

Midwest Cover Crop Council Annual Meeting

Minnesota State Report for February 11-12, 2020 Meeting in Kansas City, MO

Contact Information

MCCC State Contact NCCC-211 Official State Representative Name: Donald Wye and Anna Cates
University of Minnesota E-mail: catesa@umn.edu, Wysex001@umn.edu Telephone: 651 470 9878

Summary paragraph:

Interest in cover crops continues to grow in Minnesota. Research is focusing on incorporating cover crops into corn-soy rotations in short growing seasons, via interseeding, as well as development of winter annual crop systems to increase profitability. Adoption according to the 2017 Ag Census remains low, but state-level cost share from the MN Department of Ag and Soil and Water Conservation Districts around the state report ongoing subscription, so we anticipate increasing growth. Research in incorporating manure into cover crop systems is also ongoing. Minnesota is characterized by strong participation from non-governmental, farmer-lead organizations in cover crop outreach and education. The University of Minnesota Water Resources Center in collaboration with the MN Board of Water and Soil Resources also recently established a MN Office for Soil Health, which has increased collaboration on cover crop and soil health efforts both internal to UMN and external. We updated our Midwest Cover Crop Council Cover Crop Decision Tool and released two Cover Crop Recipes in collaboration with MCCC in 2019.

Minnesota Highlights:

A. Extension publications

- a. Moore, S., Wells, M.S., Wilson, M., Gesch, R. and Becker, R. Pennycress picks up after sweetcorn. Dec. 2019. Minnesota Crop News Blog. <https://blog-crop-news.extension.umn.edu/2019/12/pennycress-picks-up-after-sweetcorn.html>
- b. Cates, A., Shahl, L., Garcia, A., Wells, M.S. MN Cover Crop Recipes now Available. Oct. 2019. Minnesota Crop News Blog. <https://blog-crop-news.extension.umn.edu/2019/10/mn-cover-crops-recipes-now-available.html>
- c. Wilson M, Stahl L. 2019. Applying manure in late summer or early fall? Try cover crops. In: Minnesota Crop News Blog. 19 Aug. <https://blog-crop-news.extension.umn.edu/2019/08/applying-manure-in-late-summer-or-early.html>
- d. Stahl, E, A Cates, A Garcia y Garcia, and MS Wells. 2019. Minnesota Cover Crop Recipe – Post Soybean, Going to Corn: Use Oats. Midwest Cover Crops Council (MCCC-115). Online: <http://mccc.msu.edu/minnesota-cover-crop-recipe-post-soybean-going-corn-use-oats/>
- e. Stahl, E, A Cates, A Garcia y Garcia, and MS Wells. 2019. Minnesota Cover Crop Recipe – Post Corn, Going to Soybean: Use Cereal Rye. Midwest Cover Crops Council (MCCC-114). Online: <http://mccc.msu.edu/minnesota-cover-crop-recipe-post-corn-going-soybean-use-cereal-rye/>

