

2013 MCCC report from Iowa

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Emails requesting information on 2013 cover crop activities in Iowa were sent to 11 individuals on 26 February 2014. An additional email was sent to another 11 individuals on 27 February 2013. Responses were obtained from about half of the individuals contacted.

Cover crop plantings in Iowa exceeded 160,000 acres in 2013, nearly 0.7% of annual crop acreage in the state. Although this may seem insubstantial, it is nearly a 50% increase in the acreage of cover crops planted in 2012. Cover crop planting statistics were not compiled by NASS, but communications from Cooperative Extension and Iowa Department of Agricultural and Land Stewardship (IDALS) personnel indicate that some of the acres were Prevent Planting due to poor conditions during normal planting times for corn and soybeans. IDALS supported funding of up to \$40 per acre for planting cover crops on 110,000 acres in 2013. Additionally, utilization of cover crops is expected to be a considerable part of the strategy to meet Iowa Nutrient Reduction Strategy goals for reducing nitrate, P, and sediment loads in Iowa waterways (<http://www.nutrientstrategy.iastate.edu/>).

Outreach efforts on cover crops in Iowa reached an impressive number of individuals at 74 meetings and conferences in 2013. Other current outputs that include cover crops: one refereed journal manuscript accepted for publication, 18 internally produced research and extension reports, and numerous blogs. Currently, at least 11 grant-funded projects are underway that include cover crops; eight of these projects include graduate students in three departments at Iowa State University (Agronomy, Entomology, and Horticulture) and a postdoctoral research associate with USDA-ARS (Dr. Matt Bakker).

Grant Funding obtained in Iowa that includes cover crop research or outreach activities:

Morton, L.W, et al. (11 institutions) 2011-2015. Cropping systems coordinated agricultural project: Climate change, mitigation, and adaptation in corn-based cropping systems. USDA-NIFA, Award No. 2011-68002-30190.

Martinez-Feria, R., M. Wiedenhoef. 2014. NC-SARE. Suitability of winter canola (*Brassica napus*) for enhancing summer annual crop rotations in Iowa.

Roesch, G., J. Arbuckle, J. Tyndall. 2014. What farmers are saying about cover crops.

Comito, J., M. Helmers, J. Benning, T. Kaspar. 2014. Management and performance of Iowa cover crops. Leopold Center for Sustainable Agriculture. <http://www.leopold.iastate.edu/grants/e2014-02>

Miguez, F., J. Tyndall, J.G. Arbuckle, A. Basche and G. Roesch. 2013-2015. Leopold Center for Sustainable Agriculture. Covering the Ground: A transformative approach to scientific learning for greater cover crop adoption in Iowa. <http://www.leopold.iastate.edu/grants/e2014-20>

Mallarino, A., R. Cruse, M. Helmers, J. Sawyer, D. Jaynes. 2014. Iowa Nutrient Reduction Center. Impacts of cover crops on phosphorus and nitrogen loss with surface runoff. <http://www.nutrientstrategy.iastate.edu/sites/default/files/documents/abstracts/coverimpacts.pdf>

Lenssen, A.W., S. Carlson, M. Wiedenhoef. 2013-2014. NCR-SARE Research & Education. Improving cover crop options for the Corn Belt. Seth Appelgate is the MS student on the project.

Kaspar, T., T. Moorman. 2012-2015. Leopold Center for Sustainable Agriculture. Winter rye cover crop effect on corn seedling pathogens. <http://www.leopold.iastate.edu/grants/e2012-03>

Kaspar, T., T. Moorman, A. Robertson, A. Lenssen. 2014. Iowa Nutrient Reduction Center. Investigating the causes of corn yield decreases following cereal rye winter cover crop. <http://www.nutrientstrategy.iastate.edu/sites/default/files/documents/abstracts/cerealrye.pdf>

Moore, K.J, D. Laird, K. Lamkey, A. Lenssen. 2013-2014. NC-SunGrant. Managing perennial cover crops for sustainable corn stover biomass removal. Cynthia Bartel is a PhD student on the project.

Nair, A., K. Delate, C. Bregendahl, G. Artz. 2014-2016. Leopold Center for Sustainable Agriculture. Quantifying nitrogen credits and impacts of cover crops on soil biology and health in vegetable cropping systems in Iowa. <http://www.leopold.iastate.edu/grants/e2014-16>

Papers, abstracts, and reports published in 2013:

Basche, A.D., F.E. Miguez, T.C. Kaspar and M.J Castellano. 2014. Do cover crops increase or decrease nitrous oxide emissions? A meta-analysis. *Journal of Soil and Water Conservation*. In Press.

Dunbar, M.W., A.J. Gassmann, M.E. O'Neal. 2013. Impacts of rye cover crop on ground-dwelling beneficial arthropods.

