



Cover Crop Variety Trial 2016-2017

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Cooperators:

- **Jeremy Gustafson** - Boone
- **Chad Ingels** - Randalia
- **Clarke McGrath** - Clearfield
- **Mark Peterson** - Stanton
- **Myron Rees** - Crawfordsville
- **Bil Schrader** - Rake
- **Paul Kassel** - Spencer

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In a Nutshell

- Cereal rye, oats and other small grains grass species have been proven as effective cover crops in corn-soybean systems in Iowa.
- Cooperators screened grass, legume and brassica species for fall and spring groundcover in hand-seeded plots (7.5' x 25') across the state.

Key findings

- Cereal rye remains the most consistent cover crop providing fall groundcover, overwintering capability and spring groundcover across locations.
- Brassicas generally produced as much fall ground cover as the small grains grasses in the present iteration of the trial.
- Hairy vetch and radish performed better than in past iterations, likely due to exceptional growing conditions.

Project Timeline:
Fall 2016-Spring 2017



Clockwise from upper left: Cereal rye, winter wheat, winter triticale and field pennycress at Jeremy Gustafson's farm near Boone. Photo taken on Apr. 24, 2017.

Background

This was the sixth year of trials screening cover crop varieties conducted by the Practical Farmers of Iowa Cooperators' Program. Reports of previous iterations of this trial are available on the Practical Farmers website (Carlson and Anderson, 2012; Carlson and Gailans, 2013; Gailans

and Carlson, 2014; Gailans and Carlson, 2015; Gailans and Carlson, 2016). Predominant cover crops used by farmers in Iowa have tended to be small grain grasses like cereal rye, winter wheat and oats (Singer, 2008). But more recently, farmers have wondered if the cover crop portfolio in Iowa could be broadened with legume and brassica species.

The present iteration of this trial involved seven cooperators across the state. Cooperators screened 12 cover crop entries – grasses, legumes, brassicas – to determine fall and spring groundcover provided by the cover crops. Entries were hand-seeded into standing corn and soybean crops to simulate aerial seeding.

Table 1

**Cover crop entries, seeding rates and source of seed
for the 2016-2017 iteration of the cover crop variety trial.**

| Cover Crop | Variety | Category | Seeding Rate (lb/ac) | Source |
|--------------------------|----------------------|----------|----------------------|---------------------------------------|
| Cereal rye | VNS | Grass | 60 | Albert Lea Seed House, Albert Lea, MN |
| Oats | Saber | Grass | 60 | Albert Lea Seed House, Albert Lea, MN |
| Winter wheat | Expedition | Grass | 60 | Albert Lea Seed House, Albert Lea, MN |
| Winter triticale | Fridge | Grass | 60 | Albert Lea Seed House, Albert Lea, MN |
| Winter barley | P919 | Grass | 60 | Green Cover Seed, Bladen, NE |
| Hairy vetch | VNS | Legume | 20 | Albert Lea Seed House, Albert Lea, MN |
| Brown mustard | Kodiak | Brassica | 5 | Mighty Mustard, Spokane, WA |
| Rapeseed | Dwarf Essex | Brassica | 5 | Albert Lea Seed House, Albert Lea, MN |
| Radish | NitroRadish™ | Brassica | 10 | Albert Lea Seed House, Albert Lea, MN |
| Turnip | Purple Top | Brassica | 5 | Albert Lea Seed House, Albert Lea, MN |
| Field pennycress* + Oats | Ruby Wild + Saber | Mix | 7.5 + 10 | Arvegenix LLC, St. Louis, MO |
| Field pennycress* + Oats | Ruby Wild + Saber | Mix | 7.5 + 15 | Arvegenix LLC, St. Louis, MO |

* These entries were tested at the Gustafson (Boone) site only.

Methods

Cover crop entries evaluated and seeding rates used at each location are presented in **Table 1**. Seeding rates mixes were chosen based on the Midwest Cover Crops Field Guide, Second Edition (MCCC, 2014) and common practices among local farmers.

Cover crops were hand-seeded by cooperators into a standing cash crop with two replications of randomized plots. Each plot was 7.5-ft wide and 25-ft long. Cover crops were seeded when the first soybean leaves yellowed or when corn reached black layer (physiological maturity). Seeds were not incorporated into the soil. Cash crops were harvested by cooperators using standard practices, and the cover crops were left undisturbed.

Cooperators determined ground cover of each cover crop using a 16-ft rope (marked every 6-in.) placed diagonally across each cover crop entry's plot, and counting how many marks lay on top of cover crop foliage. These counts were used to calculate the percent coverage of the soil by the cover crop. A fall 2016 measurement was taken within a few days of the first predicted hard freeze, and a spring measurement was taken just prior to any field work preceding cash crop planting in 2017.



Cereal rye (left) and field pennycress were both over a foot tall by Apr. 24, 2017 at Jeremy Gustafson's near Boone. Seeded on Sept. 16, 2016 into standing soybeans.