- f. Joshi*, V, J Coulter, K Thorp, G Johnson, P Porter, J Strock, and A Garcia y Garcia. 2019. Site-specific estimation of corn yield response to nitrogen fertilizer. <https://blog-crop-news.extension.umn.edu/2019/08/site-specific-estimation-of-corn-yield.html>
 - g. Rusch*, H, JA Coulter, J Grossman, G Johnson, P Porter, and A Garcia y Garcia. 2019. Cover crop strategies to improve nitrogen cycling in corn. <https://blog-crop-news.extension.umn.edu/2019/08/cover-crop-strategies-to-improve.html>
 - h. Joshi*, V, J Coulter, M Kazula, S Naeve, and A Garcia y Garcia. 2019. In-season weather data give reliable estimates of corn and soybean yields. <https://blog-crop-news.extension.umn.edu/2019/06/in-season-weather-data-give-reliable.html>
 - i. Rusch*, H, JA Coulter, J Grossman, G Johnson, P Porter, and A Garcia y Garcia. 2019. Interseeding cover crops in corn. (<https://blog-crop-news.extension.umn.edu/2019/06/interseeding-cover-crops-in-corn.html>)
- B. Research publications (in 2019)
- a. Mohammed, Y.A., Matthees, H.L., Gesch, R., ... , Wells, M.S., and Lenssen, A. 2019. Establishing Winter Annual Cover Crops by Interseeding into Maize and Soybean. *Agronomy Journal*. In Press, 2019.
 - b. Hoerning, C.H.,* D.L. Wyse, M.S. Wells, R.W. Gesch, and F. Forcella. 2018 Light competition and weed suppression in winter annual oilseed relay-cropping system. *Agron.J.* Accepted Aug. 2019. doi: 10.2134/agronj2019.01.0006; Date posted: July 27, 2019.
 - c. Cubins, J.*, Wells, M.S., Frels, K., Ott, M., ... , Gesch, R. Management of pennycress as a winter cash cover crop. *Agronomy for Sustainable Development*. Accepted Aug. 2019.
 - d. Zanetti, F., T.A. Isbell, R.W. Gesch, R.L. Evangelista, E. Alexopoulou, B. Moser, and A. Monti. 2019. Turning a burden into an opportunity: pennycress (*Thlaspi arvense* L.) a new oilseed crop for biofuel production. *Biomass and Bioenergy* 130:1-7.
 - e. Weyers, S.L., M.D. Thom, F. Forcella, C.A. Eberle, H.L. Matthees, R.W. Gesch, M. Ott, G.W. Feyereisen, J.S. Strock, and D.L. Wyse. 2019. Potential for nutrient loss reduction in winter oilseed cover cropped systems in the Upper Midwest. *Journal of Environmental Quality* 48:660-669.
 - f. Ott, M.A., C.A. Eberle, M.D. Thom, D.W. Archer, F. Forcella, R.W. Gesch, and D.L. Wyse. 2019. Economics and agronomics of relay-cropping pennycress and camelina with soybean in Minnesota. *Agronomy Journal* 111:1281-1292.
 - g. Gesch, R.W., D.S. Long, D. Palmquist, B.L. Allen, D.W. Archer, J. Brown, J.B. Davis, J.L. Hatfield, J.D. Jabro, J.R. Kiniry, M.F. Vigil, E.A. Oblath and T.A. Isbell. 2019. Agronomic performance of Brassicaceae oilseeds in multiple environments across the western United States. *Bioenergy Res.* DOI:10.1007/s12155-019-09998-1.
 - h. Everett, L.A., Wilson, M.L., Pepin, R.J., & Coulter, J.A. (2019). Winter Rye Cover Crop with Liquid Manure Injection Reduces Spring Soil Nitrate but Not Maize