Abstract: Corn (*Zea mays* L.) and soybean (*Glycines max* L.) are two widely produced crops in the United States, both with demand and value rising threefold throughout the last decade. Increased production poses significant environmental concerns as both corn and soybean require large inputs for cultivation. Alternative management strategies, such as the planting of a rye (*Secale cereale* L.) cover crop, may decrease the costs of production by reducing soil erosion and decreasing pest pressure. We reasoned that the use of a rye cover planted within a corn-soybean annual rotation will positively increase abundance of ground-dwelling, beneficial arthropods compared to corn-soybean rotations without a rye cover crop. We measured the ground-dwelling arthropod community in two states over a two year period. In 2011, we used pitfall traps to measure the activity-density of ground-dwelling arthropods in corn and soybean plots grown with and without a rye cover crop at two locations within Iowa at five times throughout the growing season. In 2012 and 2013, we expanded our investigation to include a third location in Missouri and sampled with pitfall traps four times throughout the growing season. Arthropods captured were identified, quantified, and assigned to feeding guilds. We detected significant differences in the arthropod activity-density among sampling locations and dates, but did not observe any differences between plots growth with or without a rye cover crop. Rye cover crops provide agronomic advantages when incorporated in conventional corn or soybean production, but how this cover crop is managed may alter rye's benefits to the arthropod community.

Jose Pantoja completed his thesis in 2013. Thesis title: Effect of corn stover harvest and winter rye cover crop on corn nitrogen fertilization. A manuscript is in preparation for a scientific journal (Nitrogen fertilization requirement for corn and crop yield response to winter rye cover crop).

Pantoja, J.L., J.E. Sawyer, D.W. Barker. 2013. Evaluation of methods for estimating winter rye cover crop biomass production. Climate & Corn-based cropping systems annual meeting.

Abstract: Winter rye (*Secale cereale* L.) is often used as a cover crop between row crops, with typical minimal or no rye cover crop (RCC) growth during winter in the upper Midwest. Plant growth is driven by cumulative temperatures above a base temperature (BT). Hence, temperature (growing degree days, GDD) can be used to estimate RCC growth and biomass dry matter

(DM) production. However, a simple approach for predicting RCC DM could be to use only the number of days (NOD) with an average temperature above BT. The objective was to estimate RCC DM production at the time of control in the spring using cumulative GDD and NOD. Data included five sites in Iowa, with four sites across 2010 - 2013, and one site across 2012 - 2013. The RCC biomass was sampled following corn (FC) (*Zea mays* L.) and following soybean (FS) [*Glycine max.* (L.) Merr.] in a corn-soybean rotation. Sampling was by the prior-year N rate when FC, and by replicate when FS. The RCC DM ranged from 160 to 3180 kg DM ha⁻¹ when FC and across prior-year N rates, and from 120 to 1630 kg DM ha⁻¹ when FS. Exponential models fit the RCC DM produced when using GDD and NOD ($P < 0.10$). When including or excluding the winter period, model fits for predicting RCC DM were reduced when using a BT of 4 °C instead of 0 °C for GDD, but improved for NOD. This indicates little, if any, RCC growth occurred with average daily temperatures below 4 °C. For all measurements, the NOD provided a better estimate of RCC DM than cumulative GDD. Excluding the winter period resulted in better RCC DM estimation with GDD and NOD. The NOD method could be a more reliable approach for estimating RCC biomass production than GDD.

Basche, A, and F. Miguez. Department of Agronomy, Iowa State University. Cover Crop Research Update: MCCC Meetings, March 2014

Project 1: Do cover crops increase or decrease nitrous oxide emissions? A meta-analysis.

Abstract: There are many environmental benefits to incorporating cover crops into crop rotations, such as their potential to decrease soil erosion, reduce nitrate leaching and increase soil organic matter. Some of these benefits impact other agroecosystem processes, such as greenhouse gas emissions. In particular, there is not a consensus in the literature regarding the effect of cover crops on N₂O emissions. Compared to site-specific studies, meta-analysis can provide a more general investigation into these effects. Twenty-six peer reviewed articles including 106 observations of cover crop effects on N₂O emissions from the soil surface were analyzed according to their response ratio, the natural log of the N₂O flux with a cover crop divided by the N₂O flux without a cover crop (LRR). Forty percent of observations had negative LRRs, indicating a cover crop treatment which decreased N₂O, while 60% had positive LRRs indicating a cover crop treatment which increased N₂O. There was a significant interaction between N rate and the type of cover crop where legumes had higher LRRs at lower N rates than non-legume species. When cover crop residues were incorporated into the soil, LRRs were significantly higher than those where residue was not incorporated. Geographies with higher total precipitation and variability in precipitation tended to produce higher LRRs. Finally, data points measured during cover crop decomposition had large positive LRRs and were larger than those measured when the cover crop was alive. In contrast, those data points measuring for a full year had LRRs close to zero, indicating that there was a balance between periods when cover crops increased N₂O and periods when cover crops decreased emissions. Therefore, N₂O measurements over the entire year may be needed to determine the net effect of cover crops on N₂O. The data included in this meta-analysis indicate some overarching crop management practices that reduce direct N₂O emissions from the soil surface such as no soil incorporation of residues and using non-legume cover crop species. However, our results demonstrate that cover crops do not always reduce direct N₂O emissions from the soil surface in the short term and that more work is needed to understand the full global warming potential of cover crop management.

Citation: Basche, A.D., F.E. Miguez, T.C. Kaspar and M.J. Castellano. Do Cover Crops Increase or Decrease Nitrous Oxide Emissions? A Meta-Analysis. Journal of Soil and Water Conservation. In Press.

