# Annual Report for NC1195 for 2019-2020

# Publications, Conference papers, and Grants

# Project/Activity Number: NC1195

**Project/Activity Title:** Enhancing nitrogen utilization in corn based cropping systems to increase yield, improve profitability and minimize environmental impacts

**Period Covered:** March 7, 2019 to March 6, 2020

**Date of This Report: April 05, 2020**

**Annual Meeting Date(s):** March 3-4, 2020

**Journal Publications**

1. **Castellano**,M.J., Archontoulis, S.V., Helmers, M.J., **Poffenbarger**, H.J., and J. Six. 2019. Sustainable intensification of agricultural drainage. *Nature Sustainability* 2: 914-921.
2. Clark, J.D., Veum, K.S., **Fernandez**, F.G., Camberato, J.J., Carter, P.R., Ferguson, R.B., Franzen, D.W., Kaiser, D.E., Kitchen, N.R., **Laboski**, C.A.M., Nafziger, E.D., Rosen, C.J., **Sawyer**, J.E., and Shanahan, J.F. 2019. United states midwest soil and weather conditions influence anaerobic potentially mineralizable nitrogen. *Soil Science Society of America Journal* 83: 1137-1147.
3. Clark, J.D., Fernandez, F.G., Veum, K.S., Camberato, J.J., Carter, P.R., Ferguson, R.B., Franzen, D.W., Kaiser, D.E., Kitchen, N.R., **Laboski**, C.A.M., Nafziger, E.D., Rosen, C.J., **Sawyer**, J.E., and Shanahan, J.F. 2019. Predicting economic optimal nitrogen rate with the anaerobic potentially mineralizable nitrogen test. *Agronomy Journal* 111: 3329-3338.
4. Chu, M., Singh, S., Walker, F.R., Eash, N.S., Buschermohle, M.J., Duncan, L.A., and **Jagadamma**, S. 2019. Soil health and soil fertility assessment by the Haney Soil Health Test in an agricultural soil in west Tennessee. *Communications in Soil Science and Plant Analysis* 50(9): 1123-1131.
5. **Drijber**, R.A., and Jeske, E.S. 2020. Polarity of chloroform eluent critical to quantification of arbuscular mycorrhizal biomass using the neutral lipid fatty acid biomarker C16:1*cis*11. *Soil Biology & Biochemistry* 138: 107582.
6. Florence, A.M., Higley, L.G., **Drijber**, R.A., Francis, C.A., and Lindquist, J.L. 2019. Cover crop mixture diversity, biomass productivity, weed suppression, and stability. *PLoS ONE* 14(3): e0206195.
7. Hall, S.J., **Russell**, A.E. and A’lece, R.M., 2019. Do corn-soybean rotations enhance decomposition of soil organic matter? *Plant and Soil* 444: 427-442.
8. **Jagadamma**, S., Essington, M.E., Xu, S., and Yin, X. 2019. Total and active organic carbon from long-term agricultural management practices in West Tennessee. *Agricultural and Environmental Letters* 4: 180062
9. Kelly, A., Coatney, K.T., **Li**, X., and Coble, K.H., 2019. Subsidy incidence in the presence of Bertrand Suppliers of Complementary Inputs: A U.S. Agricultural Example. *Journal of Industry, Competition and Trade* https://doi.org /10.1007/s10842-019-00321-4.
10. Larson, J.A., Zhou, X.V., Boyer, C.N., **Yin**, X.F., McCLure, A., Savoy, H.J., and Essington, M.E. 2019. Effects of enhanced efficiency urea on no-tillage corn yields and profit. University of Tennessee Extension Publication, W 828.
11. **Li**, X., Shen, Z., Harri, A., and Coble, K.H. 2020. Comparing survey-based and programme-based yield data: implications for the U.S. Agricultural Risk Coverage-County programme. *The Geneva Papers on Risk and Insurance - Issues and Practice* 45(1): 184-202.