Yield. *Agronomy*, 9(12), 852. doi: 10.3390/agronomy9120852

- i. Liu[§], R., Wells, MS & Garcia y Garcia, A. 2019. Relay and sequential cropping corn with winter oilseed crops in northern climates. *Nutr Cycl Agroecosyst*. doi: 10.1007/s10705-019-10036-x
 - j. Joshi^{*}, VR, KR Thorp, JA Coulter, GA Johnson, PM Porter, JS Strock, and A Garcia y Garcia. 2019. Improving Site-Specific Maize Yield Estimation by Integrating Satellite Multispectral Data into a Crop Model. *Agronomy*, 9(11), 719. doi: 10.3390/agronomy9110719.
 - k. Liu[§], R, MS Wells, and A Garcia y Garcia. 2019. Cover crop potential of winter oilseed crops in the Northern U.S. Corn Belt. doi: 10.1080/03650340.2019.1578960
- C. Graduate students and post-docs • Ph.D. students, M.S. students, and post-doc
- a. Sarah Moore. M.S. 2019. Evaluating the sustainability of double-cropping rotations with pennycress (*Thlaspi arvense*)
 - b. Julija Cubins. Ph.D. Improving oilseed management and science communication.
 - c. Dr. Yesuf A. Mohammed, Postdoctoral Research Associate in Gesch Lab, Evaluating improved methods for winter oilseed cash cover crop establishment and effects of relay-cropping on soybean nodulation and N-fixation.
 - d. Manuel Sabbagh. LAAS Program. Integrating cover crops and manure application for soil health. Co-advised by Drs. M. Wilson and P. Pagliari. July 2019 – present.
 - e. Wayment, Jessica. Project title: Cover crops and living mulches and their role in minimizing unintended nitrogen consequences on the environment. September 2019-Present. Advised by Dr. Fabian Fernandez.
 - f. Stephen Gregg, MS with Dr. Axel Garcia y Garcia
 - g. Rabin KC, MS with Dr. Axel Garcia y Garcia
 - h. Vijaya R Joshi, Post-doc with Dr. Axel Garcia y Garcia
- D. Conference Abstracts
- a. Yesuf Assen Mohammed, Heather L. Matthees, Russ W. Gesch, Swetabh Patel, Frank Forcella, Burton L. Johnson, M. Scott Wells and Andrew W. Lenssen. 2019. Seed and Oil Yields of Winter Annual Oilseed Crops Interseeded into Maize (*Zea mays* L.) and Soybean [*Glycine max* (L.) Merr.]. 2019. Abstract accepted and presented at the Association of Advancement of Industrial Crops (AAIC) Annual Meeting, Sep. 8-11, Tucson, AZ.
 - b. Yesuf Assen Mohammed, Heather L. Matthees, Russ Gesch, Swetabh Patel, Frank Forcella, Kyle Aasand, Nicholas Steffl, Burton Johnson, M. Scott Wells and Andrew W. Lenssen. Interseeding winter annual cover crops in upper Midwest, USA. 2019. Cover crops establishment, corn and soybean grain yield. Abstract accepted for oral presentation at the 2019 ASA-CSSA-SSSA International Annual Meeting. Nov. 10-13, 2019, San Antonio, TX
 - c. Julija A. Cubins, Agronomy and Plant Genetics, University of Minnesota-Twin Cities, St. Paul, MN, M. Scott Wells, Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN, Maninder K. Walia, Cooperative Extension, University of Nevada-Reno, Fallon, NV and Russ Gesch, USDA-ARS-North Central Soil Conservation

- Research Laboratory, Morris, MN. 2019. [Harvest Aid Effect on Pennycress Plant and Seed Moisture, Seed Yield, and Oil Content](#). ASA.
- d. Cody Hoerning¹, Donald L. Wyse², Katherine Frels², M. Scott Wells³, James A. Anderson⁴ and Senyu Chen⁵, (1)MN, University of Minnesota-Twin Cities, Minneapolis, MN, (2)Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN, (3)Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN, (4)Department of Agronomy and Plant Genetics, University of Minnesota-Twin Cities, St. Paul, MN, (5)Southern Research and Outreach Center, University of Minnesota, Waseca, MN. 2019. [Field Assessment of Heterodera Glycines Populations in Winter Oilseed Cover Crop Rotation](#). ASA.
- e. Florence Sessoms¹, Eric Watkins², M. Scott Wells³, Nancy Jo Ehlke³, Dominic P Petrella², Donn Vellekson³ and Alexander Hard³, (1)Department of Horticultural Science, University of Minnesota-Twin Cities, St Paul, MN, (2)Department of Horticultural Science, University of Minnesota-Twin Cities, St. Paul, MN, (3)Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN. 2019. [Fine Fescues As Living Mulch in Minnesota Cropping Systems](#) ASA.
- f. Maninder K. Walia, Cooperative Extension, University of Nevada-Reno, Fallon, NV, M. Scott Wells, Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN, Julija A. Cubins, Agronomy and Plant Genetics, University of Minnesota-Twin Cities, St. Paul, MN, Donald L. Wyse, Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN, Frank Forcella, USDA-ARS, Morris, MN and Russ Gesch, USDA-ARS-North Central Soil Conservation Research Laboratory, Morris, MN.2019. [Harvest Aids Influence on Winter Camelina Seed Yield and Quality](#). ASA.
- g. Julija A. Cubins¹, M. Scott Wells², Roger L. Becker², Gregg A. Johnson³, Maninder K. Walia⁴, William Lazarus⁵ and Russ Gesch⁶, (1)Agronomy and Plant Genetics, University of Minnesota-Twin Cities, St. Paul, MN, (2)Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN, (3)Department of Agronomy and Plant Genetics, University of Minnesota-Twin Cities, Waseca, MN, (4)Cooperative Extension, University of Nevada-Reno, Fallon, NV, (5)University of Minnesota, St. Paul, MN, (6)USDA-ARS-North Central Soil Conservation Research Laboratory, Morris, MN. 2019. [Agronomic and Economic Challenges of the Emerging Soybean-Pennycress Cropping System](#). ASA.
- h. Jeffrey A. Vetsch, Southern Research and Outreach Center, University of Minnesota-Twin Cities, Waseca, MN, Fabian G. Fernandez, 1991 Upper Buford Circle, University of Minnesota-Twin Cities, St Paul, MN, M. Scott Wells, Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN and Daniel E. Kaiser, Department of Soil, Water, and Climate, University of Minnesota-Twin Cities, St. Paul, MN. 2019. [Vegetative Cover Crops As a Nitrate Reduction Strategy for Tile Drainage Water](#). ASA.
- i. Matthew A. Ott, Agronomy and Plant Genetics, University of Minnesota-Twin Cities, St. Paul, MN, Katherine Frels, Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN, Ratan Chopra, MN, University of Minnesota-Twin Cities, St Paul, MN, M. David Marks, Plant and Microbial Biology, University of Minnesota, St. Paul, MN and M. Scott Wells, Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN. 2019. [Pennycress \(*Thlaspi arvense*\) Yield Peaks at Low Nitrogen Rate](#)