This work was accepted for publication in the Journal of Soil and Water Conservation to be included in a Fall 2014 special issue on Climate Change and Agriculture. It was also part of an oral presentation at the ASABE conference in July 2013, Kansas City, MO. This research is part of a regional collaborative project supported by the USDA-NIFA, Award No. 2011-68002-30190, "Cropping Systems Coordinated Agricultural Project: Climate Change, Mitigation, and Adaptation in Corn-based Cropping Systems." Project Web site: sustainablecorn.org.

Project 2: Evaluation of long term cover crop impacts with a modeling approach

We are working with a cropping systems platform, APSIM (the Agricultural Production Systems sIMulator), a tool that can simulate crop growth and soil processes while incorporating farm-level management decisions. The major objective of this work is to improve estimates of long term cover crop impacts on carbon, nitrogen, water and cash crop yields in Midwest cropping systems. Preliminary results of the model calibration were part of an oral presentation at the Tri-Societies meetings in November 2013, Tampa, FL. Poster presentations of this work were a part of the annual meetings of the SustainableCorn.org project in July 2013, West Lafayette, IN and the USDA-NIFA Climate Change Project Directors Meeting, January 2014, Gainesville, FL.

We are also beginning work to build a statistical model using multiple years of data collected from Iowa research sites that would predict winter rye cover crop biomass from environmental variables (e.g. temperature and precipitation).

A goal in using these two modeling approaches is to improve information provided by the MCCC Cover Crop Selector Tool for factors such as biomass estimates for particular planting dates, potential cash crop yield impacts, nitrate retained and soil organic matter changes.

This research is also part of the regional collaborative project supported by the USDA-NIFA, Award No. 2011-68002-30190, "Cropping Systems Coordinated Agricultural Project: Climate Change, Mitigation, and Adaptation in Corn-based Cropping Systems." Project Web site: sustainablecorn.org. It is further supported by the Leopold Center for Sustainable Agriculture at Iowa State University.



Fall 2013 cover crop sampling, pictured graduate student Andrea Basche. Photo credit: Jacob House.



Demonstration for visiting high school students on water infiltration and aggregate stability differences between no-till cover crop plots and tilled no cover crop plots at the long term field site, pictured graduate student Andrea Basche. Photo credit: Rafael Martinez-Feria.



Graduate student Rafael Martinez-Feria uncovers biological activity (an earthworm!) in the cover crop plot while gathering soil for the above demonstration. Photo credit: Andrea Basche



Intact soil core sampling for water retention analysis, July 2013, pictured from right to left ISU undergraduate Jacob House, Ben Knutson and Tom Kaspar of USDA-ARS. Photo credit: Andrea Basche



Winter rye cover crop in ready to harvest soybean field, October 2013. Photo credit: Andrea Basche

Sklenar, T, T. Kaspar, M. Wiedenhoef, A. Lenssen. Cover crop species and termination date influences biomass and nitrogen accumulation.

Experimental Description: A replicated plot study was conducted near Ames, Iowa during the 2012-2013 growing season to investigate the effects of cover crop species, termination date and residue removal on subsequent soybean grain yield. Cover crop entries included winter rye 'Spooner', Brassica napus 'Sitro', Camelina sativa 'Bison', B. rapa 'Purple Top turnip', and a no-cover crop control. The cover crop termination dates were May 14 and May 23, before and after the 2013 USDA RMA cover crop haying and grazing guideline date of May 22. The biomass removal treatments were aboveground biomass removed and aboveground biomass left on the plot. After termination and biomass removal treatments were done in the spring, Pioneer 92M40 soybeans were planted and harvested for grain on 3 November 2013. The experimental design was a randomized complete block in a split-split plot design. The whole plot factor was cover crop entry; termination date was the first level split-plot factor and aboveground biomass removal was the second level split-plot factor. There were four replicates of each sub-subplot treatment.

Results: Stand establishment of camelina was poor due to the seed lot having only 10% germination. However, we noted that established plants readily survived the 2012-2013 winter at Ames, IA. Purple Top turnips did not successfully overwinter. Cumulative aboveground biomass, C, and N accumulation values varied for the cover crop \times termination date interaction (Table 1). As it didn't overwinter, cumulative values for the Purple Top turnip are from the November 9 sampling date alone.

Discussion: Winter rye, canola and turnip cover crops accumulated significant levels of biomass, C and N. The amount of nitrogen is of particular interest in central Iowa and most of the Midwest, as it likely would have been lost to leaching if it hadn't been taken up by cover crops. The first year of soybean results showed no statistically significant differences ($\alpha=0.05$) in yield following cover crop entry or termination date, however, cover crop biomass removal significantly influence soybean yield (Table 2). Residue removal resulted in a yield increase of 150 kg/ha compared to leaving cover crop residue in the field. Cover crops for the second year of this study were planted 27 September 2013. Additional data collection in this project is being done on weed community and percent ground cover. Another goal is to use growing degree days to develop regression models for biomass, carbon and nitrogen

accumulation of the species studied to better quantify the potential ecological and economic benefits of using cover crops.

