NCCC211 2017-2018

Meeting date: 13 March 2018, Fargo ND

Reporting dates: March 2017 to March 2018

Meeting Participants: Andy Lenssen (Iowa State Univ.), DeAnn Presley (Kansas State Univ.), Eileen Kladivko (Purdue Univ.), Shalamar Armstrong (Purdue Univ.), Matt Ruark (Univ. Wisconsin-Madison), Erin Haramoto (Univ. Kentucky), Dean Baas (Michigan State Univ.), Marisol Berti (North Dakota State Univ.), Jose Guzman (South Dakota State Univ.), Donald Wyse (University of Minnesota).

Agenda	
7:00-8:00am	**NCCC211 business meeting**
8:20-9:50am	**State Reports: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota**
10:10-11:55am	**State Reports: Nebraska, North Dakota, Ohio, Ontario, South Dakota, Wisconsin, Missouri**
12:45-1:45pm	**MCCC Partner Reports: SARE, national Wildlife Federation, Practical Farmers of Iowa, North East Cover Crops Council, Southern Cover Crops Council, CTIC**
2:00-3:00pm	**Keynote: "Roots Run Deep In Cover Crop Science" Ray Weil**
3:15-6:00pm	**Breakout Sessions**
6:00-10:00pm	**Poster Presentations and Social Event**

Accomplishments

Midwest Cover Crop Field Guide 2nd Edition (App available)

The second edition of the Cover Crop Pocket Guide continues to be a very popular source of information for farmers, trainers, conservation agencies and students. From February of 2017 to the end of February of 2018 over 8,000 copies were printed. In addition, the Cover Crop Pocket Guide was complete and being downloaded at a sizeable rate.

NCCC-211 Committee member's accomplishments

Accomplishments by state

Indiana

Cover crop interest and adoption continues to grow in Indiana (935,843 adopted acres). Therefore, the demand for training and services related to cover crops by the Conservation Partnership continues to increase. The Indiana Conservation Partnership includes NRCS, Soil and Water Conservation Districts (SWCD), Conservation Cropping Systems Initiative (CCSI), Indiana State Department of Agriculture (ISDA), State Soil Board, and Purdue Extension. To further strengthen cover crop training and services, numerous research projects are being conducted related to the functions of cover crops in the area of soil health, resilience of cropping systems to climate stress, cover crop influence on soil microbiome diversity, syncing N release of cover crops with the N demand of cash crops, surface water quality, forage quality, weed science, pest suppression, short and long-term cover crop economics. Additionally, five cover crop related papers were published in scientific journals and 15 conference paper/posters were presented. Ongoing research in cover crops

facilitated the graduate education of 12 graduate students and supported one post-doc (4 Ph.D., 8 M.S.). Cover crop research from Indiana was also presented at the 2017 National Conference on Cover Crops and Soil Health.

Kansas

Currently, in Kansas there are 14 university researchers with active research projects ranging in topics from erosion control, water quality, N cycling, weed suppression, evaluation in cropping systems, effects on soil moisture, soil health, companion planting with winter wheat, control of charcoal rot in soybean, and forage production and quality. Numerous extension presentations featuring cover crop research were made to approximately 1,500 producers and agricultural professionals. A recent SARE-funded train-the-trainer project focuses on soil health for vegetable applications and the target audience was extension agents and conservation district staff. Webinars were recorded and serve as study materials for the participants prior to coming to a one-day workshop. See www.soilhealthbootcamp.com for more information.

Kentucky

Cover crop acreage in 2017 is estimated at approximately 120,000 acres. The USDA-NRCS EQIP program cost-shared approximately 12,000 acres. Extension and research personnel at the University of Kentucky held approximately 220 meetings and field days, reaching almost 10,000 individuals. Of these meetings, approximately 25% focused on the use of cover crops for grazing or forages. In 2017, UK and Kentucky State University supported nine graduate students conducting research on cover crops, with support from 15 different grants funded by national, regional, and state institutions, as well as commodity boards.

Iowa

Estimates for the total acreage of cover crops planted in Iowa in fall of 2017 were 760,000 acres. The Iowa Department of Agriculture and Land Stewardship cost-shared 177,000 acres, USDA-NRCS EQIP contracted 27,864 acres, USDA-NRCS CSP supported additional acres contracted that included cover crop enhancements, and the ADM/Unilever Sustainable Soy Continuous Improvement program supported 39,000 cover crop acres in 2017. Outreach efforts on cover crops in Iowa reached over 10,000 individuals through nearly 200 activities, including on-farm meetings, Iowa State University Extension articles, Iowa Learning Farms and Practical Farmers of Iowa outreach activities. Other cover crop outputs included publication of 13 refereed scientific articles and two Ph.D. dissertations. For 2017, there were nine graduate students, three post-doctoral research associates, and one research associate conducting research on cover crops with support from 10 funded grant proposals.

