Evaluation of Cereal Cover Crops Prior to Corn

Trial Objective

- Cereal rye is a cool-season winter annual that is a good cover crop that is easy to establish, but seed costs and seed availability can be limiting and allelopathic effects may be a concern.
- Wheat seed may be more readily available than cereal rye.
- The effects of cereal rye and wheat as cover crops prior to corn has not been fully explored in Michigan (MI).
- While cover crops, such as cereal rye and wheat, can reduce erosion, utilize excess soil nutrients, and increase soil organic matter, they must be terminated in a timely manner in the spring to avoid negatively impacting the following cash crop.
- In this trial, different termination timings with a burndown herbicide application and tillage options were assessed to determine the impacts of a cover crop and tillage on final stand and yield potential of the following corn crop.

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rate (seeds/acre)
Mason, MI	Loam	Soybean and cover crop	No-till and conventional	05/09/2017	11/09/2017	200	35K
Mason, MI	Loam	Soybean and cover crop	No-till and conventional	05/18/2018	10/22/2018	200	35K

- Cereal rye and wheat cover crops were planted in November 2016 and November 2017 after harvest.
- Cereal rye and wheat cover crops were terminated using Roundup PowerMAX® herbicide at two timings:
  - Two weeks prior to planting corn (Pre-plant)
  - The day of planting (At-plant)
- A 103-day relative maturity corn product was planted at 35,000 seeds/acre.
- Prior to planting, 5 gallons of 10-34-0 were applied in-furrow and followed with 60 gallons of 28% UAN at the V5 growth stage.
- All treatments were planted on the same day.
  - May 9, 2017
  - May 18, 2018
- Four cover crop and tillage treatments were compared:
  - Cereal rye cover crop, no tillage
  - White wheat cover crop, no tillage
  - No cover crop, no tillage
  - No cover crop, conventional tillage
- The trial was a split plot design with cover crop removal timing as the whole plot and cover crop as the sub-plot. A confidence interval of 95% was used to compare treatment means.

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Figure 1. Corn planting into cover crop treatments.

Understanding the Results

Table 1. Effects of cover crop and tillage on final corn stand counts.

Year	Treatment	Final Stand Count (plants/acre)
2017	Cereal Rye – Pre-plant Termination	30,225
2017	Cereal Rye – At-Plant Termination	27,750
2017	Wheat – Pre-plant Termination	32,500
2017	Wheat – At-Plant Termination	31,000
2017	No Cover Crop – No-Till	31,300
2017	No Cover Crop – Conventional Till	32,750
2018	Cereal Rye – Pre-plant Termination	32,700
2018	Cereal Rye – At-Plant Termination	31,300
2018	Wheat – Pre-plant Termination	31,700
2018	Wheat – At-Plant Termination	30,700
2018	No Cover Crop – No-Till	31,600
2018	No Cover Crop – Conventional Till	32,500