Table 1: Cumulative aboveground biomass, carbon and nitrogen at each cover crop termination date.

| Cover crop entry | Biomass (kg/ha) | | Biomass carbon (kg/ha) | | Biomass nitrogen (kg/ha) | |
|------------------|-----------------|---------|------------------------|---------|--------------------------|---------|
| | 5/13/13 | 5/23/13 | 5/13/13 | 5/23/13 | 5/13/13 | 5/23/13 |
| Winter rye | 6285 a | 8577 a | 2317 a | 3273 a | 101 a | 128 a |
| Canola | 883 b | 1588 b | 341 b | 615 b | 36 b | 52 b |
| Turnip | 769 b | 769 bc | 276 b | 276 bc | 37 b | 37 bc |
| Camelina | 84 c | 350 c | 29 c | 119 c | 4 c | 12 c |

Entries within columns followed by the same letter are not different at $P=0.05$ between the natural logarithm of their values.

Table 2: Soybean grain yield following four cover crops with two termination dates and residue removal, Ames, IA. 2013.

| Treatment | Yield (kg/ha) |
|------------------|---------------|
| Cover | |
| Winter rye | 3285 |
| Canola | 3764 |
| Turnips | 3785 |
| Camelina | 3955 |
| Control | 3925 |
| Termination date | |
| 15 May 2013 | 3748 |
| 23 May 2013 | 3737 |
| Biomass removal | |
| Removed | 3818 a |
| Not removed | 3668 b |

Anonymous. 2013. On-farm cover crop trials. ISU FARM, ISRF13-99.

Arbuckle, J. Gordon, Jr., J. Ferrell, and R. Miller. 2012. Attitudes toward cover crops in Iowa: Benefits and barriers PMR 1010. <http://www.soc.iastate.edu/extension/ifrlp/PDF/PMR1010.pdf>

ISU Farmer-assisted Research and Management. 2013. On-farm cover crop trials. ISRF 13-99. <http://www.ag.iastate.edu/farms/2013/farm/CoverCrop.pdf>

Kruse, R., A. Nair. 2013. Summer cover crop influences on fall vegetable production. ISRF 13-36. <http://www.ag.iastate.edu/farms/2013/hort/SummerCoverCrop.pdf>

Nair, A., B. Carpenter, J. Tillman, D. Jokela, K. Tester. 2013. Integrating cover crops into high tunnel production. ISRF 13-36. <http://www.ag.iastate.edu/farms/2013/hort/IntegratingCoverCrops.pdf>

Tillman, J., J. Batzer, A. Nair, M. Gleason. 2013. Strip-tillage and row cover use in organically and conventionally grown muskmelon. ISRF 13-20. <http://www.ag.iastate.edu/farms/2013/muscatine/StripTillMuskmelon.pdf>

Tillman, J., A. Nair, J. Batzer, M. Gleason. 2013. Strip-tillage and row cover use in organically and conventionally grown summer squash. ISRF 13-20.

<http://www.ag.iastate.edu/farms/2013/muscatine/StripTillSquash.pdf>

Cover crop talks in Iowa - 2013

Arbuckle, J. Gordon Jr. and Gabrielle Roesch. "Farmer Perspectives on Cover Crops." National Wildlife Federation Cover Crop Champions Conference Call. August 27, 2013.

Barker, D. Corn nitrogen stress sensing. Iowa Learning Farm Webinar. 20 March 2013.

Lenssen, A. Cropping systems approach to cover crops. ISU E&O meetings in Mason City, Atlantic, Story City, and Muscatine, IA, various in 2013. Part of the Cover Crop Workshop series developed by Ajay Nair.

Lenssen, A. Cropping systems and cover crops. DuPont Pioneer Hybrid Int., Inc. annual agronomists update, Johnston, IA. Dec. 2013.

Pantoja, J. Soil Seminar Presentation, Department of Agronomy, Iowa State University. 27 March 2013.

Sawyer, J. Corn nitrogen fertilization requirement in a winter rye cover crop system. ISU NE Research and Demonstration Farm, Nashua. 26 June 2013.

Sawyer, J. Corn nitrogen fertilization requirement in a winter rye cover crop system. ISU SE Research and Demonstration Farm, Crawfordsville. 27 June 2013.

Practical Farmers of Iowa Cover Crop work in 2013

1. Publications

TV and Radio

Published **11** TV and Radio stories on cover crops;

April 25, 2013. "Keeping Crop Nutrients in the Field & On the Job." Public News Service.

<http://www.publicnewsservice.org/2013-04-25/rural-farming/keeping-crop-nutrients-in-the-field-and-on-the-job/a32141-1>

May 28, 2013. "What Happens on Iowa Farms Should Stay on Iowa Farms" Public News Service.

<http://www.publicnewsservice.org/2013-05-28/environment/what-happens-on-ia-farms-should-stay-on-ia-farms/a32652-1>

August 6, 2013. Using cover crops to build soil health and reduce erosion. Hedrick, T. KTVO-TV3.

<http://www.heartlandconnection.com/news/story.aspx?id=930487>

August 28, 2013. Mark Peterson interview about cover crops at IL Farm Progress Show by RFD-TV. To be broadcast as part of "Best of the Farm Progress Show" show in October 2013.