Results

2016-2017 Growing Conditions

Mean monthly temperature and total monthly rainfall for the period Sept. 1, 2016–Apr. 30, 2017, as well as the long-term averages, is provided from the nearest weather station to each location (Iowa Environmental Mesonet, 2017). Rainfall tended to be above normal in September 2016 and January 2017 at each site. Fall 2016 and Spring 2017 temperatures tended to be near the average across locations with a few exceptions: November 2016 and January and February 2017 were warmer than normal. Conditions at all locations appeared to be conducive to winter survival of cover crops that possessed that ability.

Cover crop performance

Cover crops were established in standing corn (2 sites) and soybeans (5 sites) in the fall of 2016. At all locations, both fall and spring groundcover assessments were conducted.

Average groundcover provided by the cover crops in the fall and spring across all locations is provided in **Figures 1 and 2**. Results for each individual location are provided in **Tables 2-8**. Cover crop entries from the current iteration of the trial that were also evaluated in past iterations are included to provide trends over time.

Small grains grasses, like cereal rye, tended to be the best performers in terms of providing both fall and spring groundcover in the present iteration. Cereal rye, winter wheat, winter triticale and winter barley generally provided similar amounts of cover in the fall and in the spring. Oats provided as much fall groundcover as the winter grains at most sites.

Brassica cover crops provided similar levels of fall groundcover as the small grains grasses. Brown mustard continues to show promise as a source of fall groundcover. As with the 2015-2016 iteration, radish performed better in Fall 2016 than in past fall seasons (prior to 2015). This was likely due once more to warmer and wetter conditions than normal in Fall 2016 that provided exceptional growing conditions. Field pennycress at the Gustafson site in Boone (**Table 2**) provided the most spring groundcover. Field pennycress also overwintered much more consistently than rapeseed (which can also overwinter) at the Gustafson site as was the case in past iterations. It should be noted that radish and field pennycress are seeded at higher rates than brown mustard, rapeseed and turnip (**Table 1**).

The lone legume studied, hairy vetch, overwintered at most sites and provided spring groundcover in greater amounts than previously observed in any past iterations. Generally, not much fall growth was observed across the sites. Like the performance of radish in the fall noted above, the performance of hairy vetch observed in present iteration is likely due to growing conditions more favorable than normal during 2016-2017. Using legume species, like hairy vetch, as cover crops in corn-soybean systems is typically challenging due to the limited amount of heat units remaining in the season for establishment when seeded in early to mid-September.

Cereal rye, and the other winter grains, remains the most consistent performer concerning fall groundcover, overwintering capability and spring groundcover across locations.

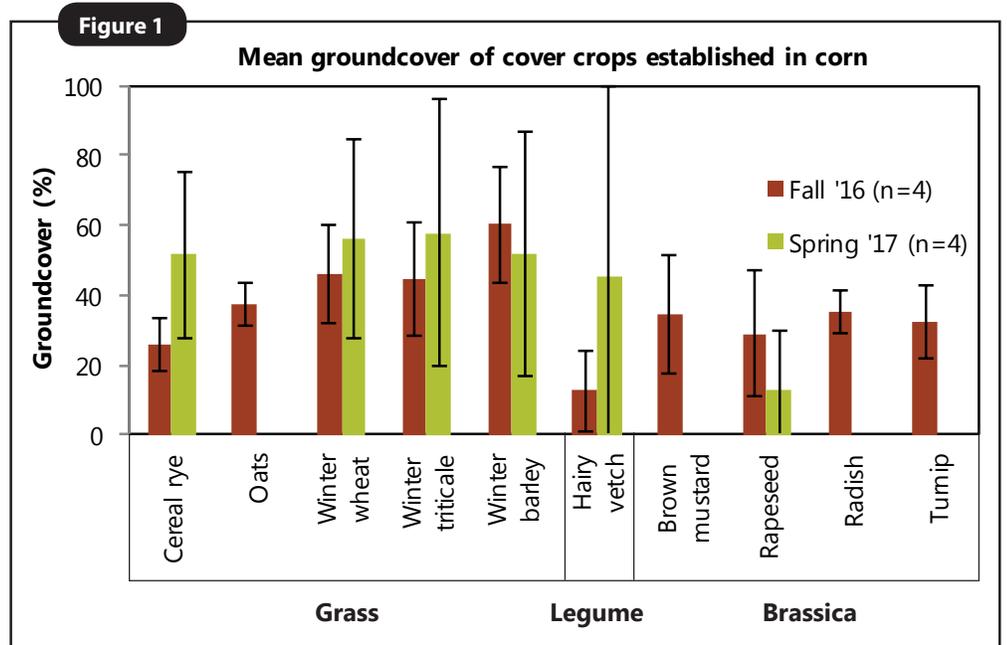


Figure 1. Average groundcover of cover crops in fall and spring across all sites where cover crops were established in standing corn in 2016 (Peterson and Rees). Error bars above and below columns represent 90% confidence intervals. By season, if error bars do not overlap, species can roughly be considered significantly different.

