

Winter Cereal Rye Cover Crop Effect on Cash Crop Yield

Year 9

Iowa Learning Farms and Practical Farmers of Iowa



Summary

Farmers reported that in 59 of 63 site-years, properly managed cover crops had little to no negative effect on corn and soybean yield (and actually increased soybean yield in 8 site-years and corn yield in 2 site-years).

Cooperators

Bill Buman, Harlan
Randy Caviness, Greenfield
Jim Funcke, Jefferson
Devan Green, Conrad
Rick Juchems, Plainfield
Rob Davis & Darwin Pierce,
Whiterock Conservancy, Coon Rapids
Mark Pokorny, Clutier
George Schaefer, Kalona
Jerry Sindt, Holstein
Rob Stout, West Chester
Gary & Dave Nelson, Fort Dodge
Kelly Tobin, New Market

Project Timeline

2008-2017 (9th year report)

This project was funded by the State Soil Conservation Committee, the Iowa Department of Agriculture and Land Stewardship and the Leopold Center for Sustainable Agriculture. Additional outreach and education funding came from a NCR-SARE grant, Walton Family Foundation, Iowa Learning Farms, Iowa State University Extension and Outreach and Practical Farmers of Iowa.

Methods

- 12 sites over the course of this study with five participating in 2017. All sites are in corn-soybean rotations.
- Cooperators establish and maintain replicated strips the length of their field for duration of the study. Each replication has one strip with cover crops and one without cover crops.
- Cooperators seed cereal rye cover crop in the fall of 2017 aerially or with a drill at seeding rates ranging between 56-60 lb/ac.
- Cover crop termination was accomplished with herbicide applied prior to cash crop planting the following spring.

Table 1. Farm location, cover crop management, and cash crop for the 2017 growing season.

| Location | Cover Crop planting date | Cover crop planting method | Cover crop seeding rate | Cover crop termination method | Cash crop | Planting date |
|---------------------------------|--------------------------|----------------------------|-------------------------|-------------------------------|-----------|---------------|
| Plainfield (NE Iowa) | 11/7/16 | Drilled | 56 lb/ac | Herbicide | Soy | 5/15/17 |
| Coon Rapids (West central Iowa) | 10/26/16 | Drilled | 60 lb/ac | Herbicide | Soy | 5/15/17 |
| West Chester (SE Iowa) | 10/18/16 | Aerial | 60 lb/ac | Herbicide | Soy | 5/15/17 |
| New Market (SW Iowa) | 10/9/16 | Drilled | 56 lb/ac | Herbicide | Soy | 5/6/17 |
| Jefferson (West Central Iowa) | 10/30/16 | Drilled | 56 lb/ac | Herbicide | Corn | 4/24/17 |

Results

Cover crop biomass

Above-ground cover crop biomass was determined at most locations at the time of cover crop termination (Table 2). Over the years, aboveground cover crop biomass at locations ranged from trace amounts to 2,407 lb/ac prior to corn and from 55- 6,513 lb/ac prior to soybeans. Cover crop was typically terminated 7-10 days prior to planting.

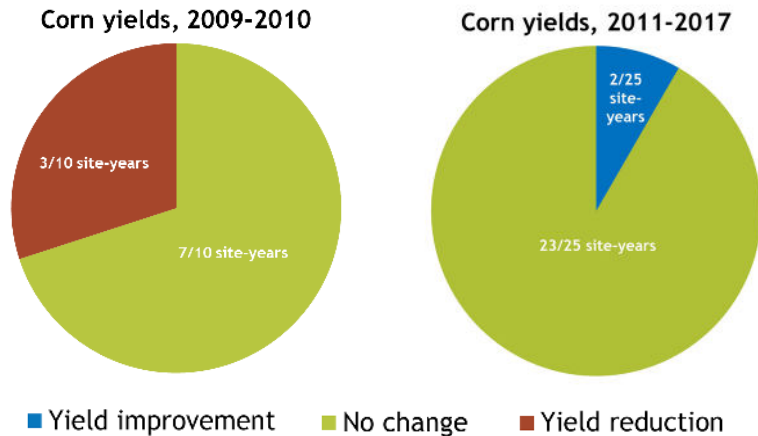
| Location | Cover crop biomass (lb/ac) | Sampling date |
|--------------|----------------------------|---------------|
| Plainfield | 220 | 5/4/17 |
| Coon Rapids | 183 | 4/11/17 |
| West Chester | 6,513 | 5/9/17 |
| New Market | 1,014 | 4/20/17 |
| Jefferson | 600 | 5/5/17 |

Table 2. Mean cover crop aboveground biomass samples prior to termination in 2017.