12. Mahal, N.K., Osterholz, W.R., Miguez, F.E., **Poffenbarger**, H.J., **Sawyer**, J.E., Olk, D.C., Archontoulis, S.V., and **Castellano**, M.J. 2019. Nitrogen fertilizer suppresses microbial mineralization of soil organic matter in maize agroecosystems. *Frontiers in Ecology and Evolution* 7: 1-12.
13. McDaniel, M.D., Walters, D.T., Bundy, L.G., Li, X., Sawyer, J.E., Castellano, M.J., Laboski, C.A.M., Scharf, P.C., Drijber, R.A., and Horwath, W.R. 2020. Combination of biological and chemical soil tests best predict maize nitrogen response. *Agronomy Journal* <https://doi.org/10.1002/agj2.20129>
14. Mundepi, A., Cabrera, M., **Norton**, J.M., and Habteselassie, M. 2019. Ammonia oxidizers as biological health indicators of elevated Zn and Cu in poultry litter amended soil. *Water, Air, & Soil Pollution,* 230: 239*.*
15. **Norton**, J.M., and Ouyang, Y. 2019. Controls and adaptive management of nitrification in agricultural soils*. Frontiers in Microbiology* doi:10.3389/fmicb.2019.01931
16. Ouyang, Y., and **Norton**, J. M.2020. Short-term nitrogen fertilization affects microbial community composition and nitrogen mineralization function in an agricultural soil. *Applied and Environmental Microbiology* doi:10.1128/AEM.02278-19
17. Ransom, C.J., Kitchen, N.R., Camberato, J.J., Carter, P.R., Ferguson, R.B., **Fernandez***,* F.G., Franzen, D.W., **Laboski**, C.A.M., Myers, D.B., Nafziger, E.D., **Sawyer**, J.E., **Scharf**, P.C., and Shanahan. J.F. 2020. Corn nitrogen rate recommendation tool’s performance across eight US Midwest corn belt states. *Agronomy Journal* 1: 1-23.
18. Ransom, C.J., Kitchen, N.R., Camberato, J.J., Carter, P.R., Ferguson, R.B., **Fernandez**, F.G., Franzen, D.W., **Laboski**, C.A.M., Myers, D.B., Nafziger, E.D., **Sawyer**, J.E., and Shanahan, J.F. 2019. Statistical and machine learning methods evaluated for incorporating soil and weather into corn nitrogen recommendations. *Computers and Electronics in Agriculture* 164: 104872.
19. Patel, S., **Sawyer**, J.E., and Lundvall, J.P. 2019. Can management practices enhance corn productivity in a rye cover crop system? *Agronomy Journal* 111: 3161-3171.
20. **Poffenbarger**,H.J., Olk, D.C., Cambardella, C., Kersey, J., Liebman, M., Mallarino, A., Six, J., and **Castellano**, M.J. 2020. Whole-profile soil organic matter content, composition and stability under crop rotations differing in belowground inputs. *Agriculture, Ecosystems, and Environment* 291: 106810.
21. Singh, P., Swain, D.K., Bhadoria, P.B.S., and **Jagadamma**, S.  2019.  Effect of planting system and elevated CO2 environment on soil NH4+–N and NO3−–N content and yield of hybrid rice in subtropical India. *International Journal of Plant Production* 13(2): 141-153.
22. Singh, S., Yan, S., Sorochan, J., Stier, J., Mayes, M.A., Zhuang, J., and **Jagadamma**, S. 2019. Soil carbon accumulation and nutrient availability in managed and unmanaged ecosystems of East Tennessee. *Soil Science Society of America Journal* 83: 458-465.
23. Stefanini, M., Larson, J.A., Lambert, D.M., **Yin**, X., Boyer, C.N., **Scharf,** P.C., Tubaña, B.S., Varco, J.J., Dunn, D., Savoy, H.J., and Buschermohle, M.J. 2019. Effects of optical sensing based variable rate nitrogen management on yields, nitrogen use, and profitability for cotton. *Precision Agriculture* 20: 591-610.