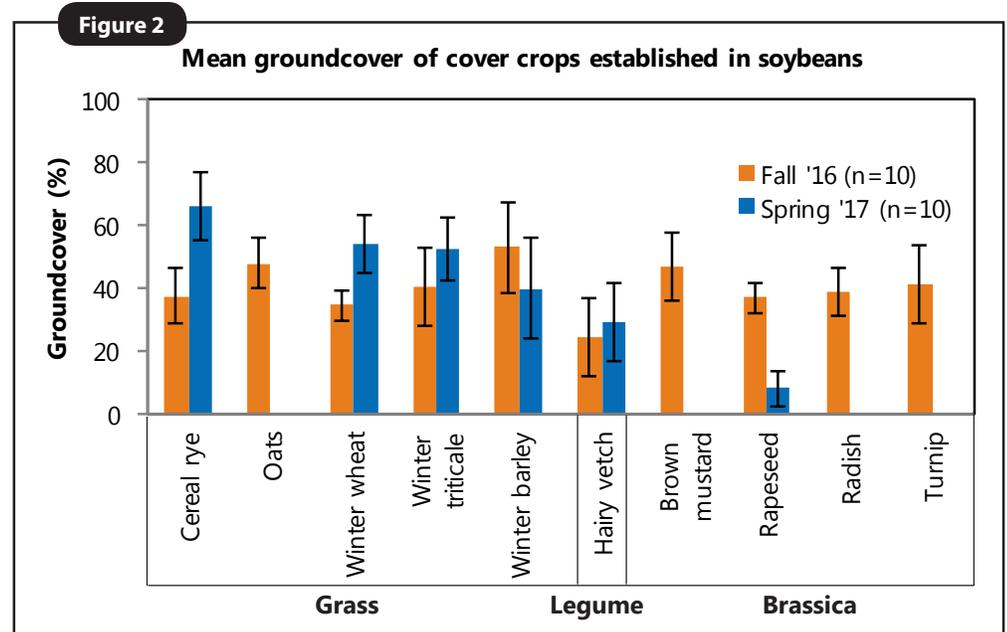
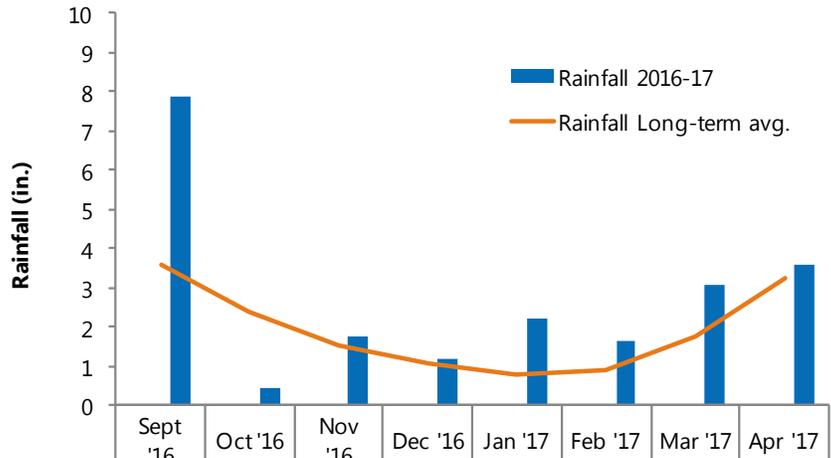


Figure 2. Average groundcover of cover crops in fall and spring across all sites where cover crops were established in standing soybeans in 2016. Error bars above and below columns represent 90% confidence intervals. By season, if error bars do not overlap, species can roughly be considered significantly different.

Jeremy Gustafson, Boone County

Standing crop, 2016: Soybeans
 Seeding date: 9/16/2016
 Fall measurement: 11/12/2016
 Spring measurement: 4/24/2017
 GDD (base 40°F) from seeding date to fall measurement: 1,115
 GDD (base 40°F) from seeding date to spring measurement: 1,814
 Replications: 2



| | Sept '16 | Oct '16 | Nov '16 | Dec '16 | Jan '17 | Feb '17 | Mar '17 | Apr '17 |
|---------------------------------|----------|---------|---------|---------|---------|---------|---------|---------|
| Temperature (°F) 2016-17 | 69 | 58 | 47 | 25 | 24 | 33 | 36 | 50 |
| Temperature (°F) Long-term avg. | 64 | 53 | 37 | 24 | 19 | 23 | 36 | 50 |

Mean monthly rainfall and temperature for the period September 2016–April 2017 and the 60-year averages at the Ames weather station (Iowa Environmental Mesonet, 2017).

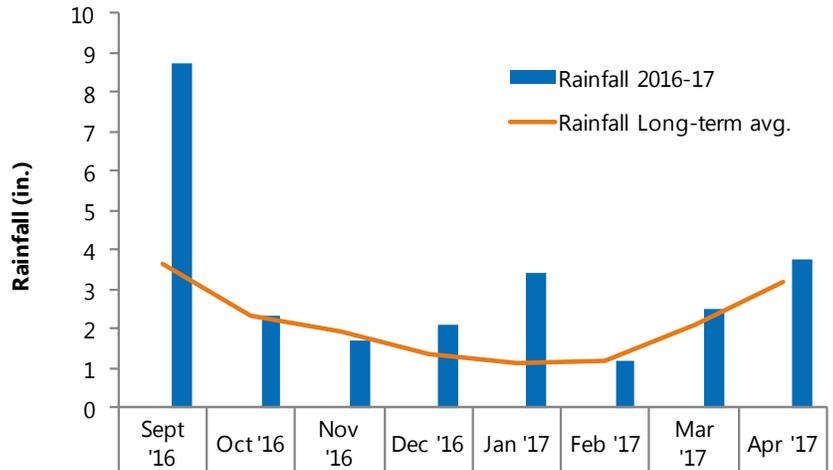
Table 2

Results for the Cover Crop Variety Trial at Jeremy Gustafson's soybean field near Boone. The least significant difference (LSD) is provided for 2016-2017 and 2015-2016.