- j. Russ W. Gesch, M. Scott Wells, Alex Hard, James Eklund, Joe Boots, and Yesuf A. Mohammed. Establishing winter annual oilseeds in a maize system. 2019 Association of Advancement of Industrial Crops (AAIC) Annual Meeting, Sep. 8-11, Tucson, AZ.
- k. Stephen Gregg, Jeffrey S. Strock, Russ Gesch, Jeffrey A. Coulter, and Axel Garcia y Garcia. Winter camelina response to nitrogen for the intensification of corn-soybean production in the Upper Midwest. 2019 ASA-CSSA-SSSA International Annual Meeting. Nov. 10-13, 2019, San Antonio, TX.
- l. Russ W. Gesch, Maninder K. Walia, and Brent Hulke. Double-cropped sunflower after winter camelina in the Northern Corn Belt. 2019 ASA-CSSA-SSSA International Annual Meeting. Nov. 10-13, 2019, San Antonio, TX.
- m. Russ W. Gesch, Brent Hulke, James V. Anderson. Field evaluation of early maturing oilseed sunflower double-cropped after winter camelina. National Sunflower Association Research Forum, Fargo, ND, January 8-9, 2020.
- n. Gregg^{*}, S, JS Strock, RW Gesch, JA Coulter, A Garcia y Garcia. 2019. Winter Camelina Response to Nitrogen for the Intensification of Corn-Soybean Production in the Upper Midwest. San Antonio, TX, Nov 10-13.
<https://scisoc.confex.com/scisoc/2019am/meetingapp.cgi/Paper/119652>
- o. Joshi^{*}, VR, JA Coulter, and A Garcia y Garcia. 2019. Characterizing Maize Nitrogen Stress through Nitrogen Nutrition Index, Chlorophyll Meter and a Dynamic Crop Model. San Antonio, TX, Nov 10-13.
<https://scisoc.confex.com/scisoc/2019am/meetingapp.cgi/Paper/122661>
- p. Ranaivoson[§], A, JS Strock, A Garcia y Garcia, and GA Johnson. 2019. Transforming Agriculture: Adopting Cropping Systems That Enhance Productivity, Promote Yield Stability, and Increase Resilience. San Antonio, TX, Nov 10-13.
<https://scisoc.confex.com/scisoc/2019am/meetingapp.cgi/Paper/119653>
- q. KC^{*}, R, GA Johnson, JS Strock, NR Jordan, and A Garcia y Garcia. 2019. Performance of Fall Planted Winter-Killed Cover Crops in Corn-Soybean Rotation and Tillage Practices. San Antonio, TX, Nov 10-13.
<https://scisoc.confex.com/scisoc/2019am/meetingapp.cgi/Paper/119178>
- r. Ranaivoson[§], A, JS Strock, BJ Dalzell, G Feyereisen, and A Garcia y Garcia. 2019. Bioreactors As a Management Practice for Nutrient Removal from Agricultural Drainage in the Upper Mississippi River Basin. San Antonio, TX, Nov 10-13.
<https://scisoc.confex.com/scisoc/2019am/meetingapp.cgi/Paper/119643>
- s. Strock, JS, A Ranaivoson, BJ Dalzell, G Feyereisen, and A Garcia y Garcia. 2019. Low-Grade Weirs As a Management Practice for Nutrient Removal in Agricultural Drainage Ditches in the Upper Mississippi River Basin. San Antonio, TX, Nov 10-13.
<https://scisoc.confex.com/scisoc/2019am/meetingapp.cgi/Paper/119635>
- t. Joshi^{*}, VR, JA Coulter, and A Garcia y Garcia. 2019. Modeling Maize Response to Nitrogen at Different Environmental Conditions. San Antonio, TX, Nov 10-13.
<https://scisoc.confex.com/scisoc/2019am/meetingapp.cgi/Paper/121957>
- u. Garcia y Garcia, A, R Liu, JS Strock, and MS Wells. 2019. Nitrogen Use Efficiency in Double-Cropping Oilseed Crops with Corn. Abstracts of the SSSA International Soils