24. Wade, J., Culman, S., Logan**,** J.A.R., **Poffenbarger**, H.J., Demyan, M.S., Grove, J.H., Mallarino, A.P., McGrath, J.M., Ruark, M., and West, J. 2020. Improved soil biological health increases corn grain yield in N fertilized systems across the Corn Belt. *Scientific Reports* 10(1): 3917.
25. Woodruff, L.K., Habteselassie, M.Y., **Norton**, J.M., Boyhan, G.E., and Cabrera, M.L. 2019. Yield and nutrient dynamics in conventional and organic sweet corn production systems. *Agronomy Journal* 111(5): 2395-2403.

**Conference presentations**

1. Bansal, S., **Yin**, X., Sykes, V.R., **Jagadamma**, S., and Lee, J. 2019. Long-term influence of crop sequences, bio-covers and aggregate sizes on organic carbon and nitrogen in soil profile under no-tillage. ASA-CSSA-SSSA Annual Meeting, November 10-13, San Antonio, TX.
2. Bansal, S., Yin, X., Singh, S., **Jagadamma**, S., Sykes, V.R., and Lee, J. 2019. Crop sequence diversity and bio-covers under no-tillage affect greenhouse gas emissions. ASA-CSSA-SSSA Annual Meeting, November 10-13, San Antonio, TX.
3. Davis, M.P., Waring, E., Helmers, M.J., and McDaniel, M.D. 2019. Does stacking cover cropping and no-tillage conservation practices enhance soil and environmental health? ASA-CSA-SSSA meetings in San Antonio, TX.
4. De, M., Roush, M., Sawyer, J.E., and McDaniel, M.D. 2019. Glycerin as a soil amendment to temporarily store and resupply nitrogen to crops. Evidence from an incubation study. SSSA Meeting in San Diego, CA (Soils Across Latitudes).
5. De, M., Roush, M., Sawyer, J.E., and McDaniel, M.D. 2019. Glycerin as a soil amendment to temporarily store and resupply nitrogen to crops. Evidence from an incubation study. Soil Health Conference in Ames, IA.
6. **Drijber**, R.A., and Jeske, E.S. 2019. Polarity of chloroform eluent critical to quantification of arbuscular mycorrhizal fungal biomass in soil using the neutral lipid fatty acid biomarker C16:1*cis*11. Rhizosphere5 International Meeting, July 7-11, 2019. Saskatoon, Saskatchewan, Canada.
7. Dutter, C., Lawrinenko, M., McDaniel, M.D., and Grandy, S.A. 2019. Extracellular enzymes: A soil health index that isolates management effect from the noise? Soil Health Conference in Ames, IA.
8. Ellison, R., Zhu-Barker, X., and **Horwath**, W.R. 2019. Improving nutrient use and reducing greenhouse gas emissions of dairy manure through hydrodynamic cavitation and chemical coagulation processes. SSSA International Soils Meeting, San Antonio, TX.
9. Jahromi, N.B., Lee, J., Johnsen, M., Fulcher, A., Nouri, A., Walker, F.R., **Jagadamma**, S., and Arelli, P.R. 2019. Biochar as soil amendment to improve flooded sandy soil for corn production. ASA-CSSA-SSSA Annual Meeting, November 10-13, San Antonio, TX.
10. Joshi, G.A. 2019. A fresh soil health perspective: Soil health dynamics and improved measurement techniques. Ph.D. Dissertation. (**Hodges** served as committee member) <https://vtechworks.lib.vt.edu>
11. **Laboski, C.A.M.,** and Andraski, T.W. 2020. Consider soil drainage class when making nitrogen application timing decisions for corn. *In* Proc. Wisconsin Agribusiness Conf., Madison, WI. 14-16 Jan. 2020.
12. **Laboski,** C.A.M., Bandura, C., Camberato, J.J., Carter, P.R., Ferguson, R.B., **Fernández**, F.G., Franzen, D.W., Kitchen, N.R., Nafziger, E.D., **Sawyer**, J.E., and Shanahan, J. 2019. Is NUE a useful metric of sustainability? American Society of Agronomy International Meeting. San Antonio TX USA. 10-14 Nov., 2019.