| Cover Crop | 2016-17 | | 2015-16 | | 2014-15 | | 2013-14 | | 2012-13 | |
|------------------------|-----------------|--------|---------|--------|---------|--------|---------|--------|---------|--------|
| | Fall | Spring | Fall | Spring | Fall | Spring | Fall | Spring | Fall | Spring |
| | Groundcover (%) | | | | | | | | | |
| Cereal rye | 14.1 | 62.6 | 45.8 | 72.9 | 57.8 | 56.3 | 43.8 | 60.9 | 78.1 | 73.4 |
| Oats | 39.0 | 0.0 | 42.7 | 0.0 | 51.6 | 0.0 | 39.0 | 0.0 | -- | -- |
| Winter wheat | 37.5 | 71.9 | 28.1 | 53.1 | -- | -- | -- | -- | -- | -- |
| Winter triticale | 57.8 | 51.6 | 35.4 | 54.2 | -- | -- | -- | -- | 74.5 | 60.4 |
| Winter barley | 71.9 | 46.9 | 62.5 | 61.5 | -- | -- | -- | -- | 62.5 | 43.8 |
| Hairy vetch | 12.5 | 56.3 | 17.7 | 64.6 | 17.2 | 15.6 | 15.6 | 0.0 | 45.3 | 34.4 |
| Brown mustard | 50.0 | 0.0 | 66.7 | 5.2 | 78.2 | 0.0 | 67.2 | 0.0 | -- | -- |
| Rapeseed | 37.5 | 17.2 | 42.7 | 44.8 | 42.2 | 0.0 | 35.9 | 0.0 | -- | -- |
| Radish | 21.9 | 0.0 | 60.4 | 0.0 | 23.4 | 0.0 | 40.7 | 0.0 | -- | -- |
| Turnip | 26.6 | 0.0 | 47.9 | 1.0 | -- | -- | -- | -- | -- | -- |
| Pennycress + oats (10) | 39.1 | 85.9 | -- | -- | -- | -- | -- | -- | -- | -- |
| Pennycress + oats (15) | 37.5 | 95.3 | -- | -- | -- | -- | -- | -- | -- | -- |
| LSD ($P \leq 0.05$) | 38.1 | 37.0 | 37.3 | 32.7 | -- | -- | -- | -- | -- | -- |

Chad Ingels, Fayette County

Standing crop, 2016: Soybeans
 Seeding date: 9/12/2016
 Fall measurement: 11/27/2016
 Spring measurement: 4/26/2017
 GDD (base 40°F) from seeding date to fall measurement: 1,136
 GDD (base 40°F) from seeding date to spring measurement: 1,642
 Replications: 2



| | Sept '16 | Oct '16 | Nov '16 | Dec '16 | Jan '17 | Feb '17 | Mar '17 | Apr '17 |
|---------------------------------|----------|---------|---------|---------|---------|---------|---------|---------|
| Temperature (°F) 2016-17 | 65 | 53 | 44 | 20 | 21 | 31 | 34 | 50 |
| Temperature (°F) Long-term avg. | 62 | 50 | 35 | 21 | 16 | 20 | 33 | 47 |

Mean monthly rainfall and temperature for the period September 2016–April 2017 and the 60-year averages at the Fayette weather station (Iowa Environmental Mesonet, 2017).

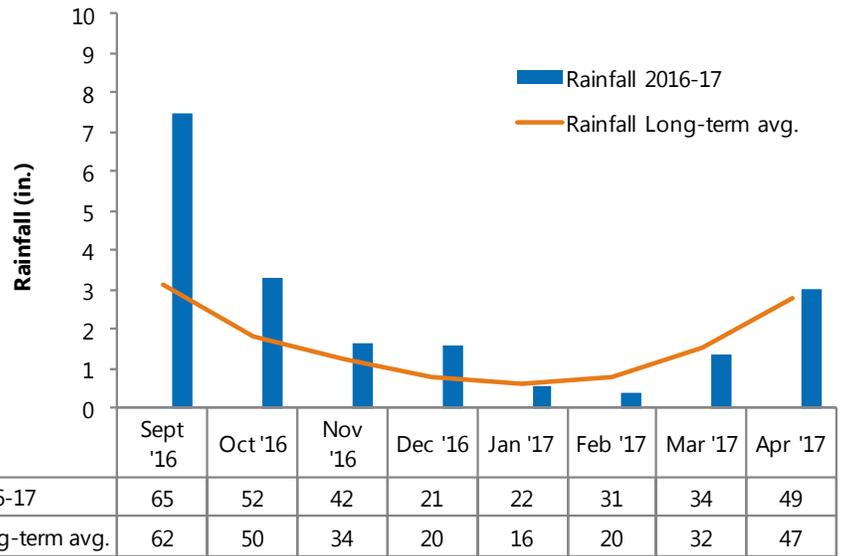
Table 3

Results for the Cover Crop Variety Trial at Chad Ingels's soybean field near Randalia. The least significant difference (LSD) is provided for 2016-2017 and 2015-2016.