August 28, 2013. Mark Peterson and Dave Bishop interviewed at the IL Farm Progress Show about cover crop usage on Talk 101 with Scott Busboom. <http://decaturradio.com/pages/15823710.php>

September 9, 2013 Sarah Carlson radio interview about prevent plant and cover crops on Faribault, MN 920 KDHL

September 9, 2013. Iowa Minute. Aerial Planting Cover Crops.
<http://www.iowafarmbureau.com/public/144/newsroom/iowa-minute>

January 20, 2014. "Iowa Farmers Start to Mix It Up: Cover Crop "Cocktails"
<http://www.publicnewsservice.org/2014-01-20/rural-farming/iowa-farmers-start-to-mix-it-up-cover-crop-cocktails/a36938-1>

February 28, 2014. Sarah Carlson radio interview about cover crops on WHO Des Moines.

March 4, 2014. Sarah Carlson radio interview about cover crops on WHO Des Moines.

Date?? Luther Smith interview on RFDTV as a result of cover crops webinar on August 20, 2013 (Cover Crops - The Good, The Bad, The Ugly or Beautiful).

Additionally, secured six radio stations mention 18 cover crop events: WHO Des Moines, KWMT Fort Dodge, KICD Spencer, KCSI Red Oak, KMA Shenandoah, and KSOM Atlantic.

Newspaper and trade publications

Secured **16** articles in 2013;

Bird, L. "Aerial seeding makes cover crop process easier." Mason City Globe Gazette. April 7, 2013. http://globegazette.com/business/aerial-seeding-makes-cover-crop-process-easier/article_d504f078-9e44-11e2-ae05-0019bb2963f4.html

Bird, L. "Farmer: Planting cover crops 'a very important practice.'" Mason City Globe Gazette. April 7, 2013. http://globegazette.com/business/farmer-planting-cover-crops-a-very-important-practice/article_9c4a50e8-9e44-11e2-a326-0019bb2963f4.html

Carlson, S. "Scout corn now for armyworms" Wallaces Farmer. June 2013.

Carlson, S. "It's the right time for cover crops." Wallaces Farmer. March, 2013

Carlson, S. 2013. Farm show to feature cover crops. Wallaces Farmer. August.
<http://magissues.farmprogress.com/WAL/WF08Aug13/wal048.pdf>

Carlson, S. and R. Stockwell. 2013. Research priorities for advancing adoption of cover crops in

Carlson, S. Cover Crops on Prevent Plant, Now What?
<http://www.leopold.iastate.edu/sites/default/files/9-2013-cover-crops.pdf>

Caspers-Simmet, J. July 8 2013. Webinar outlines cover crop options on prevented planting acres. Agri News.

<http://www.agrinews.com/webinar/outlines/cover/crop/options/on/prevented/planting/acres/story-5458.html>

Dunn, M. "Cover crops can aid livestock, too." Wallaces Farmer. September, 2013.

Heggenstaller, A. Crop Insights: Managing Winter Cover Crops in Corn and Soybean Cropping Systems. <https://www.pioneer.com/home/site/us/agronomy/library/managing-winter-cover-crops/>

Larsen, D. "Cover Crops Bring a Diversity of Benefits to the Farm." Organic Broadcaster. Volume 21, Number 6. Nov-Dec 2013. <http://mosesorganic.org/farming/farming-topics/field-crops/cover-crops-bring-a-diversity/>

Larson, D. "Herbicides can persist, hurt cover crops" Wallaces Farmer. June 2013.

Larson, D. "Solutions found across fence line." Wallaces Farmer. May, 2013.

McCloud, C. July 2013. Beyond Going with the Flow. The Bean Magazine. Special Edition Issue.

Murphy, J. September 4, 2013. Environmental practices highlighted at field day. The Bean Blog: Iowa Soybean Association stories and photos. <http://www.iasoybeans.com/TheBeanBlog/?cat=146>

Nelson, K. "So, what's in the water?: Farmers learn to test tiles for nutrients." The Messenger. August 4, 2013. <https://www.messengernews.net/page/content.detail/id/568950/So--what-s-in-the-water-.html?nav=5003>

Practical Farmers research reports

Published **7** reports from on-farm research trials where farmers compared the ecological and economic resilience of cover crop systems to a control on their farms.

"Grazing Cover Crops." Practical Farmers Research Report. Margaret Dunn. November, 2013.

"Grazing Cover Crops Fact Sheet." Practical Farmers Research Report. Margaret Dunn. February, 2013.

"Comparison of Cover Crop Establishment Methods" Practical Farmers Research Report. Stefan Gailans and Sarah Carlson. November, 2013.

"Side-dressing Corn following a Winter Rye Cover Crop" Practical Farmers Research Report. Stefan Gailans and Sarah Carlson. November, 2013.

"Twenty Cover Crop Variety Trial - Final Report." Practical Farmers Research Report. Sarah Carlson and Stefan Gailans. December, 2013.

"Quick Turnaround Cover Crops for Horticulture." Practical Farmers Research Report. Tomoko Ogawa. December, 2013.

“Winter Rye Cover Crop Effect on Cash Crop Yields: Year 4.” Practical Farmers Research Report. Sarah Carlson. January, 2013.

PFI Newsletter

Published **3** newsletter articles on cover crops;

“Cover Crops and Prevented Planting Information Guidance.” Sarah Carlson. The Practical Farmer. Vol. 28. No. 3. Summer 2013.

“Feeding Pasture-Based Cows During the ‘Off-Season.’” Margaret Dunn. The Practical Farmer. Vol. 28, No.4. Fall 2013.