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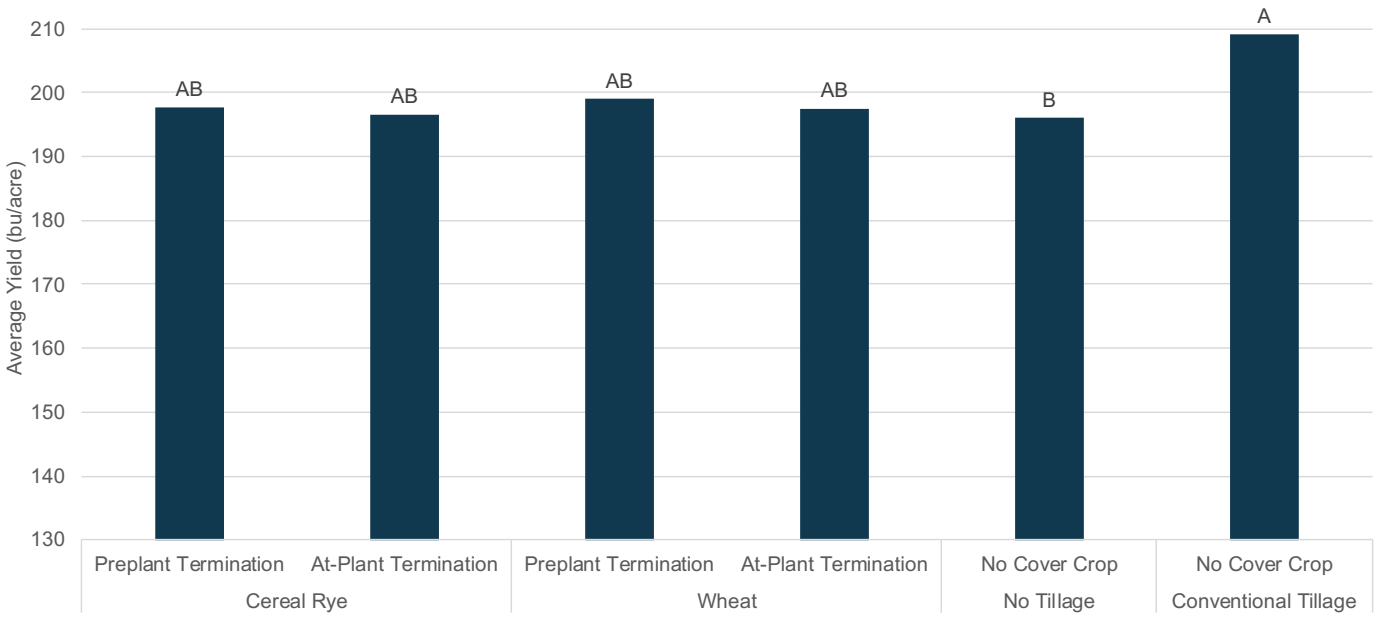

Figure 2. Average 2017 corn yield by cover crop, termination timing, and tillage. Treatments with the same letter are not significantly different (alpha level = 0.05).

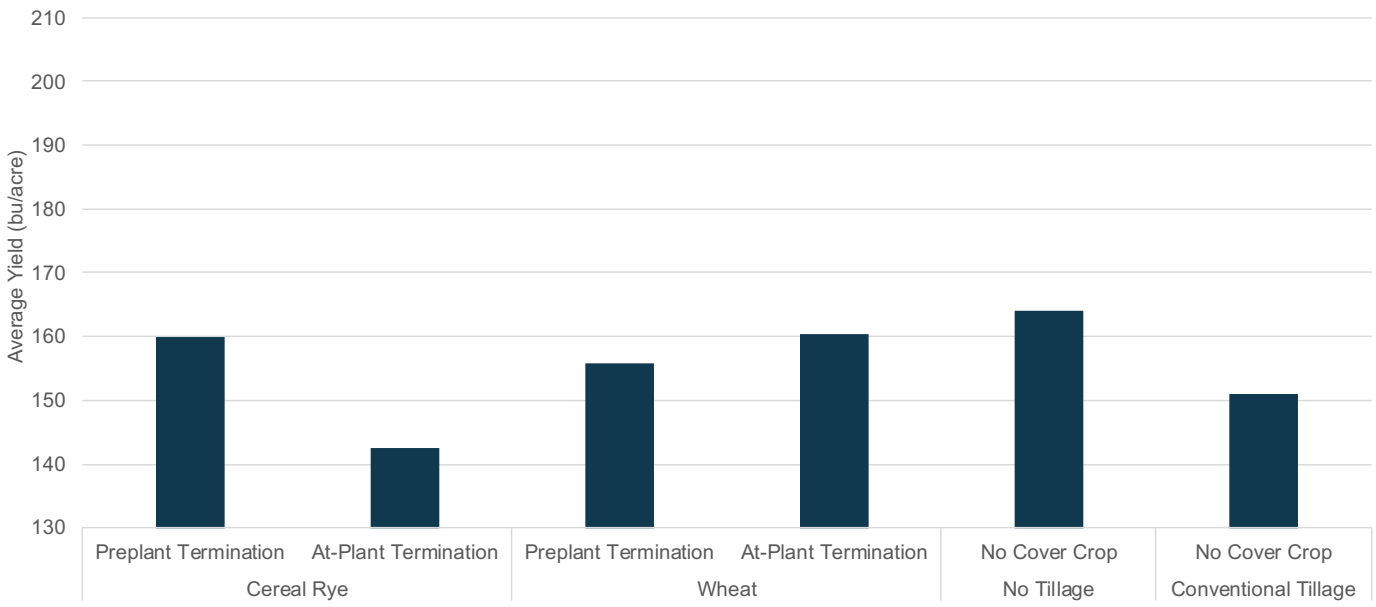

Figure 3. Average 2018 corn yield by cover crop, termination timing, and tillage. Differences in yield were not significant.