| Cover Crop | 2016-17 | | 2015-16 | | 2013-14 | |
|-----------------------|-----------------|--------|---------|--------|---------|--------|
| | Fall | Spring | Fall | Spring | Fall | Spring |
| | Groundcover (%) | | | | | |
| Cereal rye | 39.1 | 75.0 | 18.8 | 48.4 | -- | 62.5 |
| Oats | 54.7 | 0.0 | 20.3 | 0.0 | -- | 0.0 |
| Winter wheat | 31.3 | 59.4 | 15.6 | 40.6 | -- | -- |
| Winter triticale | 40.6 | 59.4 | 20.3 | 46.9 | -- | -- |
| Winter barley | 57.8 | 70.3 | 40.6 | 56.3 | -- | -- |
| Hairy vetch | 12.5 | 34.4 | 14.1 | 29.7 | -- | 0.0 |
| Brown mustard | 39.1 | 0.0 | 12.5 | 0.0 | -- | 0.0 |
| Rapeseed | 34.4 | 20.3 | 7.8 | 3.1 | -- | 0.0 |
| Radish | 48.4 | 0.0 | 9.4 | 0.0 | -- | 0.0 |
| Turnip | 57.8 | 0.0 | 7.8 | 0.0 | -- | -- |
| LSD ($P \leq 0.05$) | 42.9 | 38.9 | 18.6 | 18.6 | -- | -- |

Paul Kassel, Clay County

Standing crop, 2016: Soybeans
 Seeding date: 9/3/2016
 Fall measurement: 11/16/2016
 Spring measurement: 4/12/2017
 GDD (base 40°F) from seeding date to fall measurement: 1,312
 GDD (base 40°F) from seeding date to spring measurement: 1,685
 Replications: 2



| | | | | | | | | |
|---------------------------------|----|----|----|----|----|----|----|----|
| Temperature (°F) 2016-17 | 65 | 52 | 42 | 21 | 22 | 31 | 34 | 49 |
| Temperature (°F) Long-term avg. | 62 | 50 | 34 | 20 | 16 | 20 | 32 | 47 |

Mean monthly rainfall and temperature for the period September 2016–April 2017 and the 60-year averages at the Spencer weather station (Iowa Environmental Mesonet, 2017).

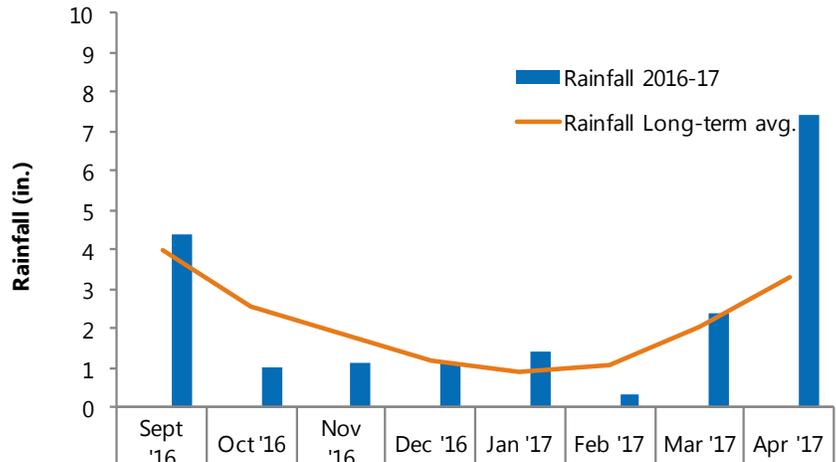
Table 4

Results for the Cover Crop Variety Trial at Paul Kassel's soybean field near Spencer. The least significant difference (LSD) is provided for 2016-2017.