“Cover Crops and One Farm’s Story: Weed Control, Soil Protection and Weed Resistance Prevention.” Sarah Carlson. The Practical Farmer. Vol. 29. No.1. Winter 2014.

Practical Farmers blog

Published **20** blog posts related to cover crops;

“PFI Beginners summarize Gabe Brown’s grazing and cover crop talks at the 2012 Grassfed Exchange.” Practical Farmers Blog. Marc Strobbe. March 25, 2013. <http://practicalfarmers.org/blog/2013/pfi-beginners-summarize-gabe-browns-grazing-and-cover-crop-talks-at-the-2012-grassfed-exchange>

“Soil Temperatures in NW IA cover crop and no-till fields.” Practical Farmers Blog. Sarah Carlson. May 3, 2013. <http://practicalfarmers.org/blog/2013/soil-temperatures-in-nw-ia-cover-crop-and-no-till-fields>

“Cover Crops and Livestock/Crop Insurance.” Practical Farmers Blog. Sarah Carlson. May 10, 2013. <http://practicalfarmers.org/blog/2013/cover-crops-and-livestockcrop-insurance>

“Brassica Cover Crops as Biofumigants” Practical Farmers Blog. Tomoko Ogawa. May 16, 2013. <http://practicalfarmers.org/blog/2013/spring-cover-crop-data-collection>

“Spring Cover Crop Data Collection.” Practical Farmers Blog. Marc Strobbe. May 17, 2013. <http://practicalfarmers.org/blog/2013/spring-cover-crop-data-collection>

“Good Cover Crops Make Good Neighbors!” Practical Farmers Blog. Margaret Dunn. July 19, 2013. <http://practicalfarmers.org/blog/2013/good-cover-crops-make-good-neighbors>

“Upcoming Cover Crop Field Days.” Practical Farmers Blog. Sarah Carlson. July 25, 2013. <http://practicalfarmers.org/blog/2013/upcoming-cover-crop-field-days>

“Fall 2013 Cover Crop Field Days Scheduled.” Practical Farmers Blog. Sarah Carlson. October, 16, 2013. <http://practicalfarmers.org/blog/2013/fall-2013-cover-crop-field-days-scheduled>

“Combining Cover Crops and Cattle.” Practical Farmers Blog. Margaret Dunn. November, 22, 2013. <http://practicalfarmers.org/blog/2013/combining-cover-crops-and-cattle>

“Cover Crop Rock Video.” Practical Farmers Blog. Sarah Carlson. November 26, 2013.
<http://practicalfarmers.org/blog/2013/cover-crop-rock-video>

“Crop Insurance and Cover Crops for 2014.” Practical Farmers Blog. Sarah Carlson. November, 22, 2013.
<http://practicalfarmers.org/blog/2013/crop-insurance-and-cover-crops-for-2014>

“Count your cover crop acres by December 15.” Practical Farmers Blog. Sarah Carlson. November, 22, 2013. <http://practicalfarmers.org/blog/2013/count-your-cover-crop-acres-by-december-15th>

“Cover Crop On farm Research Plots.” Practical Farmers Blog. Sarah Carlson. November 30, 2013.
<http://practicalfarmers.org/blog/2013/cover-crop-on-farm-research-plots>

“Study: Cover Crops Can Ward off Soybean.” Practical Farmers Blog. Sarah Carlson. January 10, 2014.
Diseases.
<http://practicalfarmers.org/blog/2014/study-cover-crops-can-ward-off-soybean-diseases>

“Cover Crops & Crop Insurance News Items.” Practical Farmers Blog. Sarah Carlson. January 21, 2014.
<http://practicalfarmers.org/blog/2014/cover-crops-crop-insurance-news-items>

“Iowa Farmers Talk Cover Crops.” Practical Farmers Blog. Sarah Carlson. February, 6, 2014.
<http://practicalfarmers.org/blog/2014/iowa-farmers-talk-cover-crops>

“Iowa Farmers Talk Cover Crops.” Practical Farmers Blog. Sarah Carlson. February 6, 2014.
<http://practicalfarmers.org/blog/2014/iowa-farmers-talk-cover-crops>

“Six Cover Crop learning options this spring.” Practical Farmers Blog. Sarah Carlson. February 14, 2014.
<http://practicalfarmers.org/blog/2014/six-cover-crop-learning-options-this-spring>

“March and April are Cover Crop Months in the Midwest.” Practical Farmers Blog. Sarah Carlson.
February 28, 2014. <http://practicalfarmers.org/blog/2014/march-and-april-are-cover-crop-month-in-the-midwest>

“New Cover Crop Research Report Available.” Practical Farmers Blog. Drake Larsen. March 11, 2014
<http://practicalfarmers.org/blog/2014/new-cover-crop-research-report-available>

Other publication materials

Created Cover crop demonstration kit, including powerpoint presentation and handouts Seven 1-minute soil health and cover crop videos were made available from the NRCS website for use by cover crop champions in their powerpoint presentations

- One video of a field day where farmers speak about cover crops for soil health
- One video of flying on cover crops and the resulting seed in the standing soybeans
- Cover Crop Champions powerpoint with updated slides of research showing the water quality and soil health benefits
- Iowa Cover Crop Business Directory
- Minnesota Cover Crop Business Directory
- Illinois Cover Crop Business Directory

