

Annual Report for NC1195 for 2018-2019
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, 2018 to March 6, 2019

Date of This Report: March 31, 2019

Annual Meeting Date(s): March 5-6, 2019

Journal Publications

1. Anapalli, S.S., K.N. Reddy, and S. **Jagadamma**. 2018. Conservation tillage impacts and adaptations in irrigated corn production in a humid climate. *Agronomy Journal* 110, 1–14.
2. Bean, G.M., N.R. Kitchen, J.J. Camberato, R.B. Ferguson, F.G. **Fernández**, D.W. Franzen, C.A.M. **Laboski**, E.D. Nafziger, J.E. **Sawyer**, P.C. **Scharf**, J.S. Schepers, and J.F. Shanahan. 2018. Active-optical reflectance sensing corn algorithms evaluated over the United States Midwest Corn Belt. *Agron. J.* 110:2552-2565.
3. Bean, G.M., N.R. Kitchen, J.J. Camberato, R.B. Ferguson, F.G. **Fernández**, D.W. Franzen, C.A.M. **Laboski**, E.D. Nafziger, J.E. **Sawyer**, P.C. **Scharf**, J.S. Schepers, and J.F. Shanahan. 2018. Improving an active-optical reflectance sensor algorithm using soil and weather information. *Agron. J.* 2541-2551.
4. Charkhabi, S., A.M. Beierle, M.D. **McDaniel**, and N.F. Reuel. 2018. Resonant Sensors for Low-Cost, Contact-Free Measurement of Hydrolytic Enzyme Activity in Closed Systems. *ACS sensors*, 3(8), 1489-1498.
5. Iqbal, J., M. Nepalova, S.V. Archontoulis, R.P. Anex, M. Bourguignon, D. Herzmann, D.C. Mitchel, J.E. **Sawyer**, Q. Zhu, and M.J. **Castellano**. 2018. Extreme weather-year sequences have nonadditive effects on environmental nitrogen losses. *Glob. Change. Biol.* 24:e303-e317. doi:10.1111/gcb.13866.
6. Jeske, E.S., H. Tian, K. Hanford, D.T. Walters, R.A. **Drijber**. 2018. Long-term nitrogen fertilization reduces extraradical biomass of arbuscular mycorrhizae in a maize (*Zea mays* L.) cropping system. *Agriculture, Ecosystems and Environment* 255:111-118.
7. Ouyang, Y., Reeve, J.R. **Norton, J.M.** 2018. Soil enzyme activities and abundance of microbial functional genes involved in nitrogen transformations in an organic farming system. *Biol Fertil Soils* 54:437-450. <https://doi.org/10.1007/s00374-018-1272-y>
8. **Poffenbarger**, H.J., J.E. **Sawyer**, D.W. Barker, D.C. Olk, J. Six, and M.J. **Castellano**. 2018. Legacy effects of long-term nitrogen fertilizer application on the fate of nitrogen fertilizer inputs in continuous maize. *Ag. Ecosys. Environ.* 265:544-555. doi:10.1016/j.agee.2018.07.005.
9. Puntel, L.A., J.E. **Sawyer**, D. Barker, P. Thorburn, M. **Castellano**, K.J. Moore, A. VanLoocke, E.A. Heaton, and S. Archontoulis. 2018. A systems modeling approach to forecast corn economic optimum nitrogen rate. *Front. Plant Sci.* 9:436. doi:10.3389/fpls.2018.00436.
10. Qin, Z., D.B., Myers, C.J. Ransom, N.R. Kitchen, S. Liang, J.J. Camberato, P.R. Carter, R.B. Ferguson, F.G. **Fernández**, D.W. Franzen, C.A.M. **Laboski**, B.D. Malone, E.D. Nafziger,