| Cover Crop | 2016-17 | | 2015-16 | | 2014-15 | | 2013-14 | | 2012-13 | |
|-----------------------|-----------------|--------|---------|--------|---------|--------|---------|--------|---------|--------|
| | Fall | Spring | Fall | Spring | Fall | Spring | Fall | Spring | Fall | Spring |
| | Groundcover (%) | | | | | | | | | |
| Cereal rye | 53.1 | 76.6 | -- | -- | 21.9 | 7.8 | 21.9 | 25.0 | 17.2 | 31.3 |
| Oats | 57.8 | 0.0 | -- | -- | 18.8 | 0.0 | 23.4 | 0.0 | -- | -- |
| Winter wheat | 35.9 | 53.1 | -- | -- | -- | -- | -- | -- | -- | -- |
| Winter triticale | 28.1 | 47.8 | -- | -- | -- | -- | -- | -- | -- | -- |
| Winter barley | 60.9 | 14.1 | -- | -- | -- | -- | -- | -- | -- | -- |
| Hairy vetch | 10.9 | 0.0 | -- | -- | 6.3 | 7.8 | 6.3 | 0.0 | 17.2 | 0.0 |
| Brown mustard | 26.6 | 0.0 | -- | -- | 15.6 | 0.0 | 15.6 | 0.0 | -- | -- |
| Rapeseed | 32.8 | 0.0 | -- | -- | 7.8 | 0.0 | 7.8 | 0.0 | -- | -- |
| Radish | 35.9 | 0.0 | -- | -- | 15.6 | 0.0 | 15.6 | 0.0 | -- | -- |
| Turnip | 23.4 | 0.0 | -- | -- | -- | -- | -- | -- | -- | -- |
| LSD ($P \leq 0.05$) | 27.7 | 14.2 | -- | -- | -- | -- | -- | -- | -- | -- |

Clarke McGrath, Ringgold County

Standing crop, 2016: Soybeans
 Seeding date: 9/19/2016
 Fall measurement: 11/10/2016
 Spring measurement: 4/17/2017
 GDD (base 40°F) from seeding date to fall measurement: 1,019
 GDD (base 40°F) from seeding date to spring measurement: 1,801
 Replications: 2



| | Sept '16 | Oct '16 | Nov '16 | Dec '16 | Jan '17 | Feb '17 | Mar '17 | Apr '17 |
|---------------------------------|----------|---------|---------|---------|---------|---------|---------|---------|
| Temperature (°F) 2016-17 | 68 | 57 | 46 | 24 | 26 | 36 | 41 | 52 |
| Temperature (°F) Long-term avg. | 65 | 54 | 39 | 27 | 22 | 27 | 38 | 51 |

Mean monthly rainfall and temperature for the period September 2016–April 2017 and the 60-year averages at the Mt. Ayr weather station (Iowa Environmental Mesonet, 2017).

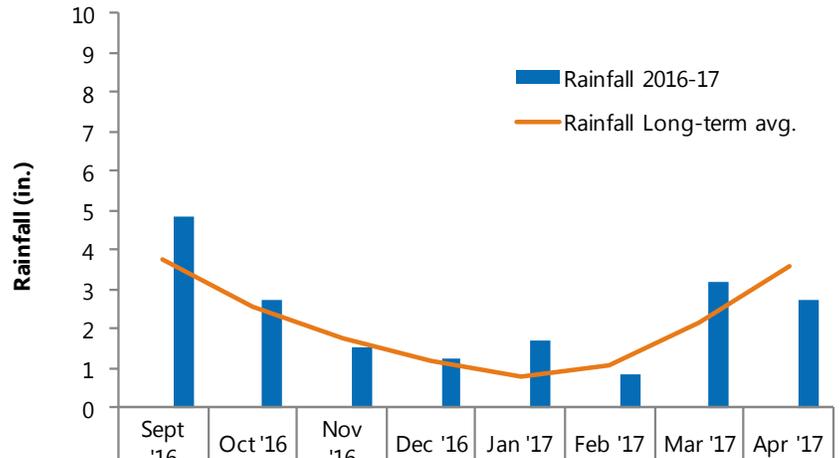
Table 5

Results for the Cover Crop Variety Trial at Clarke McGrath's soybean field near Clearfield. The least significant difference (LSD) is provided for 2106-2017 and 2015-2016.

| Cover Crop | 2016-17 | | 2015-16 | | 2014-15 | | 2013-14 | |
|-----------------------|-----------------|--------|---------|--------|---------|--------|---------|--------|
| | Fall | Spring | Fall | Spring | Fall | Spring | Fall | Spring |
| | Groundcover (%) | | | | | | | |
| Cereal rye | 48.4 | 78.1 | 34.4 | 35.9 | 40.6 | 21.9 | 43.8 | 98.4 |
| Oats | 50.0 | 0.0 | 18.8 | 0.0 | 9.4 | 0.0 | 21.9 | 0.0 |
| Winter wheat | 34.4 | 56.3 | 29.7 | 40.6 | -- | -- | -- | -- |
| Winter triticale | 28.1 | 56.3 | 18.8 | 37.5 | -- | -- | -- | -- |
| Winter barley | 20.3 | 28.1 | 25.0 | 32.8 | -- | -- | -- | -- |
| Hairy vetch | 59.4 | 40.6 | 9.4 | 9.4 | 1.6 | 1.6 | 10.9 | 0.0 |
| Brown mustard | 70.3 | 0.0 | 29.7 | 0.0 | 20.3 | 0.0 | 40.6 | 0.0 |
| Rapeseed | 37.5 | 0.0 | 23.4 | 0.0 | 4.7 | 0.0 | 20.3 | 0.0 |
| Radish | 48.4 | 0.0 | 23.4 | 0.0 | 10.9 | 0.0 | 35.9 | 0.0 |
| Turnip | 68.8 | 0.0 | 17.2 | 0.0 | -- | -- | -- | -- |
| LSD ($P \leq 0.05$) | 41.4 | 46.0 | 25.8 | 21.6 | -- | -- | -- | -- |