- Cover Crop Decision Making Tools User Fact Sheet
- Cover Crops Frequently Asked Questions: co-authored with Iowa Learning Farms

2. On-farm research projects

- Working with **28 PFI farmers** who are conducting experiments related to cover crops since the summer/fall 2013.
- Fall 2013 Practical Farmers of Iowa, Iowa Learning Farms and Iowa State University Farmer Association Farms have launched a two-year study in summer 2013 to evaluate management techniques that will increase growth and improve the overall environmental benefits of cover crops in improving soil health and reducing nutrient losses at five regional research farms in Iowa. Working with 5 researchers.
- September 2013 began discussion with 10 Midwest Cover Crop Council members to design state meetings between researchers and farmers to further discuss local cover crop information and gaps in research.
- October 2013 began discussions with Dr. Mike Castellano at Iowa State University to determine effect of winter rye cover crop termination timing and herbicide comparison prior to corn and soybeans. Networked Dr. Castellano with other researchers in Iowa studying cover crops.
- Met with The American Seed Trade Association (ASTA) twice and Bayer Crop Science to discuss industry funding potentials.

3. Outreach

Field Days/Workshops

Organized and held **27 cover crop field days** at different locations around Iowa with a total number of **1,408+spring numbers** people attending. Collaborated with the Iowa Learning Farms on **21** of the 27 field days.

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| March 6, 2013 | Pioneer Grower Meeting Cover Crops (55 attendees) |
| March 19, 2013 | Luzerne Cover Crops Field Day (99 attendees) |
| March 21, 2013 | Welton Cover Crops Field Day (92 attendees) |
| March 22, 2013 | Breda Cover Crops Field Day (85 attendees) |
| March 26, 2013 | Dedham Cover Crops Field Day (70 attendees) |
| March 28, 2013 | Red Oak Cover Crops Field Day (80 attendees) |
| April 1, 2013 | Dordt Cover Crops Field Day (82 attendees) |
| April 2, 2013 | Boone Cover Crops Train the Trainer (60 attendees) |
| April 4, 2013 | Elkader Cover Crops Field Day (86 attendees) |
| May 22, 2013 | Dan Specht Cover Crops Field Day (63 attendees) |
| June 4, 2013 | Griswold Cover Crops Field Day (15 attendees) |
| June 26, 2013 | Dyersville Cover Crops Field Day (45 attendees) |
| June 26, 2013 | Edgewood Cover Crops Workshop (150 attendees) |
| June 28, 2013 | Winterset Cover Crops Discussion (12 attendees) |
| August 1, 2013 | Cover Crop Field Tour and Meeting (50 attendees) |
| August 6, 2013 | Cover Crops Workshop (52 attendees) |
| August 8, 2013 | Cover Crops and No-Till Tour (12 attendees) |
| October 23, 2013 | Des Moines County Cover Crop Field Day (63 attendees) |
| November 1, 2013 | Cover Crop Field Day (34 attendees) |

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| November 7, 2013 | Cover Crop Field Day (59 attendees) |
| November 12, 2013 | Cover Crop and no-Till Field Day (68 attendees) |
| November 13, 2013 | Cover Crop Field Day (18 attendees) |
| November 14, 2013 | Cover Crop Field Day (18 attendees) |
| November 19, 2013 | Combining Cover Crops and Cattle (40 attendees) |
| February 25, 2014 | Innovations in Cover Crops & Grazing Workshop. (XX attendees) |
| March 13, 2014 | Wisconsin Cover Crops Conference. (XX attendees) |
| March 14, 2014 | Cover Crop Training Conference (XX attendees) |
| March 12, 2014 | Farm Profit and Productivity in the 21st Century: A Farmers Workshop on Soil Health (XX attendees) |
| March 25, 2014 | Workshop on Cover Crop Management (XX attendees) |
| March 26, 2014 | Workshop on Cover Crop Management (XX attendees) |

Webinars

June 14, 2013 Cover Crops Options for Prevented Planting Acres (153 Live Views) PFI hosted; <https://connect.extension.iastate.edu/p6ylzn8fdfd/?launcher=false&fcsContent=true&pbMode=normal>

August 20, 2013 Cover Crops The Good, The Bad, The Ugly (Live Views) American Society of Agronomy Hosted.

September 19, 2013 Managing Cover Crops (238 Live Views) PFI hosted; <https://connect.extension.iastate.edu/p3iwf9tdk5b/?launcher=false&fcsContent=true&pbMode=normal>, http://www.practicalfarmers.org/assets/files/news/article_13sep11.pdf

March 13, 20, and 27, 2014. Webinar series on Cover Crops. (? Live Views) American Society of Agronomy Hosted; <https://www.agronomy.org/education/online-courses>

Conference

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| February 7-8, 2013 | Practical Farmers Cooperators' Meeting |
| March 15, 2013 | Northwest Iowa No-Till Conference |
| November 19-20, 2013 | Great Lakes Cover Crop Summit |
| December 4-5, 2013 | Practical Farmers Cooperators' Meeting |
| January 24-25, 2014 | Practical Farmers of Iowa Annual Conference |
| January 28-30, 2014 | Iowa Power Farming Show |
| February 11, 2014 | Agribusiness Showcase and Conference |
| February 17-19, 2014 | National Conference on Cover Crops and Soil Health |
| March 4, 2014 | Wildlife benefits of cover crops Information Meeting |
| March 11, 2014 | Soil Health Meeting |
| March 13, 2014 | Wisconsin Cover Crop Conference - Your Farm, Your Options |
| March 14, 2014 | Roots for Improvement III |

Interviews and presentations

PFI staff presented or were interviewed on cover crops at **6** occasions;

- On March 15, 2013 PFI staff presented "Making Cover Crops Work" to 168 farmers at the Western Iowa No-tillers Conference. In addition three farmers were recruited to participate in a panel about their cover crop experiences.

