EVALUATION OF COVER CROP TERMINATION METHODS IN CORN PRODUCTION

TRIAL OVERVIEW

- In sustainable farm operations, cover cropping is an effective system to manage soil health, biodiversity, weeds, erosion, water quality, and other pests and diseases.
- Managing cover crops requires additional costs, such as: time, labor, modifications of existing operations to accommodate cover crop seeding, and termination of cover crops.
- Termination methods may change based on the type of cover crop used. Common termination methods include: chemical (herbicide application), environmental (e.g. winter kill), and mechanical (e.g. tillage).

RESEARCH OBJECTIVE

To evaluate different cover crop termination methods for their effects on corn growth and development and final grain yield.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Huxley, IA	Clay Loam	Soybean	Various	5/30/2017	10/28/2017	225 bu/Acre	34,000 seeds/acre

SITE NOTES:

- A 108-relative maturity SmartStax® RIB Complete® corn blend product was used for this trial.
- The trial was carried out in 30-inch row spacing, 30 rows/treatment, in 200 ft. long strips.
- Cereal rye was drilled in the fall of 2016 after harvest.
- In the spring of 2017, 4 termination methods were compared (Fig. 1):
    1. Planting/Herbicide - planting into the cover crop, followed by herbicide application to kill the cover crop.
    2. Herbicide only.
    3. Herbicide/Tillage - herbicide application followed by tillage.
    4. Tillage only.
- Roundup PowerMAX® herbicide was applied at 32 fl oz/acre for the herbicide treatments. Application was made 2 days after planting in Treatment 1, and 48 days before planting in Treatments 2 and 3.
- Treatments 3 and 4 fields were disked 22 days before planting, and worked with a soil finisher 2 days before planting.
- Treatments 2, 3, and 4 received pre- and post-emergence herbicide applications for weed control.
- All treatments were planted on the same day.

UNDERSTANDING THE RESULTS

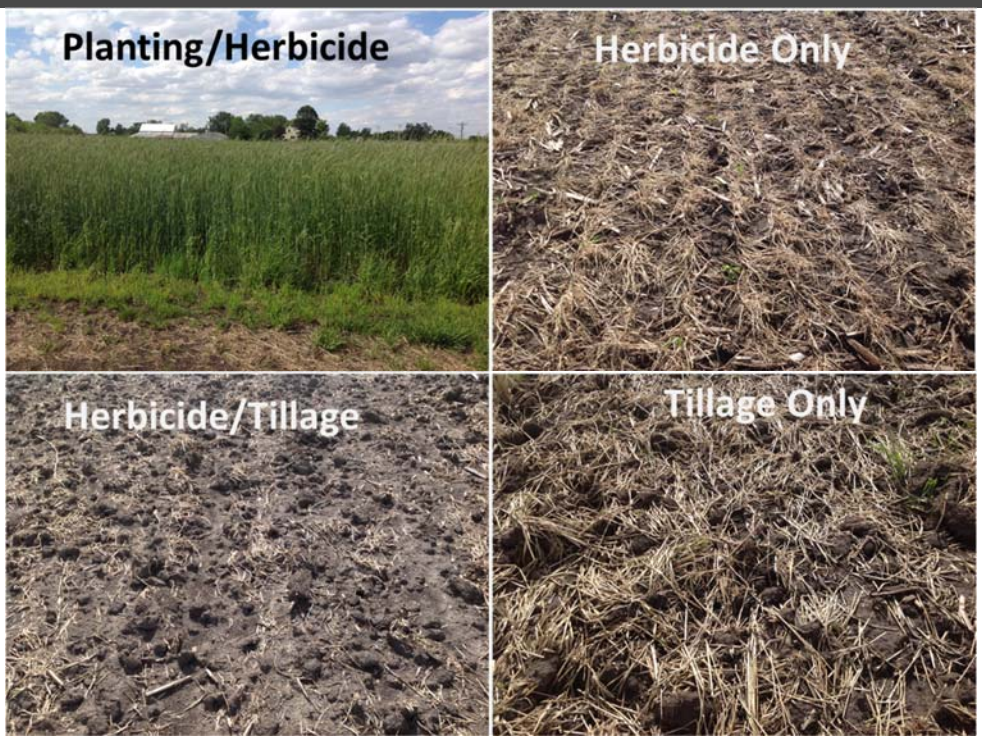

Figure 1. Field conditions of each termination method at the time of planting. The cover crop was about 5 ft. tall at the time of planting in the Planting/Herbicide treatment.