Michigan

Michigan State University (MSU) continues its commitment to cover crop research, publications, and outreach in 2017. Activities included 19 on-going research projects, four scientific/society presentations, five peer-reviewed publications, 17 Extension/outreach publications and 35 Extension workshop/field day presentations. Research projects include evaluation of cover crops for: 1) pest/disease management for weeds, diseases and/or nematodes across field crops, vegetables and/or forages; 2) interseeding of cover crop into corn; 3) cover crop herbicide tolerance; 4) management across commodities including field crops, vegetables, fruit and tree nuts and ornamentals; and 5) soil health. The MSU Michigan cover crop website (www.covercrops.msu.edu) had 5,883 page views from March 2017 – March 2018. Over forty events that included cover crops were held in Michigan in 2017 reaching over 2000 participants. In 2017 there were 13 cover crop Extension articles published on the MSU Extension News page (http://msue.anr.msu.edu/topic/info/cover_crops) written by seven educators. Five refereed journal articles were published in 2017. MSU also educated

hundreds of undergraduate and graduate students through 13 different courses in the Departments of Plant, Soil, and Microbial Science, Entomology, and Horticulture that include cover crops in their curriculum. There were four M.S. and two Ph.D. students with cover crop related research projects.

North Dakota

Cover crop awareness and adoption in North Dakota are growing very fast. The cropping systems CAP project funded by NIFA-USDA and the PDP funded by SARE which finalized in December 2017 have provided valuable resources to advance research in cover crops and bring the information directly to farmers. Additionally, the ND soybean council and MN soybean growers have provided funding to evaluate the effect of cover crops in soybean cyst nematode.
Research in North Dakota includes interseeding into standing soybean, corn and wheat, weed control with rye in dry bean, nutrient cycling, soil health, and long-term integrated crop and livestock systems on forage finishing, soil fertility, nitrogen mineralization, carbon sequestration, and profitability. We were able to reach over 500 farmers in 13 field days and tours, 10 Café Talks and 18 workshops. We have 20 farmers collaborating directly with research projects and conducting on-farm research.

South Dakota

Researchers in South Dakota are working on cover crop's effect on nutrient cycling, and residual herbicide effects on cover crops. In addition, researchers are also focusing on cover crop establishment, spatial variation of cover crop establishment in differing landscape positions, and evaluating coated cover crop seeds for optimizing establishment. Others are focusing on tillage and cover crop effects on soil water budgets. South Dakota has initiated the process of becoming the next state included in the Midwest Cover Crop Council Crop Decision Tool. A group of fifteen cover crop experts in South Dakota (SDSU agronomists, Extension specialists, NRCS, seedsmen, and experienced farmers) are working on ranking cover crops to assist farmers in selecting cover crops. Rankings are based on nine distinct agriculture regions varying by planting date, precipitation, salinity, and drainage class to list some of the variables. Results of this research is communicated in field days, and field demonstration days, and via information being distributed in cover crop booths at larger producer events (e.g. State Fair, DakotaFest)

Wisconsin

UW-Madison has many research projects on cover crops and a strong extension program (fyi.uwex.edu/covercrops). We reached an estimated 2,000 farmers, crop consultants, and governmental agency employees at our extension events in 2017. The biggest events were the Wisconsin Agribusiness Classic (~500 attendees) and the Soil, Water, and Nutrient Management Meetings (~450 attendees). Additional events include the Midwest Forage Association, Practical Farmers of Iowa Conference, OGrains Conference, and Pioneer Conference. Cover crop research focuses on use of grass covers planted following corn silage and legumes planted following winter wheat. Interseeding cover crops research started in 2017. Dr. Ruark was an invited speaker at the 2017 National Conference on Cover Crops and Soil Health. One publication involving cover crops was published: Cates, A.M. and M.D. Ruark. 2017. Soil aggregate and particulate C and N under corn rotations: responses to management and correlations with yield. Plant and Soil. 415:521-53. Three graduate students with Dr. Ruark's program had projects related to cover crops. Kavya Khrishnan (MS Soil Science & Agroecology; Rye cover crop effects on labile pools of nitrogen and carbon), Kalyn Diedrich (MS Soil Science & Agroecology; Midwestern crop management and labile carbon and nitrogen pools), Greg Richardson (MS Soil Science & Agroecology; Soil and nutrient conservation effects on soil health).

Impacts:

1. Outreach efforts reached more than 25,000 contacts through combinations of in-person meetings and workshops, websites, written media, webinars, etc.
2. Increased numbers of enrolled and/or graduated students from graduate programs focusing on cover crop research and management.
3. Soil erosion by wind is a serious problem especially during winters with little snowfall or dry springs. Cover crops are reducing erosion and increasing the sustainability of cropping systems.
4. Cover crops have been included as a nutrient loss reduction practice for both N and P in the Nutrient Reduction Strategies for Iowa, Minnesota, Ohio, and Illinois which should result in improved water quality.
5. Cover crops will impact Midwest's economy by improving soil health, nutrient cycling, productivity of grain and energy crops, reducing expensive nitrogen inputs, and increasing supply of supplemental summer and fall forage.
6. Adoption of cover crops in the Upper Mississippi Basin and Great Lakes Region continues to increase through 2017.

Publications

Peer-reviewed

1. Rorick, J.D., and E.J. Kladivko. (2017). Cereal rye cover crop effects on soil carbon and physical properties in southeastern Indiana. J. Soil Water Cons. 72:260-265.

