

45. Joshi, P.P., **Dhakar, M.**, Reynolds, Z., & Spencer, D. (2025, February 3). Strategic fertility management reduces greenhouse gas emissions in corn. Southern Association of Agricultural Scientists (SAAS), Irving, Texas
46. Joshi, P.P., Oloyede, O., Spencer, D., & **Dhakar, M.**, (2025, October). Protected Fertility Management Mitigates Greenhouse Gas Emissions with Sustainable Corn Production, Mississippi Water and Energy Conference, Mississippi Water Resources Research Institute, Mississippi State University, Mississippi
47. Oloyede, O., P. P. Joshi, **M. Dhakar**. 2025. Effect of alternate wetting and drying with automated tailwater reuse on greenhouse gas emissions in rice production. Graduate Student Research Symposium. Mississippi State University, Starkville, MS. 15 February 2025. Poster Presentations
48. Joshi, P.P., O. Oloyede, G.D. Spencer, **M. Dhakar**. (2025). Can protected fertility management mitigate greenhouse gas emission and improve corn productivity? CANVAS annual meeting, ASA-CSSA-SSSA. Nov 9-13, 2025, Salt Lake City, UT (Third place).
49. Shrestha, A., T.P. Kharel, **M. Dhakar**, K.N. Reddy. 2025. Satellite-based analysis of spatial and temporal trends in soybean yield across the Lower Mississippi River Basin. CANVAS annual meeting, ASA-CSSA-SSSA. Nov 9-13, 2025, Salt Lake City, UT.
50. Joshi, P.P., Mendez, K.V., AdvientoBorbe, M. A., Spencer, D., Reynolds, Z., & **Dhakar, M.** (2025, February 15). Automated Furrow Irrigated Rice Production System Mitigates Greenhouse Gas Emission in Rice. Spring Graduate Research Symposium, Graduate Student Association Mississippi State University, Mississippi.
51. Joshi, P.P., & **Dhakar, M.** (2025, March 20). Improved fertility management reduces greenhouse gas emissions in corn. Mississippi Academy of Sciences (MAS) annual meeting, Biloxi, Mississippi.
52. Joshi, P.P., Mendez, K.V., AdvientoBorbe, M. A., & **Dhakar, M.** (2025, April 22). Enhancing Environmental Sustainability through Automated Furrow Irrigation in Rice for Greenhouse Gas Mitigation. Spring Symposium of the Office of Research and Economic Development, Mississippi State University, Starkville, MS. 15 February 2025.
53. Mendez, K., Quiñones, C. Larazo, N., Larazo, W., Adviento-Borbe, M.A.A., **Dhakar, M.**, Massey, J.H., Krutz, J. Greenhouse Gas Emissions from Furrow Rice using Tailwater Recovery System. 2025 Rice Technical Working Group Conference, Feb 17-20, 2025, New Orleans, LA.
54. Oloyede, O., P. P. Joshi, D. Spencer, L. J. Krutz, **M. Dhakar**. 2025. Developing a model to estimate greenhouse gas fluxes and evapotranspiration using machine learning and remote sensing data. Graduate Student Research Symposium. Mississippi State University, Starkville, MS. 15 February 2025.
55. Oloyede, O., R. Willemet, M. De Boever, Wim Cornelis. 2025. Impact of Mulching on Soil Water Balance and Potato Growth. Spring Symposium of the Office of Research and Economic Development, Mississippi State University, Starkville, MS. 22 April 2025 (Second place).
56. Lasar, H., H. Petrowicz, **F. Dou**, K. Bronson. 2025. Critical thresholds on alternate wetting and drying on greenhouse gas emissions and rice yields. 40th Rice Technical Working Group Meeting. New Orleans, LA. February 2025.
57. Petrowicz, H., **F. Dou**, A. Lloyd, H. Lasar, and N. Hetti. 2025. Effects of different nitrogen rates on yield, nitrogen use efficiency, and greenhouse gas emission under alternate wetting and drying management. 40th Rice Technical Working Group Meeting. New Orleans, LA. February 2025.
58. Weathington, M., J. Vernon, T. Bera, Y. Yang, **F. Dou**, and T. Wilson. Empowering young scholars in nitrogen management for ratoon organic rice. 40th Rice Technical Working Group Meeting. New Orleans, LA. February 2025.
59. Hettiarachchi, N., **F. Dou**, X. Mao. 2025. Nutrient uptake and structural analysis of rice under Zinc-based nanomaterial application: A study using visual imaging at the nanoscale. 40th Rice Technical Working Group Meeting. New Orleans, LA. February 2025.