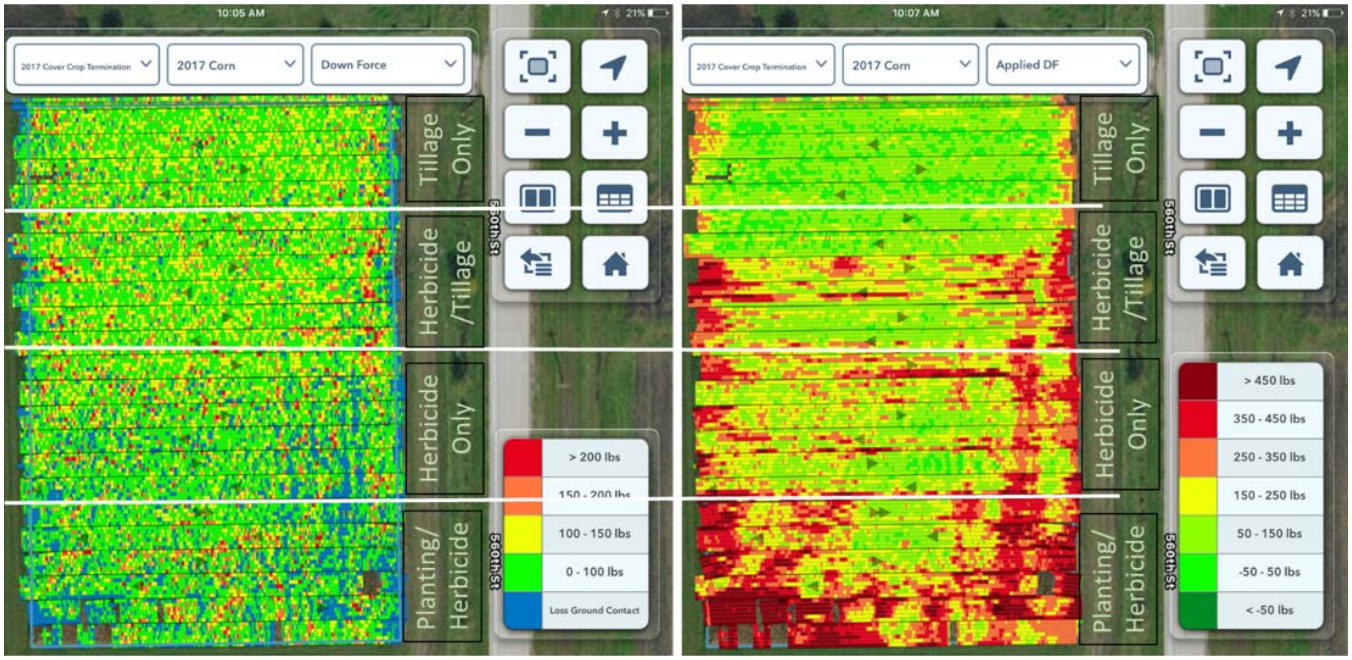

Figure 2. Climate FieldView™ maps showing down force (left) and applied down force (right) adjustments for each termination method during planting.

UNDERSTANDING THE RESULTS

Figure 3. Examples of corn growth and developmental difference as influenced by the four cover crop termination methods. **A:** young corn plants in the Planting/Herbicide treatment. **B:** young corn plants representative of the other three treatments. **C:** mid-season difference between plants of Planting/Herbicide (right 3 rows) and those representative of the other treatments (left 3 rows). **D:** while the other treatments were at full anther extrusion, plants of the Planting/Herbicide treatment were at least 4 leaf stages behind.