2. Abendroth, Lori J., Daryl E. Herzmann, Giorgi Chighladze, Eileen J. Kladivko, Matthew J. Helmers, Laura Bowling, Michael Castellano, Richard M. Cruse, Warren A. Dick, Norman R. Fausey, Jane Frankenberger, Aaron J. Gassmann, Alexandra Kravchenko, Rattan Lal, Joseph G. Lauer, Daren S. Mueller, Emerson D. Nafziger, Nsalambi Nkongolo, Matthew O'Neal, John E. Sawyer, Peter Scharf, Jeffrey S. Strock, and Maria B. Villamil. 2017. Sustainable Corn CAP Research Data (USDA-NIFA Award No. 2011-68002-30190). National Agricultural Library - ARS - USDA. https://dx.doi.org/10.15482/USDA.ADC/1411953.

3. Roth. R., M.D. Ruffatti, P.D. O'Rourke, S.D. Armstrong. 2017. A cost analysis approach to valuating cover crop environmental and nitrogen cycling benefits: A central Illinois on-farm case study. Agricultural Systems, DOI:10.1016/J.agsy.2017.10.007.

4. Armstrong, S.D., R. Roth, and C. Lacey. 2017. Do Conventional Comparative Cost Efficiency Analyses Adequately Value Nitrogen Loss reduction best management practices? Agriculture Research & Technology, DOI: 10.19080/ARTOAJ.2017.12.555861.

5. Loux, et al. 2017. Influence of Cover Crops on Management of Amaranthus Species in Glyphosate and Glufusinate-Resistant Soybean. Weed Technology 31(4):487-495. 2017 https://doi.org/10.1017/wet.2017.30.

6. Shelton, R.E., K.L. Jacobsen, and R.L. McCulley. 2018. Cover crops and fertilization alter nitrogen loss in organic and conventional conservation agriculture systems. Frontiers in Plant Science 8: article 2260. doi: 10.3389/fpls.2017.02260.

7. Matocha, C., T. Karathanasis, L. Murdock, J. Grove, J. Goodman, D. Call. 2018. Influence of Ryegrass on Physico-Chemical Properties of a Fragipan. Geoderma 317: 32-38.

8. Kokalis-Burelle, N., R. McSorley, K.H. Wang, S.K. Saha, R.J. McGovern. 2017. Rhizosphere microorganisms affected by soil solarization and cover cropping in Capsicum annuum and Phaseolus lunatus agroecosystems. Applied Soil Ecology 119: 64-71.

9. Acharya, J., M.G. Bakker, T.B. Moorman, T.C. Kaspar, A.W. Lenssen, and A.E. Robertson. 2017. Time interval between cover crop termination and planting influences corn seedling disease, plant growth, and yield. Plant Disease: 101:591-600. http://dx.doi.org/10.1094/PDIS-07-16-0975-RE.

10. Appelgate, S., A.W. Lenssen, M. Wiedenhoeft, and T. Kaspar. 2017. Cover crop options and mixes for upper Midwest corn-soybean systems. Agronomy Journal 109:968-984. doi:10.2134/agronj2016.08.0453.

11. Bakker, M.G., D.K. Manter, T.B. Moorman, and T.C. Kaspar. 2017. Isolation of cultivation-resistant oomycetes, first detected as amplicon sequences, from roots of herbicide-terminated winter rye. Phytobiomes Journal: 1:24-35.

12. Bartel, C.A., C.A. Banik, A.W. Lenssen, K.J. Moore, D.A. Laird, S.V. Archontoulis, and K.R. Lamkey. 2017. Establishment of perennial groundcovers for maize-based bioenergy production systems. Agronomy Journal 109:822-835. doi: 10.2134/agronj2016.11.0656.

13. Bulyaba, R., A.W. Lenssen. 2017. Influence of Bradyrhizobium and fungicide seed treatment on development and yield of cowpea, lablab, and soybean. Crop, Forage, and Turfgrass Management. 3. doi: 10.2134/cftm2017.01.0007

14. Gillette, K., T. Kaspar, L. Ma, T. Parkin, D. Jaynes, Q. Fang, J. Hatfield, G. Feyereisen, K. Kersebaum. 2017. N loss to drain flow and N2O emissions from a corn-soybean rotation with winter rye. Science of the Total Environment: https://doi.org/10.1016/j.scitotenv.2017.09.054

15. Malone, R.W., Kersebaum, K.C., Kaspar, T.C., Ma, L., Jaynes, D.B., Gillette, K.L. 2017. Winter rye as a cover crop reduces nitrate loss to subsurface drainage as simulated by HERMES. Agricultural Water Management. 184:156-169. doi: 10.1016/j.agwat.2017.01.016

16. Marcillo, G.S., and F.E. Miguez. 2017. Corn yield response to winter cover crops: An updated meta-analysis. Journal of Soil and Water Conservation 72:226-239. doi: 10.2489/jswc.72.3.226

17. Phillips, H.N., B.J. Heins, K. Delate, and R. Turnbull. 2017. Impact of grazing dairy steers on winter rye (Secale cereale) versus winter wheat (Triticum aestivum) and effects on meat quality, fatty acid and amino acid profiles, and consumer acceptability of organic beef. PLoS ONE 12(11):e0187686. https://doi.org/10.1371/journal.pone.0187686

18. Rosesh-McNally, G., A. Basche, J. Arbuckle, J. Tyndall, F. Miguez, T. Bowman, and R. Clay. 2017. The trouble with cover crops: Farmers' experiences with overcoming barriers to adoption. Renewable Agriculture and Food Systems 1-12. doi:10.1017/S1742170517000096

19. Schenk, L., M. Bakker, T. Moorman, and T. Kaspar. 2017. Effects of cover crop presence, cover crop species selection, and fungicide seed treatment on corn seedling growth. Renewable Agriculture and Food Systems: doi:10.1017/S1742170517000345

20. Silva, E. and K. Delate. 2017. A decade of progress in organic cover crop-based reduced tillage practices in the Upper Midwestern USA. Agriculture 7:44: doi:10.3390/agriculture7050044.