13. Leuthold, S., Wendroth, O., Salmeron, M., Haramoto, E., and **Poffenbarger**, H.J. 2020. Interactions between landscape topography and cover crops in a southeastern corn cropping system. Oral presentation. American Society of Agronomy Southern Branch Meeting. Louisville, KY, February 2020.
14. Leuthold, S., **Poffenbarger**, H.J., Salmeron Cortasa, M., Wendroth, O., and Haramoto, E. Do cover crops increase or decrease spatiotemporal variability in maize yield? Poster presentation. International Crop Modeling Conference, Montpellier, France, February 2020.
15. Leuthold, S., Salmeron Cortasa, M., Wendroth, O., Haramoto, E.R., and **Poffenbarger**, H.J. 2019. Understanding spatial variability in cover crop growth and decomposition. Poster presentation. North Central Extension-Industry Soil Fertility Conference, Des Moines IA, November 2019.
16. Leuthold, S., and Poffenbarger, H.J. 2019. Cover crop productivity and mixture composition differ by topographic position, but their impacts on early season soil properties do not. Poster presentation. Southern Cover Crop Council Meeting, Auburn, AL, July 2019.
17. Leuthold, S., **Poffenbarger**, H.J., Salmeron, M., Wendroth, O., and Haramoto, E.R. 2019. Investigating the interactions between cover crops and complex agricultural terrain in southeastern maize systems. Oral presentation. American Society of Agronomy Annual Meeting. San Antonio, TX, November 2019.
18. **Li, X**., 2019. How much within-field yield variability can be explained by public soil data? Agricultural and Applied Economics Association Annual Meeting, July 21-23, Atlanta, GA.
19. **Li, X**. and Feng, G., 2019. Estimating the optimal water requirement for soybean production in the state of Mississippi. Mississippi Water Resources Conference, April 1, 2019, Jackson, MS.
20. McDaniel, M.D. 2019. Decomposition of household items (Including Rooibos and Green Tea) as indicators of soil health. Tea Bag Index Symposium in Umea, Sweden.
21. McPherson, M.R., Stengel, A., Jeske, E.S., Dunfield, K., Tosi, M., Deen, W., and **Drijber, R.A**. 2019. Current season nitrogen fertilization rate, not prior N history, dictates extramatrical hyphal biomass of arbuscular mycorrhizal fungi in soil at maize reproduction. ASA-CSSA-SSSA Annual Meetings, November 10-13, 2019, San Antonio, TX.
22. McPherson, M., Stengel, A., Herr, J., Jeske, E.S., Jin, V.L., and **Drijber**, R.A. 2019. Crop rotation and nitrogen management history influences abundance of extramatrical arbuscular mycorrhizal fungi in maize cropping systems. ASA-CSSA-SSSA Annual Meetings, November 10-13, 2019, San Antonio, TX.
23. McPherson, M.R., Stengel, A., Jeske, E.S., Dunfield, K., Tosi, M., Deen, W., and **Drijber**, R.A. 2019. Current season nitrogen fertilization rate, not prior N history, dictates extramatrical hyphal biomass of arbuscular mycorrhizal fungi in soil at maize reproduction. Rhizosphere5 International Meeting, July 7-11, 2019. Saskatoon, Saskatchewan, Canada.
24. Middleton, T., **McDaniel**, M.D., Liebman, M., Kaspar, T.C., Al-Kaisi, M.M., Moore, K.J., Delate, K., Cambardella, C.A., and Karlen, D.L. 2019. Decomposition of household items as a low-cost soil health indicator. SSSA Meeting in San Diego, CA (Soils Across Latitudes).
25. Middleton, T., **McDaniel**, M.D., Liebman, M., Kaspar, T.C., Al-Kaisi, M.M., Moore, K.J., Delate, K., Cambardella, C.A., and Karlen, D.L. 2019. Decomposition of household items as a low-cost soil health indicator. Soil Health Conference in Ames, IA.
26. Miller P.K., Kakkar, A., and **Norton,** J.M. 2019. Nitrogen use efficiency and soil bioavailable nitrogen in corn silage production in a semi-arid environment. SSSA International Meeting. San Antonio TX USA. November 11, 2019.