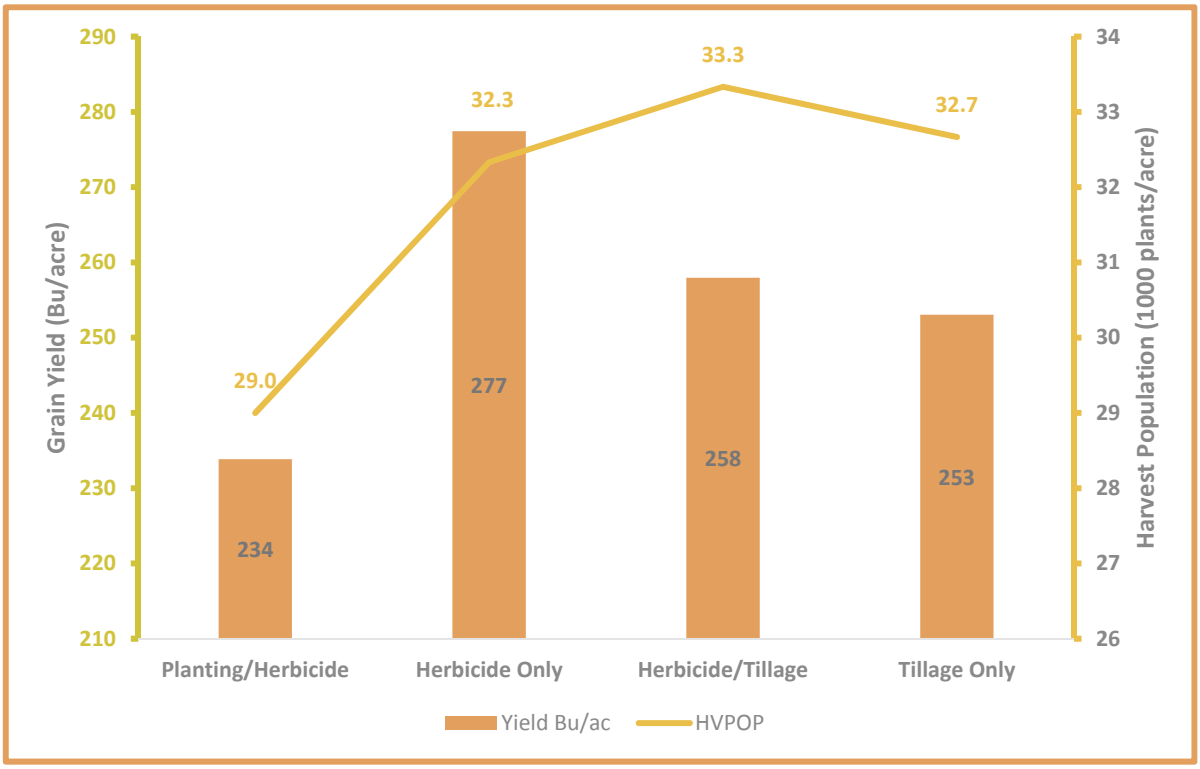

Figure 4. Effects of cover crop termination methods on corn productivity.

UNDERSTANDING THE RESULTS

- More down force was needed to plant the Planting/Herbicide and Herbicide Only treatments than in the two tillage treatments. There was significantly better ground contact in the two tillage treatments than in Planting/Herbicide and Herbicide Only treatments (Fig. 2).
- Seedling emergence and vigor was inconsistent and not uniform in the Planting/Herbicide treatment, but was nearly the same for all other treatments.
- Growth and development of the plants of the Planting/Herbicide treatment were at least 4-leaf stages behind those of the other treatments (Fig. 3).
- At planting, cereal rye in the Planting/Herbicide treatment was about 5 feet tall as a result of delayed planting due to unsuitable soil/weather conditions. The tall canopy shaded the corn plants until about V10 growth stage. This could be responsible for the delayed growth and development observed.
- There was a slight treatment response to final harvest population in which the Planting/Herbicide treatment had the lowest population (Fig. 4).
- Grain moisture content was about 4% higher in Planting/Herbicide compared to the average of the other treatments.
- Average yield varied among treatments, with the Herbicide Only treatment producing the highest yield of 277 bu/acre (Fig. 4).
- Performance of the two tillage treatments (Herbicide/Tillage and Tillage Only) was nearly the same.

WHAT DOES THIS MEANS FOR YOUR FARM?

- Modifications of farm operations to include cover crops is a viable sustainability effort for growers to pursue.
- The choice of cover crop species or mixtures plays a significant role in the ease with which the system is managed.
- If planting is delayed in commercial operations, as was the case in the Planting/Herbicide treatment, cereal rye may be mowed for hay before planting.
- The Herbicide Only treatment out-yielding the other treatments is a great incentive, as this practice can easily be adopted in no-till systems.
- Growers should pay close attention to the herbicides used in their cover crop programs to avoid carryover issues.
- Growers should also pay attention to a corn products tolerance to seedling diseases and use the appropriate seed treatments for their fields.