21. Berti, M.T., D. Samarappuli, B.L. Johnson, and R.W. Gesch. 2017. Integrating winter camelina into maize and soybean cropping systems. Ind. Crops. Prod. 107:595-601 https://doi.org/10.1016/j.indcrop.2017.06.014.

22. Berti, M.T., B.L. Johnson, D. Ripplinger, R.W. Gesch, and A. Aponte. 2017. Environmental impact assessment of double- and relay-cropping with winter camelina in the northern Great Plains, USA. Agricultural Sys. 156C:1-12.

23. Matthees, H.L., M.D. Thom, R.W. Gesch, and F. Forcella. 2018. Salinity tolerance of germinating alternative oilseeds. Ind. Crops Prod. 113:358-367. doi:10.1016/j.indcrop.2018.01.042.

24. Gesch, R.W., H.L. Matthees, A.L. Alvarez, and R.D. Gardner. Winter camelina: crop growth, seed yield and quality response to genotype and sowing rate. Crop Sci. (submitted January 2018).

25. Cates, A.M. and M.D. Ruark. 2017. Soil aggregate and particulate C and N under corn rotations: responses to management and correlations with yield. Plant and Soil. 415:521-533

Book chapters

1. Gramig G.G. 2017. Weed management in organic crop cultivation. In: Zimdahl, R. L. (ed.), Integrated weed management for sustainable agriculture, Burleigh Dodds Science Publishing, Cambridge, UK.

2. Weyers S.L., Gramig G.G. 2017. Low input and intensified crop production systems effects on soil health and environment. In: Al-Kaisi M and Lowery B, Eds., Soil Health and Intensification of Agroecosystems. Elsevier, Amsterdam, Netherlands.

Proceedings

1. Mercier, K.M., C.D. Teutsch, S.R. Smith, E.L. Ritchey, K.H. Burdine, and E.S. Vanzant. 2018. Grazing stockers on diverse mixtures of summer annual forages. Proceedings of the American Forage and Grassland Annual Conference. Louisville, KY.

2. Acharya, J., Kaspar, T., Lenssen, A. W. and Robertson, A.E. 2017. Effect of fungicide seed treatments for managing corn seedling diseases following a winter rye cover crop. Phytopathology 108:S (in press)

3. Acharya, J., Kaspar, T., Lenssen, A. W. and Robertson, A.E. 2017. The risk of seedling disease of corn caused by Pythium increases with proximity of the corn seedling to terminated winter rye cover crop plants. Phytopathology 108:S (in press)

4. Acharya, J., Kaspar, T.C., Robertson, A.E. 2017. Fungicide seed treatments for evaluating the corn seedling disease complex following a winter rye cover crop. In: Proceedings of American Phytopathological Society North Central Division Meeting, June 14-16, 2017, Champaign, Illinois.

5. Moorman, T.B., Tomer, M.D., Jaynes, D.B., Kaspar, T.C., Parkin, T.B., Malone, R.W., Isenhart, T.M. 2017. Long-term research and monitoring of conservation practice effects in Iowa watersheds. In: proceedings of UCOWR/NIWR Annual Conference, June 13-15, 2017, Fort Collins, Colorado. Available: http://ucowr.org/files/2017_Conference/proceedings/2017.pdf.

6. Robertson, A.E., Kaspar, T. Acharya, J., Mueller, D., Leandro, L. 2017. Disease risks associated with cover crops in corn and soybean production. Proceedings of the 29th Integrated Crop Management, Ames, IA. https://store.extension.iastate.edu/Product/15312

7. Sawyer, J.E., S. Patel, J. Pantoja, D.W. Barker, and J.P. Lundvall. 2017. Nitrogen dynamics with a rye cover crop. p. 161-167. In Proc. 29th Annual Integrated Crop Manag. Conf., Ames, IA. 29-30 Nov. 2017. Iowa State Univ., Ames. https://store.extension.iastate.edu/Product/15312