27. **Norton**, J.M., and Ouyang, Y. 2019. Why ammonia oxidizing bacteria and ammonia oxidizing archaea co-exist in agricultural soils. SSSA International Meeting. San Antonio TX USA. November 13, 2019.
28. **Norton**, J.M., and Ouyang, Y. 2019. Nitrogen fertilization affects microbial community composition and nitrogen mineralization function in an agricultural soil. Dept. of Energy JGI, San Francisco, CA USA. April 3-4, 2019.
29. **Norton**, J.M., and Ouyang, Y. 2019. Ammonium fertilizers increase the activity but not the abundance of nitrite oxidizers in an agricultural soil. SSSA International Meeting. San Diego CA USA. January 9, 2019.
30. Panyi, A., **Li,** X., Park, E., Harri, A., and Coble, K.H., 2020. Does crop yield risk differ across soil types? Evidence from Mississippi Variety Trials” Southern Agricultural Economics Association Annual Meeting, February 1-4, Louisville, KY.
31. Pieper J., McDaniel, M.D., VanLoocke, A., Baldwin-Kordick, R., and Marino, J. 2019. What matters more when controlling for biologically-available carbon in soil: roots or management? Symposium on Undergraduate Research and Creative Expression (SoURCE) at Iowa State University Memorial Union. Ames, IA.
32. **Poffenbarger**, H.J., and Grove, J.H. 2019. Effects of long-term no-till on optimal nitrogen fertilization practices for corn. Poster presentation. American Society of Agronomy Annual Meeting, San Antonio, TX, November 2019.
33. Quinn, D., **Poffenbarger**, H.J., and Lee, C.D. 2019. Optimum nitrogen fertilizer rate and timing for corn following a rye cover crop. Poster presentation. American Society of Agronomy Annual Meeting, San Antonio, TX, November 2019.
34. Quinn, D., **Poffenbarger**, H.J., and Lee, C.D. 2019. Rye cover crop and in-furrow fertilizer and fungicide effects on corn optimum seeding rate and grain yield. Oral presentation. American Society of Agronomy Annual Meeting. San Antonio, TX, November 2019.
35. Ramirez, S., Jin, V.L., Al Serae, H., Jeske, E.S., Gunderson, L., Stengel, A., Hanford, K., and **Drijber**, R.A. 2019. Increasing diversity of maize crop rotations under variable rates of nitrogen fertilization alters soil microbial community structure and function. ASA-CSSA-SSSA Annual Meetings, November 10-13, 2019, San Antonio, TX.
36. **Sawyer,** J.E. 2019. Nitrogen use in corn – What long-term data tells us. p. 115-122. *In* Proc. 31st Annual Integrated Crop Management Conference, Ames, IA. 4-5 Dec. 2019. Iowa State Univ., Ames.
37. Smith, C., Zhu-Barker, X., and **Horwath**, W.R. 2019. Evaluation of certified organic fertilizers for long-term nutrient planning. Proceedings of the Annual California Department of Food and Agriculture Fertilizer Research and Education Program meeting held October 28-30 in Fresno, California.
38. Smith, C., Zhu-Barker, X., de la Fuente, M., and **Horwath**, W.R. 2019. Exploring nitrogen fertilizer transformations using an indirect 15N field method in California's central coast vegetable crops. SSSA International Soils Meeting, San Antonio, TX.
39. Stengel, A., McPherson, M.R., Franklin, M., Jeske, E.S., Jin, V.L., Schmer, M.R., Weinhold, B.J., Herr, J.R., and **Drijber**, R.A. 2019. Characterizing the influence of soil recruitment pools on rhizosphere compartmentalization in maize seedlings. Rhizosphere5 International Meeting, July 7-11, 2019. Saskatoon, Saskatchewan, Canada.
40. Stengel, A., McPherson, M., Herr, J., Franklin, M., Jeske, E.S., Jin, V.L., and **Drijber**, R.A. 2019. Crop rotation history shapes soil recruitment pools of maize under nitrogen limitation. ASA-CSSA-SSSA Annual Meetings, November 10-13, 2019, San Antonio, TX.