- J.E. **Sawyer**, and J.F. Shanahan. 2018. Application of machine learning methodologies for predicting corn economic optimal nitrogen rate. *Agron. J.* 110:2596-2607.
11. Rakkar, M.K., H. Blanco-Canqui, R.J. Rasby, K. Ulmer, J. Cox-O'Neill, M.E. Drewnoski, R.A. **Drijber**, K. Jenkins, J.C. MacDonald. 2018. Grazing crop residues has less impact in the short-term on soil properties than baling in the Central Great Plains. *Agronomy Journal*, doi:10.2134/agronj2018.03.0224.
 12. Ruis, S., H. Blanco, C. Burr, B. Olson, M. Reiman, D. Rudnick, R. **Drijber**, T. Shaver. 2018. Corn residue baling and grazing impacts on soil carbon stocks and other properties on a Haplustoll. *Soil Science Society of America Journal* 82:202-213.
 13. Sassman, A.M., D.W. Barker, and J.E. **Sawyer**. 2018. Corn response to urea-ammonium nitrate solution treated with encapsulated nitrpyrin. *Agron. J.* 110:1058-1067.
 14. Woli, K.P., J.E. **Sawyer**, M.J. Boyer, L.J. Abendroth, and R.W. Elmore. 2018. Corn era hybrid macronutrient and dry matter accumulation in plant components. *Agron. J.* 1648-1658. doi:10.2134/agronj2018.01.0025.
 15. Yost, M.A., K.S. Veum, N.R. Kitchen, J.E. **Sawyer**, J.J. Camberato, P.R. Carter, R.B. Ferguson, F.G. **Fernández**, D.W. Franzen, C.A. **Laboski**, and E.D. Nafziger. 2018. Evaluation of the soil health nutrient tool for corn nitrogen recommendations across eight midwest states. *J. Soil Water Conserv.* 75:587-592. Doi:10.2489/jswc.73.5.587.

Conference presentations

1. Changa, T., S. Wang, T. Awada, B. Wienhold, R. **Drijber**, E. Jeske, J. Okalebo. Evaluating Electrical Conductivity based Soil Sampling Methodology for the Evaluation of Spatial and Temporal Dynamics of Soil Microbial Communities in Managed Agroecosystems. Nebraska Society of Professional Soil Scientists Annual Meeting. February 2, 2018, Lincoln, NE.
2. **Fernández**, F.G. 2018. Nutrient management guidelines that meet crop production and environmental quality goals. In: Annual Meetings Abstracts [CD-ROM]. SSSA International Soils Meeting, Madison, WI.
3. **Jagadamma**, S and M. Sabbagh. 2018. Cover crop mixtures and soil properties in row-crop systems. No-Till Field Day. July 26, Milan, TN.
4. Kitchen, N.R., C. Ransom, G.M. Bean, J.J. Camberato, P.R. Carter, R.B. Ferguson, F.G. **Fernández**, D.W. Franzen, C.A.M. **Laboski**, E.D. Nafziger, and J.E. **Sawyer**. 2018. Corn nitrogen fertilizer recommendations: Always a toolbox, or can we get to a tool? In: Annual Meetings Abstracts [CD-ROM]. SSSA International Soils Meeting, Madison, WI.
5. **Laboski**, C.A.M. and T.W. Andraski. 2019. NUE and ROI Related to N Application Timing for Wisconsin Corn Production. In Annual meetings abstracts online. SSSA, Madison, WI.
6. **Laboski**, C.A.M. 2019. NUE and Potential Environmental Outcomes Associated with N Application Timing for Corn. Proc. 2019 Wis. Agribusiness Classic Online (<https://extension.soils.wisc.edu/agconference/>).
7. **Li**, X. and Coble, H. K. (2018). Using Profitability Map to Make Precision Farming Decisions: A Case Study in Mississippi. In Proceedings of the 14th International Conference on Precision Agriculture (unpaginated, online). Monticello, IL: International Society of Precision Agriculture.
8. **Li**, X., E. Park, A. Harri, and K. Coble (2018). Does Soil Affect Yield Stability in the U.S. Crop Production? Selected Paper prepared for presentation at the 2018 Agricultural &