Mark Peterson, Montgomery County

Standing crop, 2016: Corn
 Seeding date: 9/9/2016
 Fall measurement: 11/12/2016
 Spring measurement: 5/5/2017
 GDD (base 40°F) from seeding date to fall measurement: 1,361
 GDD (base 40°F) from seeding date to spring measurement: 2,425
 Replications: 2



| | Sept '16 | Oct '16 | Nov '16 | Dec '16 | Jan '17 | Feb '17 | Mar '17 | Apr '17 |
|---------------------------------|----------|---------|---------|---------|---------|---------|---------|---------|
| Temperature (°F) 2016-17 | 70 | 58 | 47 | 26 | 27 | 37 | 42 | 53 |
| Temperature (°F) Long-term avg. | 66 | 54 | 39 | 27 | 22 | 27 | 39 | 52 |

Mean monthly rainfall and temperature for the period September 2016–April 2017 and the 60-year averages at the Red Oak weather station (Iowa Environmental Mesonet, 2017).

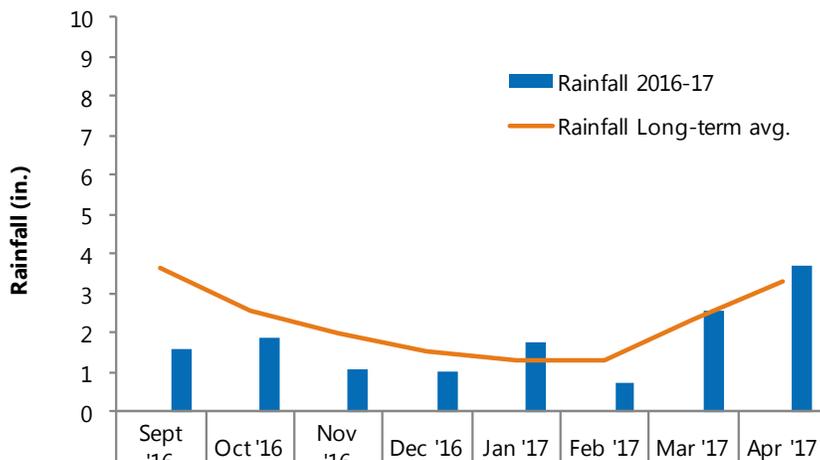
Table 6

Results for the Cover Crop Variety Trial at Mark Peterson's corn field near Stanton. The least significant difference (LSD) is provided for 2016-2017 and 2015-2016.

| Cover Crop | 2016-17 | | 2015-16 | | 2014-15 | | 2013-14 | |
|-----------------------|-----------------|--------|---------|--------|---------|--------|---------|--------|
| | Fall | Spring | Fall | Spring | Fall | Spring | Fall | Spring |
| | Groundcover (%) | | | | | | | |
| Cereal rye | 26.7 | 34.4 | 21.9 | -- | 37.5 | -- | 35.9 | 100 |
| Oats | 37.5 | 0.0 | 20.3 | -- | 10.9 | -- | 12.5 | 0.0 |
| Winter wheat | 50.0 | 35.9 | 32.8 | -- | -- | -- | -- | -- |
| Winter triticale | 46.9 | 29.7 | 28.1 | -- | -- | -- | -- | -- |
| Winter barley | 50.0 | 31.3 | 37.5 | -- | -- | -- | -- | -- |
| Hairy vetch | 4.7 | 0.0 | 3.1 | -- | 6.3 | -- | 9.4 | 0.0 |
| Brown mustard | 37.5 | 0.0 | 34.4 | -- | 17.2 | -- | 4.7 | 0.0 |
| Rapeseed | 42.2 | 0.0 | 28.1 | -- | 10.9 | -- | 1.6 | 0.0 |
| Radish | 32.8 | 0.0 | 29.7 | -- | 6.3 | -- | 1.6 | 0.0 |
| Turnip | 39.0 | 0.0 | 20.3 | -- | -- | -- | -- | -- |
| LSD ($P \leq 0.05$) | 49.3 | 28.4 | 63.9 | -- | -- | -- | -- | -- |

Myron Rees, Washington County

Standing crop, 2016: Corn
 Seeding date: 9/23/2016
 Fall measurement: 11/18/2016
 Spring measurement: 5/11/2017
 GDD (base 40°F) from seeding date to fall measurement: 1,034
 GDD (base 40°F) from seeding date to spring measurement: 2,021
 Replications: 2



| | | | | | | | | |
|---------------------------------|----|----|----|----|----|----|----|----|
| Temperature (°F) 2016-17 | 69 | 58 | 46 | 25 | 26 | 36 | 40 | 52 |
| Temperature (°F) Long-term avg. | 66 | 54 | 40 | 27 | 22 | 26 | 38 | 51 |

Mean monthly rainfall and temperature for the period September 2016–April 2017 and the 60-year averages at the Washington weather station (Iowa Environmental Mesonet, 2017).