Conferences and abstracts

1. Woodyard, J.D., S.M. Zuber, E.J. Kladivko. 2017. Cover Crop and No-Tillage Impacts on Soil Health Indicators Over a Growing Season. ASA/SSSA
2. Zuber, S.M. and E.J. Kladivko. 2017. Assessing effectiveness of commercial soil health tests for conservation cropping systems in Indiana. ASA/SSSA
3. Benally, N.A., S.M. Zuber, and E.J. Kladivko. 2017. Soil active carbon and aggregation measurements to help farmers assess progress in soil health. ASA/SSSA
4. Armstrong, S.D., C. O'Reilly, B. Bruening, C. Lacey, R. Roth, M. D. Ruffatti and W. T. Deppe. 2017. Cover Crop Adoption and Performance on a Watershed Scale: Potential Impacts on Water Quality. ASA/SSSA
5. Nevins, C.J., C. Lacey, L. A. Hoagland, R. F. Turco, C. Nakatsu and S. D. Armstrong. 2017. Soil Microbial Community Dynamics over the Growing Season of a Corn Agroecosystem after Winter Cover Cropping. ASA/SSSA
6. Liu, S., S. D. Armstrong and T. G. Gardner. 2017. Winter Cover Crops Influence Bacterial Community Structure. ASA/SSSA
7. Miller H., and S. D. Armstrong. 2017. Predicting the Contribution of Soil EMN to Total Corn N Uptake. ASA/SSSA
8. Lacey, C., C. J. Nevins, H. Miller and S. D. Armstrong. 2017. The Impact of Cover Crops, Tillage, and Crop Rotation on Yield in Midwest Grain Systems. ASA/SSSA
9. Nevins, C.J., C. Lacey, L. A. Hoagland, R. F. Turco, C. Nakatsu and S. D. Armstrong. 2017. Impact of Cover Crop Species on Enzyme Activity and Nitrogen Supply at Corn Growth Stages. ASA/SSSA
10. Lacey, C., C. J. Nevins, H. Miller and S. D. Armstrong. 2017. Cover Crop Decomposition and Residue Nitrogen Release Dynamics. ASA/SSSA
11. Roth, R. T., S. D. Armstrong and M. D. Ruffatti. 2017. A Cost Analysis Approach to Valuing Cover Crop Environmental and Nitrogen Cycling Benefits: A Central Illinois on Farm Case Study. ASA/SSSA
12. Ruffatti, M. D., S. D. Armstrong, R. Roth and C. Lacey. 2017. Effect of Cover Crops and Nitrogen Application Timing on Nutrient Loading through Subsurface Drainage and Cash Crop Yield. ASA/SSSA
13. DeSimini, S. and W. G. Johnson. 2017. Evaluation of Herbicide Treatments for Termination of Cereal Rye and Canola as Winter Cover Crops. North Central Weed Science Society
14. DeSimini, S. and W. G. Johnson. 2017. Effects of Failed Cover Crop Termination and Winter Annual Weed Suppression in the Eastern Cornbelt. North Central Weed Science Society
15. Johnson, W.G. 2017. Influence of Fall Establishment and Spring Termination Timings of Annual Ryegrass on Corn Yields. North Central Weed Science Society
16. Haramoto, E.R. and B. Pearce. Cover Crop Utilization Influences Weed Management Potential, 58th Annual Meeting, Weed Science Society.
17. Haramoto, E.R. and B. Pearce. Cover Crop Utilization Affects Weed Dynamics in Tobacco. 72nd Annual Meeting, North Central Weed Science Society.
18. Stanton, T., E.R. Haramoto, and T. Phillips. Interseeding Cover Crops to Suppress Weeds in Kentucky Corn-Soybean Rotations. 72nd Annual Meeting, North Central Weed Science Society.
19. Sherman, A.D., E.R. Haramoto, and JD Green. Controlling Horseweed with Cover Crop and Herbicide Combinations. 72nd Annual Meeting, North Central Weed Science Society

20. Haramoto, E.R. Cover Crops: Benefits and Risks. 50th Annual Southern Illinois Fertilizer and Pesticide Conference.
21. Haramoto, E.R. and B. Goff. Cover Crops: Opportunities for Improved Management and Utilization. American Forage and Grassland Annual Conference.