41. Studt, J.E., Heaton, E.A., and **McDaniel**, M.D. 2019. *Miscanthus × Giganteus*: a low-input Perennial biomass crop to improve soil health and water quality. SSSA Meeting in San Diego, CA (Soils Across Latitudes).
42. Studt, J.E., E.A. Heaton, M.D. **McDaniel**. 2019. Miscanthus × Giganteus: a low-input Perennial biomass crop to improve soil health and water quality. Soil Health Conference in Ames, IA.
43. Teeter, A.O., **Laboski**, C.A.M., and Andraski, T.W. 2020. Evaluating efficacy of 590 manure management practices to improve corn N utilization. *In* Proc. Wisconsin Agribusiness Conf., Madison, WI. 14-16 Jan. 2020.
44. Thomsen, S. J. 2019. Linking cattle, forage, and tree production in Silvopastures. M.S. Thesis. (**Hodges** served as committee member) <https://vtechworks.lib.vt.edu>
45. Tosi, M., Deen, W., **Drijber**, R., and Dunfield, K. 2019. Soil microbial community structure is shaped by long-term fertilization regimes of corn crops. Rhizosphere5 International Meeting, July 7-11, 2019. Saskatoon, Saskatchewan, Canada.
46. Wolters, B.R. 2019. To mix or not to mix: diverse cover crop mixture performance and management. Ph.D. Dissertation (**Hodges** served as committee member).
47. Xu, S., **Jagadamma**, S., Ashworth, A., Singh, S., Owens, P., and Moore, P. 2019. Soil organic carbon accumulation in response to different grazing management practices. ASA-CSSA-SSSA Annual Meeting. November 10-13, San Antonio, TX.
48. Zhu-Barker, X., Xu, C., Qiong, Y., and **Horwath**, W.R. 2019. Responses of soil organic matter stability, N transformation processes and nitrous oxide production to compost application in long-term sustainable managed soils. AGU Fall Meeting San Francisco, CA.

**Grants awarded or ongoing in 2019**

1. Coble, K.H. (PI), Harri, A., **Li**, X., and Park, E. Redesigning farm policy in an era of digital agriculture. USDA NIFA-AFRI, 2018-2020, $479,336.
2. Czarnecki, J. (PI), **Li**, X., and Fox, A. Improving the operational and economic opportunities for unmanned aerial systems in Mississippi agriculture. Mississippi Agricultural and Forestry Experiment Station, Special Research Initiative, 2019, $28,696.
3. **Drijber**, R. (PI). Soil Response to Agricultural Intensification, Dept of Agriculture-ARS, Federal, Research, 2019-2024, ($150,000).
4. **Drijber**, R. (PI). Enhancing nitrogen utilization in corn based cropping systems to increase yield, improve profitability and minimize environmental impacts. 2016-2021, ($50,000).
5. **Drijber**, R. (PI). Soil Microbial Community Structure. USDA-ARS, 2014-2019, ($80,000).
6. **Fernández**, F.G. (PI), Kaiser, D.E., Vetsch, J.A., Strock, J.S., Pagliari, P.H., Pease, L., Rosen, C., Miao, Y., Sims, A., Wilson, M., and Fabrizzi, K.P. Long-term impact of nitrogen fertilization on corn production, soils, and nitrogen cycling processes in Minnesota. Minnesota Agricultural Fertilizer Research and Education Council. 2019-2020. $95,000.
7. **Fernández**, F.G. (PI), and Pagliari, P.H. Nitrate in tile-drain water relative to time and source of nitrogen application. Minnesota Agricultural Fertilizer Research and Education Council. 2019-2020. $77,147.
8. **Fernández**, F.G. (PI), Kaiser, D.E., and Vetsch, J.A. Urea and urea additives as fertilizer sources for corn production in Minnesota. Minnesota Agricultural Fertilizer Research and Education Council. 2019-2020. $165,690.