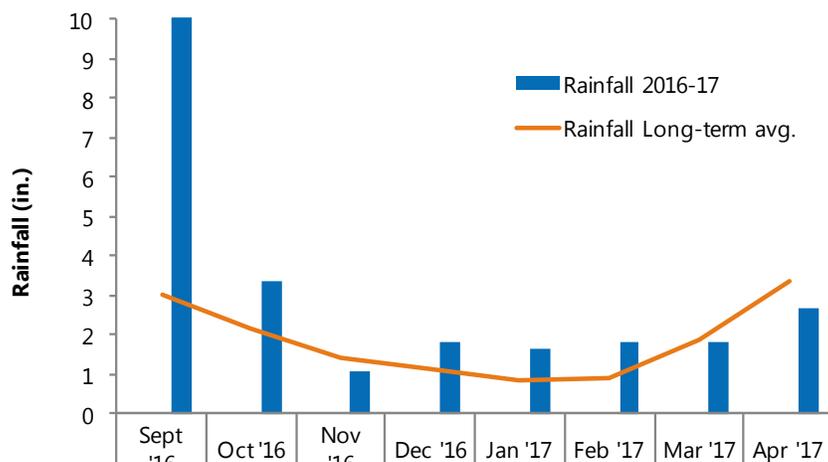
Table 7

Results for the Cover Crop Variety Trial at Myron Rees's corn field near Crawfordsville. The least significant difference (LSD) is provided for 2016-2017 and 2015-2016.

| Cover Crop | 2016-17 | | 2015-16 | |
|-----------------------|-----------------|--------|---------|--------|
| | Fall | Spring | Fall | Spring |
| | Groundcover (%) | | | |
| Cereal rye | 21.9 | 68.8 | 31.3 | 54.7 |
| Oats | 37.5 | 0.0 | 29.7 | 0.0 |
| Winter wheat | 42.2 | 76.6 | 40.6 | 35.9 |
| Winter triticale | 42.2 | 85.9 | 32.8 | 48.4 |
| Winter barley | 70.3 | 71.9 | 45.3 | 42.2 |
| Hairy vetch | 20.3 | 90.6 | 10.9 | 34.4 |
| Brown mustard | 31.3 | 0.0 | 18.8 | 0.0 |
| Rapeseed | 15.6 | 25.0 | 10.9 | 1.6 |
| Radish | 37.5 | 0.0 | 25.0 | 0.0 |
| Turnip | 25.0 | 0.0 | 6.3 | 0.0 |
| LSD ($P \leq 0.05$) | 21.5 | 58.1 | 21.4 | 27.0 |

Bil Schrader, Winnebago County

Standing crop, 2016: Soybeans
 Seeding date: 9/15/2016
 Fall measurement: 11/14/2016
 Spring measurement: 4/24/2017
 GDD (base 40°F) from seeding date to fall measurement: 928
 GDD (base 40°F) from seeding date to spring measurement: 1,378
 Replications: 2



| | | | | | | | | |
|---------------------------------|----|----|----|----|----|----|----|----|
| Temperature (°F) 2016-17 | 64 | 51 | 43 | 18 | 19 | 29 | 32 | 48 |
| Temperature (°F) Long-term avg. | 62 | 50 | 34 | 20 | 14 | 20 | 32 | 47 |

Mean monthly rainfall and temperature for the period September 2016–April 2017 and the 60-year averages at the Forest City weather station (Iowa Environmental Mesonet, 2017).

Table 8

Results for the Cover Crop Variety Trial at Bil Schrader's soybean field near Rake. The least significant difference (LSD) is provided for 2016-2017.

| Cover Crop | 2016-17 | | 2015-16 | |
|-----------------------|-----------------|--------|---------|--------|
| | Fall | Spring | Fall | Spring |
| | Groundcover (%) | | | |
| Cereal rye | 31.3 | 34.4 | 53.3 | -- |
| Oats | 37.5 | 0.0 | 65.6 | -- |
| Winter wheat | 32.8 | 20.5 | 65.6 | -- |
| Winter triticale | -- | -- | 56.3 | -- |
| Winter barley | -- | -- | 78.1 | -- |
| Hairy vetch | 25.0 | 14.1 | 43.8 | -- |
| Brown mustard | 46.9 | 0.0 | 75.0 | -- |
| Rapeseed | 42.2 | 1.6 | 50.0 | -- |
| Radish | 37.5 | 0.0 | 40.6 | -- |
| Turnip | 29.7 | 0.0 | 59.4 | -- |
| LSD ($P \leq 0.05$) | 68.7 | 25.2 | NA | -- |

References

- Carlson, S. and A. Anderson. 2012. *Cover Crops Do Double-Duty*. Practical Farmers of Iowa Cooperators' Program. Ames, IA. <http://practicalfarmers.org/farmer-knowledge/research-reports/2012/cover-crops-double-duty-cover-and-small-grains/> (accessed Apr. 24, 2017).
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PFI Cooperators' Program

PFI's Cooperators' Program gives farmers practical answers to questions they have about on-farm challenges through research, record-keeping, and demonstration projects. The Cooperators' Program began in 1987 with farmers looking to save money through more judicious use of inputs. If you are interested in conducting an on-farm trial contact Stefan Gailans @ 515-232-5661 or stefan@practicalfarmers.org.