22. Acharya, J., A. Robinson, T. Kaspar, A. Lenssen. 2017. The risk of seedling disease of corn caused by Pythium increases with proximity of the corn seedling to terminated winter rye cover crop plants. Annual American Phytopathological Society meetings
23. Bartel, C.A., C. Banik, A.W. Lenssen, K.J. Moore, D.A. Laird, S.V. Archontoulis. 2017. Living mulch establishment in row crop systems for sustainable biofuels production. Oral presentation at the Iowa State University Undergraduate Agronomy Club Meeting
24. Bartel, C.A., C. Banik, A.W. Lenssen, K.J. Moore, D.A. Laird, S.V. Archontoulis. 2017. Living mulch establishment in row crop systems for sustainable biofuels production. Oral presentation at the Eastern Iowa Hay Producers Association Annual Meeting
25. Bartel, C.A., C.A. Banik, A.W. Lenssen, K.J. Moore, D.A. Laird, S.V. Archontoulis, K.R. Lamkey. 2017. Establishment of perennial groundcover for maize-based bioenergy production systems. Northern Research Farm 2016 Annual Progress Report.
26. Bulyaba, R. and A.W. Lenssen. 2017. Influence of Bradyrhizobium Inoculation and Fungicide Seed Treatment on Development and Yield of Cowpea, Lablab, and Soybean. International Bean and Cowpea conference.
27. Delate, K., and C. Cambardella. 2017. Effect of Field History and Tillage on Crop Productivity and Soil Quality in Organic No-till Soybean Systems. American Society of Agronomy Annual Conference.
28. Delate, K., R. Johnson, and C. Cambardella. 2017. Improving Soil Conservation and Crop Performance through Reduced Tillage and Cover Crop-based Rotations in Organic Squash Production, ASHS Annual Conference.
29. Dose, Heather, Russ Gesch, Frank Forcella, Burton Johnson, Kyle Aasand, M.S. Wells, Andy Lenssen, Swetabh Patel, Marisol Berti. 2017. Determining optimum time to seed winter cover crops into standing corn and soybean in the northern Corn Belt. Agricultural Production Symposium, University of Minnesota.
30. Dose, Heather, Russ Gesch, Frank Forcella, Kyle Aasand, Nicholas Steffl, Burton Johnson, M. Scott Wells, Swetabh Patel, Andrew Lenssen, Marisol Berti. 2017. Intensifying production in the northern Corn Belt by incorporating cash cover crops.
31. Fawcett, Jim; Mitchell, Tyler; Rogers, Jim; and Rossiter, Lyle. 2017. On-Farm Cover Crop Trials. Farm Progress Reports: Vol. 2016: Iss. 1, Article 9. Available at: http://lib.dr.iastate.edu/farmprogressreports/vol2016/iss1/9
32. Krzton-Presson, John; Nair, Ajay; and Shaw, Angela. 2017. Effects of Tillage and Cover Crops on Muskmelon Production and Food Safety. Farm Progress Reports: Vol. 2016: Iss. 1, Article 27. Available at: http://lib.dr.iastate.edu/farmprogressreports/vol2016/iss1/27
33. Lundvall, John; Patel, Swetabh; and Sawyer, John. 2017. Enhancing Corn Yield in a Winter Cereal Rye Cover Crop System in Southwest Iowa. Farm Progress Reports: Vol. 2016: Iss. 1, Article 11.
Available at: http://lib.dr.iastate.edu/farmprogressreports/vol2016/iss1/11
34. Lundvall, John; Patel, Swetabh; and Sawyer, John. 2017. Enhancing Corn Yield in a Winter Cereal Rye Cover Crop System in Northeast Iowa. Farm Progress Reports: Vol. 2016: Iss. 1, Article 67.
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35. Lundvall, John; Patel, Swetabh; and Sawyer, John. 2017. Enhancing Corn Yield in a Winter Cereal Rye Cover Crop System in Northwest Iowa." Farm Progress Reports: Vol. 2016: Iss. 1, Article 115.
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36. Lundvall, John; Patel, Swetabh; and Sawyer, John. 2017. Enhancing Corn Yield in a Winter Cereal Rye Cover Crop System in Southeast Iowa. Farm Progress Reports: Vol. 2016: Iss. 1, Article 139.
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37. Marcillo, G., and F.E. Miguez. 2017. Towards sustainability in maize systems: Modeling biomass response to planting density and evaluating its impact on US maize production. XXII Latin American maize meeting, Quevedo-Ecuador, September 2017.
38. Neu, Kristine and Nair, Ajay. 2017. Effect of Planting Date and Cultivar on Cereal Rye Development and Termination for Organic No-Till Production Systems. Farm Progress Reports: Vol. 2016: Iss. 1, Article 26. Available at: http://lib.dr.iastate.edu/farmprogressreports/vol2016/iss1/26
39. Thicke, F. and K. Delate. 2017. Organic No-Till for Field Crops. Midwest Organic Conference (MOSES), February 24, 2017, LaCrosse, WI: https://mosesorganic.org/wp-content/uploads/2013/08/MOSES-2017-Program.pdf

40. Peterson, A., M.T. Berti, D. Samarappuli, B. Andersen, S. Cabello, and S. Podder. 2018. Maximizing cover crop performance by interseeding into standing soybean. Production Agriculture Symposium Univ. of Minnesota.
41. Andersen, B., M.T. Berti, D. Samarappuli, A. Peterson, S. Cabello, and S. Podder 2018 Integrating faba bean (Vicia faba L.) as cover crop, intercrop, and late-season forage. Production Agriculture Symposium Univ. of Minnesota.
42. Cabello, S., M.T. Berti, D. Samarappuli, B. Andersen, A. Peterson, and S. Podder. 2018. Cover crops decreased soil nitrogen (N-NO3) previous sugarbeet production in the northern Great Plains. Production Agriculture Symposium Univ. of Minnesota.
43. Berti, M.T., 2017. Cover crops: why and what to seed. Central Dakota Ag Day Conference. Carrington Research Extension Center.
44. Berti, M.T., 2017. Role of cover crops roots. North Dakota Chapter of Soil and Water Conservation Annual Conference.
45. Peterson, A., M.T. Berti, H.H. Kandel, and B.L. Johnson. 2017. Intersowing cover crops into standing soybean to reduce soil loss in late fall. ASA-CSSA.
46. Dose (Matthees), H.L., R.W. Gesch, F. Forcella, K. Aasand, B.L. Johnson, N. Steffl, M.S. Wells, S. Patel, A. Lenssen, and M.T. Berti. 2017. Intensifying production in the northern Corn Belt by incorporating cash cover crops. ASA-CSSA.
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50. Steffl, N.J., K.A. Aasand, B.L. Johnson, P.J. Petersen, and M.T. Berti. 2017. Relay cover crops in soybean (Glycine max (L.) Merr.) cropping systems in eastern North Dakota. In Association for the Advancement of Industrial Crops 29th annual meeting.
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56. Berti, M.T. 2017. Nutrient uptake by cover crops. How Far North Can We Grow? 49th Parallel Cover Crop Project. Innovation Working Group Meeting.
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2. A.F. Wick, 2018. Cover Crop Seeding Timing Makes a Difference. Extension Education Video, InHouse Productions, https://www.youtube.com/watch?v=_yVyI8arsxU