9. **Fernández**, F.G. (PI), Kaiser, D.E., and Vetsch, J.A. Urea and urea additives as fertilizer sources for corn production in Minnesota. Minnesota Agricultural Fertilizer Research and Education Council. 2018-2019. $165,690.
10. **Fernández**, F.G. (PI). Coordinated educational program for nutrient management in Minnesota. Minnesota Agricultural Fertilizer Research and Education Council. 2019-2020. $13,000.
11. **Fernández**, F.G. (PI). Coordinated educational program for nutrient management in Minnesota. Minnesota Agricultural Fertilizer Research and Education Council. 2018-2019. $26,105.
12. **Fernández**, F.G. (PI), Pagliari, P.H., and Strock, J.S. Nitrate in tile-drain water relative to time and source of nitrogen application. Minnesota Agricultural Fertilizer Research and Education Council. 2018-2019. $79,718.
13. Garcia y Garcia, A. (PI), Johnson, G., Coulter, J.A., Nieber, J.A., Sadok, W., Mulla, D.J., **Fernández**, F.G., Vetsch, J.A., and Wells, M.S. The cover crops, water, and nitrogen nexus: How do they impact corn and soybean production and the environment? Minnesota Department of Agriculture. 2016-2020. $450,223 [$10,000 to **Fernández**].
14. Gish-Hill, C. (PI),and **McDaniel**, M.D. Reuniting the three sisters: native american intercropping and soil health. North Central Regional - Sustainable Agriculture Research & Education (SARE), $200,000, 11/1/2019–10/31/2021.
15. Gish-Hill, C. (PI), **McDaniel**, M.D., Winham, D., and Nair, A. Reuniting the three sisters: enhancing community and soil health in Native American communities. United States Department of Agriculture – National Institute of Food and Agriculture – Critical Agricultural Research and Extension (CARE), $300,000, 7/1/2019–6/30/2022.
16. Haramoto, E. (PI), and **Poffenbarger**, H.J.Equipment modifications for planting into for high-residue cover crops. Kentucky Corn Growers’ Association Research Grant. 2019-2020. $5,660.
17. Haramoto, E. (PI), and **Poffenbarger**, H.J. Investigating cereal rye varieties for improved cover crop performance. Kentucky Small Grain Growers’ Association Research Grant. 9/18-8/19. Renewed 9/19-9/20. $35,000.
18. Helmers, M. (PI), Brouder, S., Christianson, L., Nelson, K., Jaynes, D., Gentry, L., Drury, C., **Fernández**, F.G., Eagle, A., and Snyder, C. Foundation for Food and Agriculture Research. Coordinated site network for studying the impacts of 4R nutrient management on crop production and nutrient loss. 2017-2020. $2,000,000 [$231,000 to **Fernández**]
19. **Jagadamma**, S. (PI), Walker, F., Singh, S., Duncan, L., McClure, A., and Upendram, S. Demonstrating the impacts of cover crops for soil health and farm profitability in Tennessee. Tennessee Department of Agriculture, 2019-2023, $341,493
20. **Jagadamma**, S. (PI), Lee, J., Duncan, L., McClure, A., Raper, T., and Kivlin, S. Optimizing plant-soil-microbial interactions through crop diversification to enhance sustainability in southeastern croplands. USDA-AFRI, 2020-2024, $500,000
21. **Laboski**, C.A.M.(PI). Adaptive N management strategies for corn. Wisconsin Corn Promotion Board, 2019-2020, ($49,443).
22. **Laboski**, C.A.M.(PI). Adaptive N management strategies for corn II. Wisconsin Fertilizer Research Council, 2020-2023, ($120,957).
23. **Laboski**, C.A.M.(PI) Investigation of soil health N tests to predict corn N need. Wisconsin Fertilizer Research Council, 2020-2023, ($138,227).
24. Lee, J. (PI), and **Jagadamma**, S. Row crop production under climate change – assessment of sustainable management practices and soil additives in sand deposited fields. USDA -Agricultural Research Service, $103,704.