Meetings. San Diego, CA, January 6-9.

<https://scisoc.confex.com/scisoc/2019sssa/meetingapp.cgi/Paper/116329>

- v. Strock, JS, M Coulter, A Ranaivoson, A Garcia y Garcia, and BJ Dalzell. 2019. Integrated Landscape Management for Agricultural Production and Water Quality: Design. Abstracts of the SSSA International Soils Meetings. San Diego, CA, January 6-9.
<https://scisoc.confex.com/scisoc/2019sssa/meetingapp.cgi/Paper/115437>
 - w. Ranaivoson[§], A, JS Strock , A Garcia y Garcia, and BJ Dalzell. 2019. Integrated Landscape Management for Agricultural Production and Water Quality: Results. Abstracts of the SSSA International Soils Meetings. San Diego, CA, January 6-9.
<https://scisoc.confex.com/scisoc/2019sssa/meetingapp.cgi/Paper/115441>
- E. Ongoing research studies
- a. Corn Relative Maturity Impacts on Oilseed Survival
 - b. Corn Stover Residue Management for Improved Pennycress grain yields
 - c. Wide-row corn for improved cover crop forage and water quality
 - d. Desiccation of grain corn to hasten direct-drill establishment of oilseeds
 - e. Double-cropping early semi-dwarf sunflower with winter camelina
 - f. Optimizing N rate and application timing for winter oilseeds
 - g. Demonstrating innovative techniques for the integration of cover crops and manure to improve soil health in cool climates. Funded by USDA-NRCS.
 - i. Two small plot studies at WCROC and 1 on-farm trial near Nicollet, MN.
 - h. Best management practices to integrate cover crops and manure. Funded by MN Corn Research and Promotion Council.
 - i. Two small plot studies at SROC and 1 on-farm trial near Trimont, MN.
 - i. Field evaluations of elite pennycress and winter camelina germplasm for commercial production
 - j. Innovations for sustainable food, energy, and water supplies in intensively cultivated regions: integrating technologies, data, and human behavior
 - k. The Cover Crops, Water, and Nitrogen Nexus: How do They Impact Corn and Soybean Production and the Environment?
 - l. Cover crops in high tunnels
 - m. Tillage and Erosion Survey Advisory Committee at University of Minnesota. They are looking at conducting field survey of cover crop plantings around Minnesota (throughout the year)
- F. Extension/Education/Outreach/On-farm trials/NGO
- a. Cannon River Watershed Regen Ag. 2019
 - b. Southern Research and Outreach Center Winter Camelina Field School. 2019.
 - c. Invited talk “Closing agronomic and breeding gaps for commercialization of pennycress and camelina” given to representatives of the Walton Family Foundation (Walmart), UMN Borlaug Hall, St. Paul, MN (5/13/19).
 - d. Invited by MPCA (MN Pollution Control Agency) to serve as a panel member to discuss the impact of agriculture on water quality in MN, UMM (9/25/19).
 - e. Invited to speak to on oilseed cover crops at a Farm-to-Table celebration at the Cato de Prairie Lodge in Havana, ND (8/28-29/19; 200 participants).

