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# On-Farm Cover Crop Trials

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**Abstract**
Cover crops can benefit farmers by aiding in erosion control, increasing organic matter in the soil, and reducing nitrate losses into the surface waters. Cover crops also have been promoted to alleviate soil compaction and improve soil drainage. Legume cover crops can supply nitrogen to the following crop. Cover crops are an important practice in meeting Iowa's nutrient reduction strategy goals. However, some research has indicated that planting corn following a rye cover crop can result in corn grain yield losses, especially if the cover crop is not killed at least two weeks prior to planting the corn.

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# On-Farm Cover Crop Trials

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## Introduction

Cover crops can benefit farmers by aiding in erosion control, increasing organic matter in the soil, and reducing nitrate losses into the surface waters. Cover crops also have been promoted to alleviate soil compaction and improve soil drainage. Legume cover crops can supply nitrogen to the following crop. Cover crops are an important practice in meeting Iowa's nutrient reduction strategy goals. However, some research has indicated that planting corn following a rye cover crop can result in corn grain yield losses, especially if the cover crop is not killed at least two weeks prior to planting the corn.

## Materials and Methods

In 2014, cover crop use was examined in two trials of corn in western Iowa (Table 1) and one trial in soybean in northeast Iowa (Table 2). All trials were conducted on-farm by farmer cooperators using the farmers' equipment. Strips were arranged in a randomized complete block design with at least three replications per treatment. Strip width and length varied from field to field depending on equipment size and size of field. All strips were machine harvested for grain yield.

In Trial 1, 44 lb/acre of a seed mixture containing 70 percent crimson clover and 30 percent tillage radish was no-till drilled in mid-September 2013 following a corn silage harvest. The cover crop that survived the winter (primarily crimson clover) was sprayed with glyphosate when it was about 6 in. tall, immediately prior to planting the corn no-till on May 7, 2014. In Trial 2, winter rye was no-till drilled at 1.5 bushels/acre into soybean stubble on October 10, 2013. The rye was sprayed with glyphosate on April 10, 2014 about four weeks prior to the no-till planting of the corn. Corn without a cover crop was compared with the corn planted after a cover crop in both trials.

In Trial 3, four different cover crop seeding mixtures were no-till drilled on August 8, 2013 into a "prevented planting" field where wet spring and summer conditions prevented the field from being planted to corn or soybean. The four treatments were winter rye at 1.25 bushels/acre, oats at 2.5 bushels/acre, tillage radish at 10 lb/acre, and oats plus radish at 1.25 lb/acre plus 5 lb/acre. The entire area was grazed after November 1. Because of regulations regarding cover crops on prevented planting acres, it was not possible to include an untreated control. All strips were sprayed with glyphosate on April 28, 2014 when the winter rye was about 7 in. tall (about 3 weeks prior to soybean planting). Evaluations of soybean plant stands were made in the spring.

## Results and Discussion

In Trial 1, there was a yield increase of 17 bushels/acre with the corn planted after the crimson clover plus tillage radish cover crop compared with the corn without a cover crop (Table 3). This may have been due to improving the soil drainage with the tillage radish, or some nitrogen benefit to the crimson clover. The rate of nitrogen fertilizer on the field was 192 lb/acre. With the excess spring rains, it is possible the corn might have responded to additional nitrogen, because the field had been in corn for several years.

In Trial 2, there was no difference in yield between the corn planted following a rye cover crop and the corn without the cover crop.

In Trial 3, the soybean yield was 2-3 bushels/acre lower following the winter rye cover crop compared with the oats, oats plus tillage radish, or tillage radish (Table 4). The soybean plant stands also were lower following the winter rye, although the stand of 123,000 plants/acre should have been sufficient for optimum yields. Without an untreated control, it is not possible to know how the soybean yield following any of these cover crops would have compared with soybeans without a cover crop.

**Table 1. Hybrid, row spacing, planting date, planting population, previous crop, and tillage practices from on-farm cover crop trials in corn in 2014.**

| Exp. no. | Trial | County | Hybrid | Row spacing (in.) | Planting date | Planting population (seeds/A) | Previous crop | Tillage practices |
|---|---|---|---|---|---|---|---|---|
| 140314 | 1 | Monona | LG 2602VT3 PRIB | 30 | 5/7/14 | 31,000 | Corn | No-till |
| 140128 | 2 | Sioux | Pioneer 636AM | 30 | 5/6/14 | 34,300 | Soybean | No-till |

**Table 2. Variety, row spacing, planting date, planting population, previous crop, and tillage practices from an on-farm cover crop trial in soybean in 2014.**

| Exp. no. | Trial | County | Variety | Row spacing (in.) | Planting date | Planting population (seeds/A) | Previous crop | Tillage practices |
|---|---|---|---|---|---|---|---|---|
| 140802 | 3 | Howard | Stine 20DR20 | 30 | 5/21/14 | 165,700 | Corn | Spring field cultivate |

**Table 3. Yield from on-farm cover crop trials in corn in 2014.**

| Exp. no. | Trial | Treatment | Yield (bu/A) | P-value[x] |
|---|---|---|---|---|
| 140314 | 1 | Fall seeded crimson clover & tillage radish | 206 | 0.01 |
| | | Control | 189 | |
| 140128 | 2 | Fall seeded rye | 196 | 0.70 |
| | | Control | 193 | |

[x]P-Value = the calculated probability that the difference in yields can be attributed to the treatments and not other factors. For example, if a trial has a P-Value of 0.10, then we are 90 percent confident the yield differences are in response to treatments. For P = 0.05, we would be 95 percent confident.

**Table 4. Yield from an on-farm cover crop trial in soybean in 2014.**

| Exp. no. | Trial | Treatment | Yield (bu/A)[x] | P-value (yield)[y] | Spring stand[x] | P-value (stand)[y] |
|---|---|---|---|---|---|---|
| 140802 | 3 | Oats | 55 b | 0.01 | 136,000 a | <0.01 |
| | | Oat + radish | 56 b | | 136,000 a | |
| | | Radish | 55 b | | 136,000 a | |
| | | Winter rye | 53 a | | 123,000 b | |

[x]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.05.
[y]P-Value = the calculated probability that the difference in yields can be attributed to the treatments and not other factors. For example, if a trial has a P-Value of 0.10, then we are 90 percent confident the yield differences are in response to treatments. For P = 0.05, we would be 95 percent confident.