25. Lee, C. (PI), **Poffenbarger**, H.J., and Wise, K. Successfully establishing corn in cover crops. Kentucky Corn Growers’ Association Research Grant. 1/19-12/19. Renewed 1/20-12/20. $80,000.
26. **McDaniel**, M.D. (PI), Davis, M.P., Zhang, W., and **Sawyer,** J.E. Investigating the double impact of soil health promoting practices on water quality. Iowa Nutrient Research Center, $170,327, 07/01/2019–06/30/2021.
27. **McDaniel**,M.D. (PI), and M. Licht. Biological seed coating’s ability to enhance plant growth and soil health. BASF, $130,700, 5/1/2019–4/30/2021.
28. McGrath, J. (PI), **Poffenbarger**, H.J., Salmeron, M., Ritchey, E., Sama, M., and Shockley, J. Kentucky Corn Growers’ Association Research Grant. Nitrogen rate decision support for Kentucky corn grain production. 2019-2020. $215,451.
29. Naeve, S. (PI), and **Fernández**, F.G. Minnesota Soybean Research and Promotion Council Nitrogen management is not all about the corn crop: Understanding direct and indirect effects of nitrogen on soybean. 2018-2019. $136,000 [$76,000 to **Fernández**]
30. **Norton, J.M.** (PI), Reeve, J., Jones, S., Stark, S., and Habteselassie. M.Y. USDA/NIFA Climate Variability & Change, Linking nitrification to microbial community in agroecosystems under changing climate. 2016-2020
31. Pagliari, P.H. (PI), **Fernández**, F.G., and Kaiser, D.E. Minnesota Agricultural Fertilizer Research and Education Council. Assessment of atmospheric deposition of nutrients in Minnesota. 2019-2020. $28,000.
32. **Poffenbarger**, H.J. (PI), and McNear, D. Getting to the root of the matter: Linking root traits to soil health. United States Department of Agriculture Foundational and Applied Program Grant. 2019-2023. $499,040.
33. **Poffenbarger**, H.J. (PI) and Leuthold, S. Investigating the effects of grass-legume winter cover crop mixtures on soil nitrogen supply in rolling cropland. Southern Sustainable Agriculture Research and Education Graduate Research Grant. 2019-2021. $16,500.
34. **Poffenbarger**, H.J. (PI), Leuthold, S., Wendroth, O., Salmeron, M., and Haramoto, E. Understanding subfield variation in corn nitrogen fertilizer needs. Kentucky Corn Growers’ Association Research Grant. 1/7/2020-1/6/2021. $12,000.
35. **Poffenbarger**, H.J. (PI), and Van Sanford, D. Investigating the impact of soil properties on wheat flavor. College of Agriculture, Food, and Environment Research Activity Award. 10/2019-6/2020. $1,500.
36. Reberg-Horton, C. (PI), Mirsky, S.B., **Poffenbarger**, H.J., and Haramoto, E, et al. (46 total investigators). A cover crop network for enhancing the sustainability of U.S. cropping systems. United States Department of Agriculture Sustainable Agricultural Systems Grant. 2019-2014. $10,000,000.
37. Salmeron Cortasa, M. (PI), Haramoto, E., **Poffenbarger**, H.J., Hildebrand, D., Purcell, L., Naeve, S., and Sadok, W. How does management increase soybean seed protein? A mechanistic approach to identifying limitations and opportunities. United Soybean Board. 10/18-9/19. Renewed 10/19-9/20. $426,367.
38. Salmeron Cortasa, M. (PI), **Poffenbarger**, H.J., and Boote, K. Network for evaluating and improving soybean crop models and their role in environmental impact and sustainability of agronomic systems. United States Department of Agriculture Foundational and Applied Program Grant. 2019-2022. $500,000.
39. **Scharf**, P.C. Protecting soil after soybean. Missouri Soybean Merchandising Council ($25,000).
40. Sharma, V. (PI), Mulla, D., and **Fernández**, F.G. Minnesota Department of Agriculture. Evaluation and performance of different irrigation scheduling methods and their impact on corn production and nitrate leaching in central sands region of Minnesota. 2019-2021. $124,005 [35,000 to **Fernández**]