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4. A.F. Wick, 2018. NDSU Evaluating Cover Crops in Rotation. Extension Education Video, InHouse Productions, https://www.youtube.com/watch?v=yOQOvYc_W9I

5. A.F. Wick, 2018. Picking a Legume for Frost Tolerance. Extension Education Video, InHouse Productions, https://www.youtube.com/watch?v=qZmQfb57GgY

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13. A.F. Wick, 2017. Soil Health Minute: Variable Rate Seeding with Cover Crops, AgWeek TV Soil Health Minute, Fargo Communications Production, http://www.agweek.com/agweektv/4326293-soil-health-minute-variable-rate-seeding-cover-crops

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24. A.F. Wick, 2017. Cover Crops in Sunflower, Extension Education Video, InHouse Productions, https://www.youtube.com/watch?v=WYTxcuCOAh8

25. Getting Started with Cover Crops. KSU Olathe OHREC YouTube Channel. 3 minutes. https://youtu.be/hf5zqmVrP0o

26. Soil Health. 8 minutes. KSU Agronomy YouTube Channel. https://youtu.be/4dmRQfOi208

27. Soil Structure. 2 minutes. KSU Agronomy YouTube Channel. https://youtu.be/cr83avt1WVI

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Research grants

1. Presley, DeAnn, and Peter Tomlinson. Soil Health Monitoring Network - On-Site Data Collection. USDA-National Soil Survey Center. $200,000. 10/1/2017 to 9/30/2019.

2. Nelson, Nathan, Gerard Kluitenberg, Peter Tomlinson, and DeAnn Presley. Protecting Surface Water with Healthy Soils and Cover Crops. USDA-NRCS National Conservation Innovation Grant. $468,599. 9/30/2016 to 9/29/2019.

3. Kennelly, Megan, DeAnn Presley, Cary Rivard, and Ray Cloyd. Soil health bootcamp and applications to sustainable vegetable cropping: Professional development for local agriculture educators. NC-SARE. $64,307. 10/1/2015 to 5/31/2018.

4. Sassenrath, G., J. Moyer, L. Lomas, J. Farney, H. George, X. Lin, and **D.** Presley. Conservation management systems for sustainable intensification of integrated crop and animal production systems. NCR-SARE. $152,614. 10/1/2015-5/31/2018.

5. Gleason, M., M. Williams, R. Bessin, J. Harwood. 2015-2018. USDA-OTP. Reinventing sustainable protection systems for cucurbit production. $499,974.

6. Murdock, L. Numerous commodity board sources. Fragipan remediation using cover crops. $45,000

7. McNear, D., J. Grove, J. McGrath. 2016-2020. AFRI NIFA Microbial Communities Program. Rhizosphere priming effects on legacy organic phosphorus in a winter wheat / corn rotation. $499,400

8. Proctor, C., M. Drewnoski, R. Elmore, S. Everhart, A. McMechan, J. Parsons, D. Redfearn, R. Werle, L. Lindsey, E. Haramoto, M. Salmeron. 2017-2019. USDA AFRI Foundational Knowledge of Agricultural Production Systems Priority area. Optimizing cropping systems for resilience to stress: role of maturity group selection and cover crops on yield, weeds, insects, and microbes. $460,000

9. Jacobsen, K., T. Woods, E. Haramoto, T. Phillips, A. Wszelaki, S. O'Connell. 2016-2019. Southern region Sustainable Agriculture Research and Extension. Cover crops under cover: evaluating costs, benefits, and ecosystem services of cover crops in year-round high tunnel production systems. $241,615

10. Grove, J. 2017-2018. KY Small Grain Growers Association. Comparison of wheat grown for cover crop vs. wheat for grain prior to double-crop soybeans. $10,000

11. Phillips, T. 2017-2018. KY Small Grain Growers Association. Cereal rye breeding for cover crop improvement. $3000

12. Ritchey, E., J. McGrath, B. Lee, E. Haramoto, M. Coyne, J. Shockley. 2017-2018. USDA Natural Resource Conservation Service, Kentucky Office, State Conservation Innovation Grant program Providing a better understanding of cover crop – soil interactions. $75,000
13. Pearce, B. and E. Haramoto. 2017-2018. Altria Corp. Cover crop management for no-till production of burley tobacco. $9,500

14. Goff, B., B. Pearce, and E. Haramoto. 2017-2018. Council for Burley Tobacco and Burley Tobacco Co-op. Optimizing the integration of annual forages into tobacco systems. $19,862

15. Haramoto, E. 2017-18. Kentucky Soybean Promotion Board. Optimizing winter cover crops for weed management in soybeans. $38,093

16. Pighetti, G., others at University of Tennessee, S.R. Smith, J. Bewley, K. Burdine. 2015-2019. USDA NIFA. Developing science-based recommendations to efficiently manage forages, herd health, and productivity on organic dairies in the southeastern US. $1,800,000.