60. Petrowicz, H., **F. Dou**, M. Trevino, H. Laser, N. Hettiarachchi, T. Gentry, LT Wilson, Y. Yang, and L. Tarpley. 2025. Effects of nitrogen rate on rice yield, nitrogen use efficiency, and greenhouse gas emissions under alternate wetting and drying. CANVAS 2025. Salt Lake City, UT.
61. Lasar, HGW., H. Petrowicz, **F. Dou**, T. Gentry, X. Ma, and K. Bronson. 2025. Critical thresholds in alternate wetting and drying for optimizing rice performance and minimizing environmental impacts. CANVAS 2025. Salt Lake City, UT.
62. Lasar, HGW, H. Petrowicz, **F. Dou**, T. Gentry, X. Ma, and K. Bronson. 2025. Productivity and environmental tradeoffs of alternate wetting and drying irrigation across hybrid and inbred rice cultivars. CANVAS 2025. Salt Lake City, UT.
63. Lasar, HGW, S. Lamichhane, **F. Dou**, and T. Gentry. 2025. Productivity and environmental impacts of organic nitrogen strategies in flooded rice systems. CANVAS 2025. Salt Lake City, UT.
64. Hettiarachchi, N., **F. Dou**, T. Gentry, S. Ma, H. Petrowicz, M. Trevino, and H. Lasar. Consequences of zinc nanomaterial and transformed product amendments on nutrient dynamics, rice growth, grain quality, and productivity in flooded paddy soils of Beaumont, TX. CANVAS 2025. Salt Lake City, UT.
65. Hettiarachchi, N., **F. Dou**, S. Ma, T. Gentry, H. Petrowicz, M. Trevino, and H. Lasar. Assessment of soil quality, root morphological traits, and nutrient uptake in rice under Zn-based nanomaterials and their transformed products. CANVAS 2025. Salt Lake City, UT.
66. Yang, Y., LT Wilson, **F. Dou**, and T. Bera. 2025. Cellulosic biorefinery siting and biomass supply logistics in the Southeast United States. CANVAS 2025. Salt Lake City, UT.
67. Poondla, M, JE Mowrer, **F. Dou**, and HGW Lasar. 2025. Redox-mediated shifts in phosphorus availability under safe AWD versus continuous flooding in rice fields. CANVAS 2025. Salt Lake City, UT.
68. Poondla, M, JE Mowrer, **F. Dou**, and HGW Lasar. 2025. Influence of redox-driven chemical processes on soil phosphorus availability under AWD in rice. CANVAS 2025. Salt Lake City, UT.
69. **Rui, Y.** From microbial tradeoffs to management solutions: Rethinking soil organic carbon in agroecosystems. Invited seminar, Department of Ecology, Evolution, and Organismal Biology, Iowa State University, Ames, Iowa, November 6, 2025.
70. Benson, A., **Rui, Y.**, Paul, S., Wilhelm, R.C., and Kladvko, E.J. Digging into organic soil health: What we learned from 91 Indiana field sites. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, Utah, November 9-12, 2025.
71. Jaya, P., **Rui, Y.**, and Sandeep, S. Comprehensive soil carbon profiling across cropland and woodland: A multi-analytical assessment from the Midwest U.S. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, Utah, November 9-12, 2025.
72. Gramajo, E., Quinn, D., **Rui, Y.**, and Brouder, S.M. Combined effects of nitrogen rate, source, and enhanced-efficiency fertilizer use in Midwest corn production. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, Utah, November 9-12, 2025.
73. Lu, S., **Rui, Y.**, Volenec, J.J., Brouder, S.M., and Chen, Y. Microbial network complexity and abundance mediate soil multifunctionality under intensive agriculture. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, Utah, November 9-12, 2025.
74. Pearl, C., Joshi, B., Ordóñez, R.A., Wilhelm, R.C., Penn, C.J., and **Rui, Y.** Impacts of nitrogen fertilization on plant carbon allocation and belowground carbon dynamics in short- and tall-stature maize. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, Utah, November 9-12, 2025.
75. Joshi, B., Ordóñez, R.A., Pearl, C., Quinn, D., Penn, C.J., and **Rui, Y.** Influence of nitrogen fertilization rates on root phenes of short- and tall-stature corn hybrids and soil-health indicators. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, Utah, November 9-12, 2025.
76. INVITED. **Cristina Lazcano.** Regeneración de Suelos y Prácticas Sostenibles, Simposio Internacional de Viticultura Sustentable: Innovación, Agua y Cambio Climático. Centro de Estudios Vitivinícolas (CEVIT). CETYS Universidad Campus Internacional Ensenada (Mexico).

