# Integrating Cover Crop into a Continuous Corn Production System

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## Introduction

Sustainability is becoming the key to maintain crop profitability in modern agriculture. The use of non-renewable resources in agricultural production is likely to limit where food will likely be grown within 100 years. In the US corn-belt region corn is still grown in a monocropping system and cover crop has the potential to help adding diversity into this system.

Cover crops may improve growing conditions in many different ways; it can improve soil organic mater and physical properties; it can bring nutrient from subsurface horizon to near the root zone of plants; and it can also provide physical protection against erosion during the early spring days when the primary crop is not growing.

The challenge for cover crop in Minnesota is the establishment due to the cold falls and cold and wet springs. This study investigated a few different aspects of adding cover crop into a continuous corn system.

## Objectives

***1-*** *Determine the potential for in-season cover crop planting;*

***2-*** *Investigate the effect of residue removal on corn grain yield and cover crop establishment;*

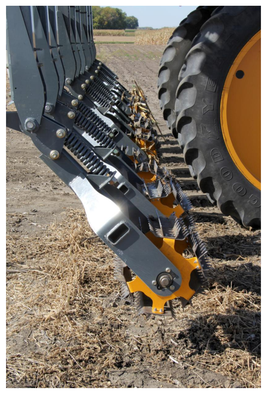
***3-*** *Assess the differences in potential yield on a corn-corn and corn-soybean cropping systems when cover crops are introduced.*

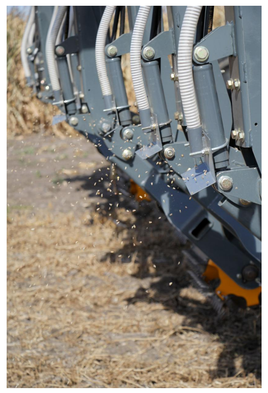
## Materials and Methods

- This study is a 5-year (2013-2018) study;
- Treatments included:
  - corn residue removal compared with no residue removal;
  - cover crop (mix of hairy vetch and winter rye) and no cover crop;
  - tillage (Fall [disk ripper]/Spring[disk, field cultivator]) and no till;
  - and cover crop (mix hairy vetch and winter rye) in a continuous corn rotation system.
- Soil samples were collected in the fall 2013 for baseline measurements of soil fertility;
- Corn was planted in mid-May 2014, N rate used was the same for all plots at 168 kg N $ha^{-1}$ as urea;
- First year cover crop was planted in November 2013; Second year cover crop was planted on standing corn in October 2014;
- Grain yields presented this year are for the first year of the study;
- The experiment was set up in a randomized block design and replicated four times.

**Table 1**. Treatments and corn grain yield for the first year of the cover crop research.

| Tillage | Cropping System | Cover Crop | Residue Removal | Corn Grain Yield (kg $ha^{-1}$) |
|---|---|---|---|---|
| CT | C/S | No | 0% | 8348 a |
| CT | C/C | No | 50% | 8223 ab |
| CT | C/C | Yes | 50% | 8023 abc |
| NT | C/C | No | 50% | 7467 bcd |
| CT | C/C | No | 0% | 7296 cd |
| NT | C/C | Yes | 50% | 7056 de |
| CT | C/C | Yes | 0% | 6328 e |





## Results and Discussion

- The experiment was started after a corn crop in 2013 and the first cover crop was planted in November 2013. The pictures located in the upper right are the cover crops in early spring 2014. There was a good stand for the rye but little hairy vetch emerged.
- Corn grain yields for the 2014 season are present in Table 1. Although there were significant differences between treatments, the differences are not likely due to the treatments. The significant differences are more likely to be due to the cover crop planting in 2014.

## Results and Discussion (Cont.)

- The optimum time to plant the cover crop was August, however, due to logistics problems the planting was only done in mid-October.
- There were significant ears dropped onto the ground as a result of the equipment travel in the plots, which could have led to the results observed.

## Conclusions

- The results of this research showed that it is possible to plant cover crop in standing corn, however, timing of cover crop planting will be an important variable in this practice.
- It is too early to detect any true treatment effect on corn grain yield.