- On August 8, 2013 PFI staff were interviewed for an article to be published in Corn and Soybean Digest “Cover Crops for Beginners.”
- On September 16, 2013 PFI staff were interviewed on KXEL from Waterloo, IA about cover crop basics and prevented planted cover crop management options.
- August 30, 2013 Cover crop presentation at Iowa State University Agronomy Farm where City of Ames staff attended. Spoke with them more formally about how city bio-solids could be applied to cover crops and potential future projects.
- September 28, 2013 Mark Peterson presented about the need for cover crops and funding for cover crops to the Environmental Grantmakers. PFI staff helped Mark prepare slides for the meeting including research about the benefits of cover crops and the increased interest in the Midwest.
- On February 2014, PFI staff presented at Agribusiness Showcase and Conference in Des Moines, IA. The session title was “Cover Crops in Iowa” and approximately 100 people attended.

Events

August 27-29, 2013 Cover Crop Champions, Sarah Carlson, Illinois Stewardship Alliance staff, American Farmland Trust staff and Conservation Technology Information Center staff attended the IL Farm Progress Show. More than 2500 farmers were asked their most pressing cover crop research questions and had access to 4 cover crop experts at any time to answer their questions. In addition to farmers we specifically reached out to representatives from Case IH Agriculture & Farm Equipment, Hagie Manufacturing Company, Illinois Department of Natural Resources, and Illinois Soybean Association.

Meetings

Hosted and/or participated in **14** meetings related to cover crops:

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| June 11- 13, 2013. | AGree Meeting |
| June 16, 2013 | DC Fly-IN |
| June 19, 2013 | Meeting with Environmental Working Group |
| June 28, 2013 | Coops/Ag Business staff meeting. |
| July 30, 2013. | Cover Crop Informational Meeting (71 attendees) |
| July 31, 2013. | 4 County Cover Crop Meeting/Farmer Panel (95 attendees) |
| August 8, 2013. | Cover Crop Meeting and Farmer Panel (56 attendees) |
| August 27, 2013. | Hamilton/Wright Counties cover crops/nutrient reduction strategy (75 attendees) |
| September 5, 2013 | Pioneer Grower Meeting. (65 attendees) |
| September 17, 2013 | Renze Seed Meeting. (250 attendees) |
| February 27, 2014 | Talked with Northwood DNR people at cover crop meeting about setting up a cover crop wildlife meeting. |
| March 4, 2014 | Cover Crop Wildlife meetings on wildlife benefits from cover crops. |
| March 5, 2014 | Working meeting with DNR, NRCS, Bradford Research and Extension Center |
| March 12, 2014 | Meeting with DNR on cover crops. |

Other communications

- PFI staff have participated in the conference calls and responded to requests to offer input on items. Steering committee calls have been important for sharing information among other advisory members and also between NWF staff and members.

- PFI staff and Cover Crop Champion Mark Peterson presented at “Cover Crop Workshop and Information Exchange” in Worthington, MN, co-sponsored by Nobles County Natural Resources Conservation Services (NRCS), Soil and Water District (SWCD), Okobena & Ocheda Watershed District, MN Sustainable Farmers Association, MN West-Worthington Campus, Nobles County Corn and Soybean Growers Association.
- On March 12, PFI staff and Cover Crop Champion Mark Peterson presented at “Farm Profit and Productivity in the 21st Century: A Farmers Workshop on Soil Health” hosted by Cannon River Watershed Partnership in Faribault, MN.
- The City of Griswold Iowa were contacted and asked to attend a PFI cover crop field day held in Red Oak, IA. The city employees learned about how farmers were using cover crops and the benefits to water quality. At that field day PFI staff and city employees developed a plan for helping farmers near their city water wells add cover crops this fall 2013. Plans are in place and the farmers, representing near 600 acres are committed. An aerial pilot service, local coop who will handle the seed and a local farmer who will grow the rye cover crop seed have all begun discussions. Follow-up meetings will begin immediately after planting. City employees will monitor water quality spring and summer of 2013 and then the following time period next year after cover crops are seeded. PFI staff met with City of Griswold employees and Department of Natural Resources staff to flesh out ideas for a Conservation Innovation Grant to help offset some of the cover crop costs for the next two years. The group was awarded the grant and now funds are available from the City in the first year and covered by CIG funds in the future.
- Provided Des Moines Water Works staff with information about how to add cover crops to land that the DMWW owns. Cover crops were seeded this fall on that property by helicopter. Next steps are to work with DMWW staff and farmer tenants to better understand the benefits of cover crops to not only DMWW land but also to watersheds which provide drinking water for the city of Des Moines.