- Applied Economics Association Annual Meeting, Washington, D.C., August 5-August 7
9. **Li, X., Jagadamma, S., N.Abdoulmoumine, J. DeBruyn and F. Walker** 2018. Influence of biochar on soil nitrogen dynamics. Biochar 2018, August 20-23, Wilmington, DE.
 10. **Li, X, Jagadamma, S. and F. Walker.** 2018. Effect of biochar amendment on soil properties and biomass yield of Tall Fescue dominated system in Middle Tennessee. Biochar 2018, August 20-23, Wilmington, DE.
 11. **McDaniel, M.D., D.T. Walters, L.G. Bundy, C.A.M. Laboski, P.C. Scharf, R.A. Drijber, W.R. Horwath, J.E. Sawyer, and M.J. Castellano.** 2018. A combination of soil incubation and chemical extraction tests best predicts maize yield response to fertilizer nitrogen. North Central Extension-Industry Soil Fertility Conference (International Plant Nutrition Institute) in Des Moines, IA.
 12. Park, E., B.W. Brorsen, and X. **Li.** 2018. How to Use Yield Monitor Data to Determine Nitrogen Recommendations: Bayesian Kriging for Site-Specific Parameter Estimates. Selected Paper prepared for presentation at the 2018 Agricultural & Applied Economics.
 13. **Poffenbarger, H.J. and J. McGrath.** January 17, 2019. Nitrogen rate decision support. Kentucky Commodity Conference.
 14. Sabbagh, M., S. **Jagadamma,** and F. Walker, 2018. Cover Crops to Mitigate Water Contamination in the Mississippi River. Tennessee Water Resource Symposium, April 11-13, Burns, TN.
 15. Stengel, A., J.R. Herr, R.A. **Drijber.** Ecosystems Beneath our Feet: Soil Bacteria in a Maize Cropland. UNL Complex Biosystems Seminar, February 22, 2018, Lincoln, NE.
 16. Stengel, A., J.R. Herr, R.A. **Drijber.** Soil Bacteria in a Maize Cropland. NC1195 Annual Meeting, March 6, 2018, Kansas City, KS.
 17. Teeter, A.O., T.W. Andraski, and C.A.M. **Laboski.** 2018. Can Nitrapyrin and Cover Crop Improve Fall Dairy Slurry N Availability to Corn? Proc. North Central Extension-Industry Soil Fertility Conf. 34:129-137.
 18. Teeter, A.O., T.W. Andraski, and C.A.M. **Laboski.** 2019. Can Nitrapyrin and Cover Crop Improve Fall Dairy Slurry N Availability to Corn? In Annual meetings abstracts online. SSSA, Madison, WI.