- f. Invited along with UMN Forever Green Initiative Team to speak to Cargill's New Food Uses Innovation Team on development of winter camelina and pennycress for commercial production, Cargill Food Innovation Center, Plymouth MN (1/23/20)
- g. Wilson ML. 2019. Manure and Cover Crops: Best Management Practices. In: Soil Health Summit. National Corn Growers Soil Health Partnership. St. Louis, MO. 15 Jan. (70 attendees)
- h. Wilson ML, Hatlewick, H. 2019. Table Talk: Crop and cover crops. In: Conservation Tillage Conference. University of Minnesota Extension. Saint Cloud, MN. 17-18 Dec. (32 attendees)
- i. Wilson ML. 2019. Applying Liquid Manure into Cover Crops. In: Crop Pest Management Short Course. Institute for Ag Professionals –University of Minnesota Extension. Minneapolis, MN. 12 Dec. (2 presentations; 77 attendees)
- j. Wilson ML. 2019. Manure Management in Cover Crops & Side-Dressing Corn. In: Tour de Forage. Midwest Forage Association. Welch, MN. 4 Dec. (51 attendees)
- k. "Integrating fall manure and cover crops" - Farm Connections program on KSMQ. Oct. 1, 2019.
- l. "Applying manure to cover crop offers multiple benefits" – MN Farm Guide. January 30, 2019.
- m. "MANURE, COVER CROPS FIT WELL TOGETHER" – Successful Farming. January 22, 2019.
- n. Fernández, F.G. 2019. Cover crops and nitrogen management in irrigated corn and soybean where nitrate leaching is a concern. Rosholt Farm Agronomy Day, Westport, MN. 27 August 2019. (92 attendees).
- o. Fernández, F.G. 2019. Nitrogen management and cover crops for corn production and water quality in irrigated sands. Irrigators Clinic, Spicer, MN. 21 March 2019. (50 attendees).
- p. Land Stewardship Project: Sep to Oct 2019, four events that featured grazing of cover crops and perennials
- q. Land Stewardship Project Podcast: [A U of M experiment station's research into grazing, cover crops, and soil health.](#) (12/3/19)
- r. *Winona Post* Article: [Ridgeway farmers grow corn and covers — simultaneously](#) (10/2/19)
- s. Land Stewardship Project Blog: [Soil Health: Short-Term Gains, Long-Term Dividends](#) (7/17/19)
- t. *No-Till Farmer* Article: [On-Farm Research Validates Benefits of No-Till, Cover Crops](#) (7/11/19)
- u. Land Stewardship Project Blog: [Are You Trying to Grow a Crop in a Biological Desert?](#) (5/15/19)
- v. *Agri-View* Article: [Cotter chooses cover crops](#) (4/5/19)
- w. Land Stewardship Project Blog: ['Caring for the Land' with Cover Crops, the Roller-Crimper & Spring CC Seeding](#) (2/20/19)
- x. NRCS: Monthly staff meetings held with our Soil Health Teams (1 representative from each area of the state) on 1st Wednesday each month.
- y. NRCS: Spoke at Pheasant Forever meeting in Alexandria about NRCS Programs including cover crops (January 2019)

- z. Sustainable Farming Association Soil Health Summit in St. Peter on Cover Crops and Soil Health (March 2019)
- aa. NRCS field offices: Cover Crop Summit Webinar Series (March 2019)
- bb. NRCS: Promoted Soil Health and Cover Crops through booth and demonstration at the MN FFA Convention (April 2019)
- cc. NRCS: Provided Prevented Plant Factsheet and EQIP cover crop signup for producers (June 2019)
- dd. NRCS/UMN Office for Soil Health: 2 weeks of Soil Health Trainings in all 4 areas of the state (June 2019)
- ee. NRCS/Becker County SWCD/UMN: Soil Health Bus Trip to Bismarck, ND (included University, SWCD, NRCS, and Producers from NW MN) (July 2019)
- ff. NRCS: Conservation Planning Training in Morris. Talk about soil health and cover crops in planning process(August 2019)
- gg. NRCS: Worked with Land O' Lakes on Soil Health Management Systems (August 2019)
- hh. UMN, NRCS, Sustainable Farming Association, Soil Health Coalition: Cover crop education at Farmfest (August 2019)
- ii. NRCS: 4R Field Day and promoted cover crops and soil health (August 2019)
 - a. Soil Health Coalition Kickoff—(August 2019)
 - b. NRCS: State Technical Committee Meeting (August 2019)