77. INVITED. **Cristina Lazcano**. Viticultura Regenerativa: Más Allá de la Agricultura Orgánica, Simposio Internacional de Viticultura Sustentable: Innovación, Agua y Cambio Climático. Centro de Estudios Vitivinícolas (CEVIT). CETYS Universidad Campus Internacional Ensenada (Mexico).
78. INVITED. Can regenerative management improve soil hydrological health in Mediterranean agroecosystems?, Annual meeting of the California Soil and Water Conservation Society, CA, NV Chapter. Davis, CA (USA).
79. Halima Malal, Chiara De Quay, Reymond Reis, Axel Mauricio Herrera Moreno, Zackary Jones, Sabina Dore, Guillermo Tagle, Patrick Becket, Sangeeta Bansal, Jorge Dominguez, **Cristina Lazcano**. Effects of vermifiltration vermicompost on soil health and nitrous oxide emissions across different annual and perennial systems in Washington and California, 81st SWCS International Annual Conference. July 26-29, 2026, St. Louis, Missouri (USA).
80. Sarah Brickman, Jimena Balic, Mauricio Shoebitz, Ediardo Arellano, Leah Renwick, Amelie Gaudin, **Cristina Lazcano**. Poster. Cover crop mowing or tillage, but not sheep grazing, alter within-season soil inorganic nitrogen availability in an organic vineyard, 81st SWCS International Annual Conference, July 26-29, 2026, in St. Louis, Missouri (USA).
81. Axel Herrera, Ian Ferrer, Kelsey Fenn, Mallika Nocco, Elizabeth Forrestel, Nicolas Bambach, **Cristina Lazcano**. Oral Presentation. Soil hydraulic responses to combined regenerative management practices in a commercial Sonoma vineyard, 2026 National Conference, American Society for Enology and Viticulture. June 19-22, Boise, Idaho (USA).
82. Chiara I. de Quay, Connie Wong, Axel Herrera, **Cristina Lazcano**. Poster. Short-term Effects of Compost & Tillage on Vine Yield & Soil Health of Chardonnay Vineyards in California and Oregon, 2026 National Conference, American Society for Enology and Viticulture. June 19-22, Boise, Idaho (USA).
83. Mallika Arudi Nocco, Nicolas Bambach, Jeff Borum, John Bushoven, Alyssa DeVincentis, Kelsey Fenn, Andrew Gal, Joshua Garcia, Gaurav Jha, Sat Darshan S Khalsa, **Cristina Lazcano**, Patrick Makiri, Andrew J McElrone, Samuel Sandoval Solis, Dilruba Yeasmin. Assessing deep root zone microirrigation in California almonds, ASABE Global Symposium on Sustainable Microirrigation Advances: Drop to Boom.
84. Ian Ferrer, Axel Herrera, Kelsey Fenn, Mallika Nocco, **Cristina Lazcano**. Effects of stacked regenerative practices on soil water infiltration dynamics and moisture regimes in a Sonoma vineyard, CA. Poster, 2026 California Plant and Soil Conference. Tuesday-Wednesday, February 3-4, Visalia, California (USA).
85. Halima Malal, Mariel Mondragon-Becerra, Kefang Nie, Raymond Reis, Camila Cancino, Joshua Garcia, Daniel J Geisseler, **Cristina Lazcano**, Hannah Waterhouse, Rebecca Ryals, Alda Pires, Elliott Campbell. Oral Presentation. Nitrogen mineralization dynamics of California composts in processing tomato production: incubation and field study, Compost 2026. February 2-5 2026. Sacramento, California (USA).
86. Kelsey Fenn, Andy Gal, Josh Garcia, Ashly Lord, Majdi Abou Najm, Anthony O'Geen, **Cristina Lazcano**, Mallika A. Nocco. Oral Presentation. Integrating Soil Physics and Microbial Ecology through Perennial Cover Cropping., 4th Global Soil Biodiversity Conference, British Columbia, Canada, April 12-15, 2026.
87. Connie T. F. Wong, Luisa Robles Zaragoza, Bruna Albuquerque Vaz, Chiara De Quay, Jared France, Ivan Martinez, Axel Herrera, Joshua Garcia, Kerri L. Steenwerth, **Cristina Lazcano**. Oral Presentation. Soil microbial diversity and carbon cycling across the soil profile under regenerative management in Northern California vineyards, 4th Global Soil Biodiversity Conference, British Columbia, Canada, April 12-15, 2026.
88. Kelsey Fenn, Andrew Gal, Nall Moonilall, Ashly Lord, **Cristina Lazcano**, Mallika A. Nocco. Oakville Bluegrass Cover Crop in California Almond Orchards: Establishment and Early Soil Health Responses, 2026 California Plant and Soil Conference. Tuesday-Wednesday, February 3-4, 2026. Visalia, California (USA).