Grants awarded or ongoing in 2018

1. **Fernández**, F.G. (PI), D.E. Kaiser, J.A. Vetsch, J.S. Strock, P.H. Pagliari, L. Pease, C. Rosen, Y. Miao, A. Sims, M. Wilson, and K.P. Fabrizzi. Minnesota Agricultural Fertilizer Research and Education Council. Long-term impact of nitrogen fertilization on corn production, soils, and nitrogen cycling processes in Minnesota. 2019-2020. \$95,000
2. **Fernández**, F.G. (PI), P.H. Pagliari. Minnesota Agricultural Fertilizer Research and Education Council. Nitrate in tile-drain water relative to time and source of nitrogen application. 2019-2020. \$77,147
3. **Fernández**, F.G. (PI), D.E. Kaiser, and J.A. Vetsch. Minnesota Agricultural Fertilizer Research and Education Council. Urea and urea additives as fertilizer sources for corn production in Minnesota. 2019-2020. \$165,690
4. **Fernández**, F.G. (PI), D.E. Kaiser, and J.A. Vetsch. Minnesota Agricultural Fertilizer Research and Education Council. Urea and urea additives as fertilizer sources for corn production in Minnesota. 2018-2019. \$165,690
5. **Fernández**, F.G. (PI), D.E. Kaiser, and J.A. Vetsch. Minnesota Agricultural Fertilizer Research and Education Council. Urea and urea additives as fertilizer sources for corn production in Minnesota. 2017-2018. \$165,690
6. **Fernández**, F.G. (PI). Minnesota Agricultural Fertilizer Research and Education Council. Coordinated educational program for nutrient management in Minnesota. 2019-2020. \$13,000
7. **Fernández**, F.G. (PI). Minnesota Agricultural Fertilizer Research and Education Council. Coordinated educational program for nutrient management in Minnesota. 2018-2019. \$26,105
8. **Fernández**, F.G. (PI). Minnesota Department of Agriculture. Nitrogen and water quality with and without cover crops and living mulches in irrigated corn in Pope County, Minnesota. 2017-2018. \$150,860
9. **Fernández**, F.G. (PI), P.H. Pagliari, and J.S. Strock. Minnesota Agricultural Fertilizer Research and Education Council. Nitrate in tile-drain water relative to time and source of nitrogen application. 2018-2019. \$79,718
10. **Fernández**, F.G. (PI), P.H. Pagliari, and J.S. Strock. Minnesota Agricultural Fertilizer Research and Education Council. Nitrate in tile-drain water relative to time and source of nitrogen application. 2017-2018. \$94,292
11. Garcia y Garcia, A. (PI), G. Johnson, J.A. Coulter, J.A. Nieber, W. Sadok, D.J. Mulla, F.G. **Fernández**, J.A. Vetsch, and M.S. Wells. Minnesota Department of Agriculture. The cover crops, water, and nitrogen nexus: How do they impact corn and soybean production and the environment? 2016-2020. \$450,223 [\$10,000 to **Fernández**]
12. Haramoto, E. (PI), H.J. **Poffenbarger**. Kentucky Corn Growers' Association Research Grant. Equipment modifications for planting into for high-residue cover crops. 2019-2020. \$5,660.
13. Helmers, M. (PI), S. Brouder, L. Christianson, K. Nelson, D. Jaynes, L. Gentry, C. Drury, F.G. **Fernández**, A. Eagle, C. Snyder. 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**]
14. **Jagadamma**, S (PI), M. Buschermohle, L. Duncan, and F. Walker. Tennessee Soybean Promotion Council. Establishing cover crops for sustainable soybean production. 01-2018 to

12-2018. \$16,500

15. Kaiser, D.E. (PI), F.G. **Fernández**, J.A. Vetsch, B. Carlson, and R. Miller. Minnesota Agricultural Fertilizer Research and Education Council. Evaluation and calibration of in-season tools for detecting nitrogen stress in corn. 2017-2018. \$40,000 [\$2,000 to **Fernández**]
16. **Laboski**, C.A.M. (PI) Wisconsin Fertilizer Research Program. Improving corn N use efficiency through split applications on silt loams. 7/1/14-6/30/18. \$140,111
17. McGrath, J. (PI) with H. **Poffenbarger**, M. Salmeron, E. Ritchey, M. Sama, and J. Shockley. Kentucky Corn Growers' Association Research Grant. Nitrogen rate decision support for Kentucky corn grain production. 2019-2020. \$215,451.
18. Naeve, S. (PI) and F.G. **Fernández**. 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**]
19. Naeve, S. (PI) and F.G. **Fernández**. Minnesota Soybean Research and Promotion Council Nitrogen management is not all about the corn crop: Understanding direct and indirect effects of nitrogen on soybean. 2017-2018. \$131,513 [\$69,881 to **Fernández**]
20. Olander, K. (PI) and F.G. **Fernández**. Minnesota Department of Agriculture. Nitrogen Fertilizer rate demonstration on coarse-textured sandy soils. 2017-2018. \$126,393. [\$120,000 to **Fernández**]
21. Pagliari, P.H. (PI), F.G. **Fernández**, and D.E. Kaiser. Minnesota Agricultural Fertilizer Research and Education Council. Assessment of atmospheric deposition of nutrients in Minnesota. 2019-2020. \$28,000.
22. Sharma, V. (PI), D. Mulla, and F.G. **Fernández**. 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**]
23. Vetsch, J.A. (PI), F.G. **Fernández**, S. Wells, D.E. Kaiser, B. Carlson, and J.S. Strock. Minnesota Corn Research and Promotion Council. Vegetative cover crops as a nitrate reduction strategy for tile drainage. 2016-2018. \$85,700 [\$5,000 to **Fernández**]