Corn yields 2017

In general, corn yields were equivalent regardless of cover crop treatment as determined by statistical analysis (t-test). Only at Jefferson (2009), Coon Rapids (2010) and Harlan (2010) were corn yields reduced in the cover crop strips. It should be noted that these instances occurred only in the first two growing seasons of the trial. Cooperators identified insufficient cover crop termination (Jefferson '09) or improper planter settings (Coon Rapids, Harlan '10) as reasons for the average yield decrease of 27 bu/ac. In the remaining cases, corn yields were mostly not affected by the cover crop (Figure 1). In 2016, corn yields were statistically improved by 3 and 19 bu/ac at West Chester and New Market, respectively.

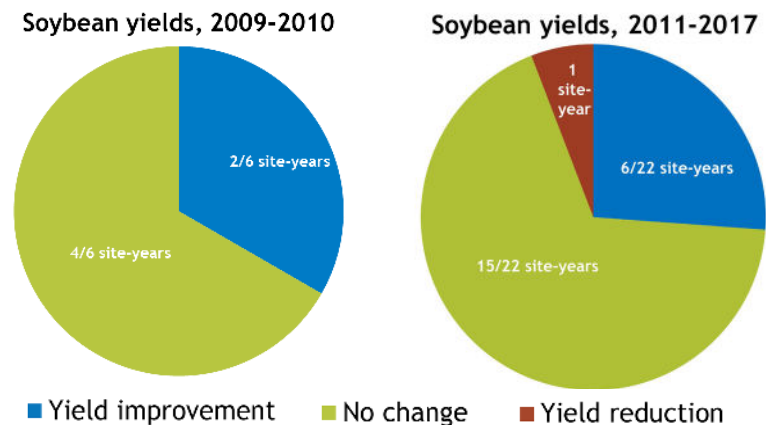
Figure 1. Trends with respect to cover crop effect on corn yields at 10 site-years from 2009 to 2010 and 25 site-years from 2011 to 2017.



Soybean yields 2017

Soybean yields were typically equivalent regardless of cover crop treatment as determined by statistical analysis (t-test). In eight cases, however, soybean yields were improved by the cover crop. Increase in soybean yield ranged from 3 to 11 bu/ac with an average increase of 8 bu/ac in these cases. As with corn, soybean yield was also mostly not affected by the cover crop (Figure 2). Only at Coon Rapids (2013) were soybean yields reduced in the cover crop strips. The cooperator identified planter setting as a reason for the yield difference.

Figure 2. Trends with respect to cover crop effect on soybean yields at 6 site-years from 2009 to 2010 and 22 site-years from 2011 to 2017.



Cover crop effect on cash crop yield trends

Since 2008, there have been 35 site-years dedicated to determining the effect on corn yields and 28 site-years to determine the effect on soybean yields. After their first year of introducing cereal rye into their operations, the farmer partners made adjustments to their planter settings to handle more residue and planned to terminate the cover crop 10-14 days before planting to minimize negative impacts on yield. After nine years in the study, the farmer partners have reported mostly no effect of the cereal rye cover crop on corn and soybean yield.

For more detailed information on the project and Year 5 report, see "Winter Cereal Rye Cover Crop Effect on Cash Crop Yield – Year 5" on these websites:

ILF: <https://www.iowalearningfarms.org/content/cover-crop-research>

PFI: <http://practicalfarmers.org/farmer-knowledge/research-reports/2014/winter-cereal-rye-cover-crop-effect-cash-crop-yield/>



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