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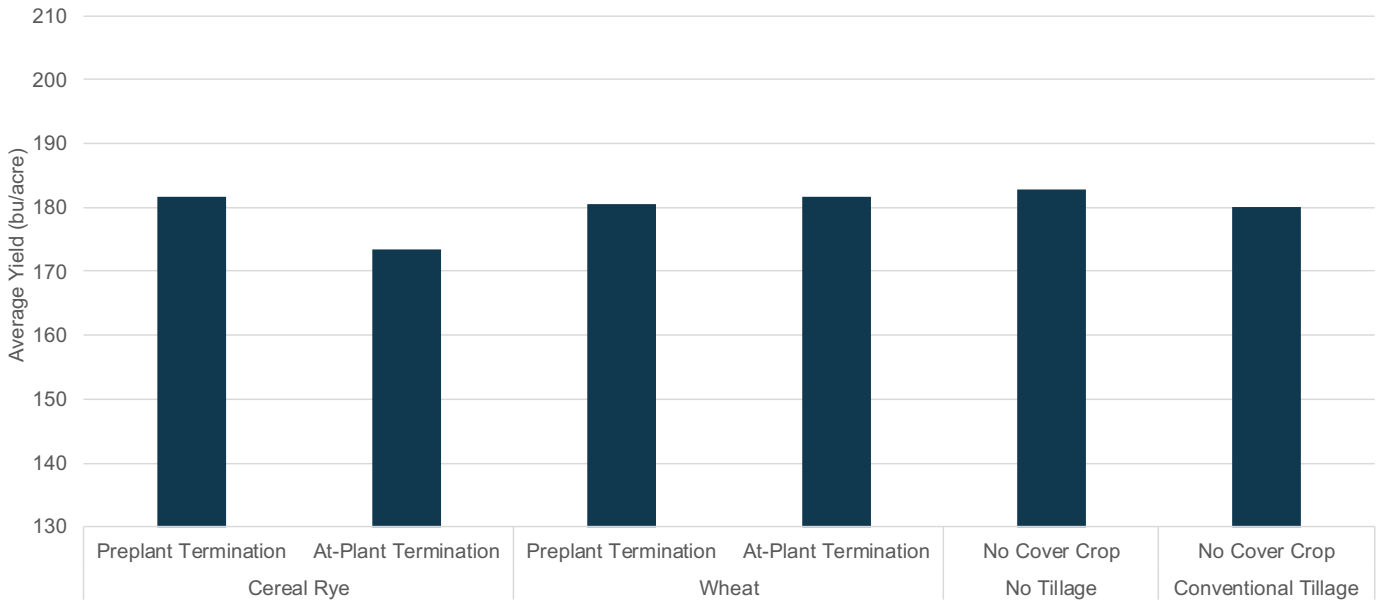

Figure 4. Average 2017 and 2018 corn yield by cover crop, termination timing, and tillage. Differences in yield were not significant.

- The termination timing of the wheat cover crop had little effect on subsequent corn stands and yield in both 2017 and 2018.
- When averaged over both years, termination of cereal rye two weeks prior to planting had a beneficial impact (though not significant) on corn stand counts and yield (Table 1 and Figure 4).
- Termination of the cereal rye cover crop at the same time as planting may negatively impact yield due to: competition with emerging corn plants for light, delayed availability of nitrogen, and allelopathic compounds suppressing the growth of corn seedlings.

What Does This Mean for Your Farm?

- Modifications of farm operations to include cover crops is a valuable sustainability effort for growers to pursue.
- Waiting too long to terminate a cereal rye cover crop may reduce yield potential.
- Wheat may be a viable cover crop alternative to cereal rye with less concern of allelopathy.

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Legal Statment

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