89. **Jagadamma, S.**, Rasu, E., and Lazicki, P. 2025. Deep soil carbon storage across a range of pedogenic, climatic, and management variations in southeastern US croplands. Soil and Water Conservation Society Annual Meeting, August 3-6, Costa Mesa, CA.
90. Kallingal, B., Wright, K., Cui, S., Nieman, C.C., Keyser, P.D., and **Jagadamma, S.** 2025. Organically managed native warm-season grasses for improving soil health in the Southeastern United States. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, UT. Nov. 9-12, 2025.
91. **Jagadamma, S.** 2025. Harnessing the potential of subsoil to store stable soil organic carbon in agroecosystems. Soils for Our Future 2025 Manitoba Soil Science Society Conference, July 20-25, Winnipeg, Canada.
92. Dai, W., G. Feng and **X. Zhang**. Soil aggregation responses to sustainable agricultural practices in the southeastern United States. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, UT. Nov. 9-12, 2025.
93. Vital, S., G. Feng, H. Tewolde, **X. Zhang**, J. Brooks and D. Morin. Spatial configuration of cover crop mixtures with poultry litter: assessing net biodiversity effects on residual nutrient cycling and cotton productivity. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, UT. Nov. 9-12, 2025.
94. Vital, S., G. Feng, H. Tewolde, **X. Zhang**, J. Brooks and D. Morin. Cover crops and poultry litter drive soybean nutrition, yield, and soil nutrient dynamics across planting windows. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, UT. Nov. 9-12, 2025.
95. Vital, S., G. Feng, W. Dai, A. Adeli, D. Miles, J. Brooks, **X. Zhang** and D. Morin. Linking soil health, greenhouse gas fluxes, and crop yield: decoding management impacts in cover-crop systems. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, UT. Nov. 9-12, 2025.
96. Vital, S., S. Xu, M. Geza Nisrani, P.J. Sexton, N. Ghimire, C. Graham, L. Xu, **X. Zhang** and J. Wu, J. Response of soil macropores, hydro-physical properties, water dynamics, and carbon accumulation to crop rotations and cover cropping under no-till management. ASA-CSSA-SSSA Annual Meeting, Salt Lake City, UT. Nov. 9-12, 2025.
97. **Lal, R.** 2025. Lecture presented at the UN Decarbonization Meeting, New York, NY, April 16, 2025.
98. **Lal, R.** 2025. Agriculture in Africa: The future breadbasket of the world. Adaptation of African Agriculture Dialogue, Meknes, Morocco, April 22, 2025.
99. **Lal, R.** 2025. Transforming Brazilian agriculture into a model of green revolution. Sistema FAMATO, Cuiaba, Brazil, May 22, 2025.
100. **Lal, R.** 2025. Presentation at the NC-1178 Annual Meeting, Knoxville, TN, June 2, 2025.
101. **Lal, R.** 2025. Living soils: Advancing sustainable development goals of America. American Agricultural and Food Security Forum, Edmonton, Canada (virtual), June 17, 2025.
102. **Lal, R.** 2025. Potential and opportunities of regenerative agriculture. Generation Restoration Dialogue, UNCCD and G20 Global Land Initiative, Bonn, Germany, July 11, 2025.
103. **Lal, R.** 2025. Soil health and agriculture by soil carbon management. Çukurova University, Adana, Turkey, September 3, 2025.

G. Extension Services and Reports

1. **Rui, Y.** Research and Extension update from the Indiana Organic Network. Indiana Horticulture and Small Farm Conference, Danville, Indiana, March 5, 2026.
2. **Rui, Y.** The hidden half: Root-soil-nitrogen interactions of short-stature corn. Indiana Certified Crop Adviser Conference, Indianapolis, Indiana, December 10, 2025.
3. **Rui, Y.** Impacts of biochar and gypsum application on pasture productivity and soil health. Greener Pastures Field Day, Ferdinand, Indiana, August 28, 2025.
4. Hanley, M.L. & **Naughton, H.R.** "Litter input quality, soil structure, and oxygen interactions shaping soil carbon storage". Northeastern Organic Farm Association Meeting poster, Amherst, MA. 28 February 2026.

5. Williamson, C.D., Hashemi, M. & **Naughton, H.R.** “Preliminary data of cover crop carbon and nitrogen application rates in summer season; single and multispecies”. Northeastern Organic Farm Association Meeting poster, Amherst, MA. 28 February 2026.
6. Williamson, C.D., Park, O.* & **Naughton, H.R.** Nutrient cycling and carbon dynamics of summertime cover crops in vegetable production”. UMass Research Farm Field Day, South Deerfield, MA. 06 August 2025.
7. Publication: Herrera, Axel, Ellen Bruno, and **Cristina Lazcano**. 2025. “The Profitability of Regenerative Viticulture in Sonoma County, California.” ARE Update 28(5): 5-8. University of California Giannini Foundation of Agricultural Economics.