17. Coyne, M. and J. Grove. 2015-2017. USDA Natural Resource Conservation Service, Kentucky Office, State Conservation Innovation Grant program. Study the effect of cover crops on soil health and N fertilizer response. $75,000

18. Rittschof, C., E. Haramoto, and S. Rehan. 2018-2021. Foundation for Food and Agricultural Research. Can commodity crop weed management practices enhance bee abundance, diversity, and health on agricultural land? $120,900

19. Haramoto, E., K. Gage, R. Smeda, and A. Dille. 2017-2019. USDA NIFA Crop Protection and Pest Management program area. Integrated management techniques to combat potential shifts in horseweed emergence. $325,000

20. Haramoto, E., and JD Green. 2017-2018. Kentucky Soybean Promotion Board. Integrating cover crops and herbicides for marestail management prior to soybean. $10,000

21. Berti, M., B. Johnson, D. Ripplinger, H. Kandel, A. Wick, A. Akyuz, J. Ransom, D. Franzen, R. Gesch, F. Forcella, A. Lenssen, S. Wells. 2015-2019, USDA AFRI Food Security CAP, Agricultural Production Systems – Cropping Systems. A5160. A novel management approach to

increase productivity, resilience, and long-term sustainability in cropping systems in the northern Great Plains. $3,739,199.

22. Carlson, S., S. Gailans, and A.E. Robertson. 2017-2019. Iowa State Conservation and Water Quality. Confronting the cover crop conundrum for corn: Do farmers' BMPs mitigate seedling disease and stalk rot?

23. Delate, K. 2013-2017. CERES Foundation. Improving Organic No-Till Systems for Enhanced Soil Quality and Weed Management in Organic Vegetable and Grain/Forage Systems.

24. Delate, K., and C. Cambardella. 2009-2017. USDA CSREES Organic Research and Extension Initiative and Water Quality programs. Enhancing Farmland Water Quality and Availability through Soil-Building Crop Rotations and Organic Practices.

25. Delate, K., and C. Cambardella. 2017-2018. Iowa Nutrient Reduction Center. Impacts of cropping system diversity and input reduction on greenhouse gas mitigation, soil and water quality, and economic performance of Iowa grain systems.

26. Delate, K., Rodale Institute, and Univ. of Minnesota. 2014-2018. USDA NIFA Organic Research and Extension Initiative. Integrating Crops and Livestock in a Systems Approach to Enhance Organic Farm Stability, Safety and Resilience.

27. Iowa Learning Farms. 2008-2019. State Soil Conservation Committee, Iowa Department of Agriculture and Land Stewardship, Leopold Center for Sustainable Agriculture. Long-term demonstration of cover crops on Iowa farmland: Management, soil health and water quality benefits.

28. Iowa Learning Farms. 2015-2018. USDA-NRCS State Conservation Innovation Grant, Leopold Center for Sustainable Agriculture. Earthworms and cover crops: Unlocking the secrets of soil health through early biological indicators.

29. Iowa Learning Farms. 2013-2018. USDA-NRCS Federal Conservation Innovation Grant. Demonstrating cover crop mixtures on Iowa farmland: Management, soil health and water quality benefits.

30. Mallarino, A., M. Helmers, R. Cruse, J. Sawyer, and D. Jaynes. 2017. Iowa Nutrient Reduction Center. Impacts of cover crops on phosphorus and nitrogen loss with surface runoff.

31. Moore, K.D., S.-Z. Fei, D.A. Laird, A.W. Lenssen. 2017-2019. NIFA AFRI. Foundational Program – Cover Crops. Improving corn competitiveness against perennial cover crop grasses. $499,629.

32. Nair, A., D. Brainard, A. Shaw, C. Chase, C. Bregendahl. 2014-2017. NCR-SARE Research & Education. Cover crops and strip tillage to promote soil quality, environmental sustainability, food safety, and profitability in cucurbit cropping systems.

33. Robinson, A., T. Kaspar, A. Lenssen, L. Leandro. 2015-2018, Iowa Nutrient Reduction Center. Cover crops influence yield and diseases of corn and soybean. $150,000.

34. Thompson, M., M. Liebman, and M. Helmers. 2017. Iowa Nutrient Reduction Center. Limiting nitrogen immobilization in cover crop systems.

35. Berti, M., and Chaterjee, A. Sugarbeet council, 5/2018-4/2019. $ 4,392. Adopting cover crops in sugarbeet production system.

36. Berti, M., Peltier, and Glogoza. MN Soybean council, 5/2018-4/2019. $ 20,260. Managing SCN with cover crops in Minnesota.

37. Berti, M., and Yan. ND Soybean council, 7/2018-6/2019. $ 7,335. Preceding and interseeding trap crops into standing soybean to reduce SCN population.

38. Berti, M., and Yan. ND SBARE-soybeans, 7/2018-6/2019. $ 14,005. Preceding and interseeding trap crops into standing soybean to reduce SCN population.

39. Gramig G.G. North Dakota Specialty Crop Block Grant Program . $ 96,595. Combining cover crops, strip tillage, and novel mulches to manage weeds in vegetable cropping systems.

40. Endres, G. Northwest bean growers association. $ 1,500. Use of winter rye with pinto bean.

Graduate students and Postdoctoral Researchers in Cover Crops Research

- Total of 38 MS students: KY-5, IA-4, MI-4, WI-3, IN-4, ND-11, WI-3

- Total of 18 PhD students: KY-1, IA-4, MI-2, IN-8, ND-3

- Total of 2 Postdoctoral researchers: IN-1, ND-1