

Spring-Seeded Brassica Cover Crops

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In a Nutshell

- Can frost-seeding small-seeded brassica species into crop residue be an effective spring cover crop strategy?

Key Findings

- Among three locations, mustard provided the most groundcover.
- When frost-seeded in the spring, cover crop growth appears to be related to GDD accumulated prior to termination.

Project Timeline
Spring 2017

Background

Cover crops in Iowa are typically seeded in late summer or fall. The most common cover crops are winter small grains like cereal rye or winter wheat. But farmers are increasingly interested in diversifying the cover crop portfolio in Iowa. Over the past few years, PFI's Cover Crop Variety Trial has shown the promise of some brassica species, namely mustard and rapeseed (Carlson and Gailans, 2013; Gailans and Carlson, 2014; Gailans and Carlson, 2015; Gailans and Carlson, 2016; Gailans and Carlson, 2017). Being cool-season species, mustard and rapeseed might be able to thrive in the early spring as a cover crop ahead of the eventual cash crop planted later in the spring. Frost-seeding red clover into winter wheat works quite well owing to the clover's relatively small seed that is worked into the soil by the daily freeze-thaw cycles during the early spring. Because mustard and rapeseed are similar in seed size to red clover, some have



Kodiak mustard at Jeremy Gustafson's on Apr. 24, 2017

wondered if frost-seeding these into crop residue in the early spring could be an effective 40- or 50-day cover crop strategy.

Methods

This trial was conducted by Steve McGrew near Emerson in Mills County; Jeremy Gustafson near Boone in Boone County; and Chad Ingels near Randalia in Fayette County. These were in southwest, central and northeast Iowa, respectively. McGrew

evaluated rapeseed ('Trophy'), radish ('Daikon') and mustard ('Pacific Gold'). Gustafson and Ingels evaluated rapeseed ('Dwarf Essex'), mustard ('Kodiak') and turnip ('Purple Top'). At each location, all cover crops were hand-seeded at a rate of 5 lb/ac into plots measuring 7.5 ft x 25 ft. Cover crops were seeded onto soybean residue at each farm. Locations, seeding dates, sampling dates and growing degree days (GDD) accumulated between seeding

and sampling (base 40°F) are shown in **Table 1**. GDD for the nearest weather stations were accessed from the Iowa Environmental Mesonet (2017).

Groundcover by the cover crops were determined near the time of termination before a cash crop was to be planted. Gustafson and Ingels 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. McGrew used a 20-ft length of tape measure and counted the cover crop foliage beneath each 1-ft mark. At each site, these counts were used to calculate the percent coverage of the soil by the cover crop.

Table 1 Trial locations, dates and growing degree days (GDD) accumulated.				
Farm	Location	Seeding Date	Sampling Date	GDD (base 40°F)
McGrew	Emerson	March 10	May 3	592
Gustafson	Boone	March 2	Apr. 24	439
Ingels	Randalia	March 12	Apr. 26	369

Data were analyzed using JMP Pro 12 (SAS Institute Inc., Cary, NC). By location, groundcover means separations are reported using Tukey's Least Significant Difference (LSD). Statistical significance was determined at the $P \leq 0.10$ level.

Results

Average groundcover provided by the cover crops for each farm is provided in **Figure 1**. At McGrew's, the Pacific Gold mustard provided nearly 25% groundcover which was significantly greater than the Trophy rapeseed (11%). The Daikon radish did not establish. At Gustafson's and Ingels's, Kodiak mustard was the top performer. There were no differences between the Dwarf Essex rapeseed or Purple Top turnips, though. The cover crops at McGrew's and Gustafson's provided approximately twice as much groundcover as those at Ingels's. When considering all three locations, the amount of groundcover provided by the spring-seeded cover crops was loosely correlated to the amount of GDDs accumulated between the time of seeding and sampling ($r = 0.41$; $P = 0.02$). Not surprisingly, more GDD were accumulated in the southwest (McGrew) and center (Gustafson's) than in the northeast (Ingels) and this translated into more groundcover by the cover crops at McGrew's and Gustafson's.

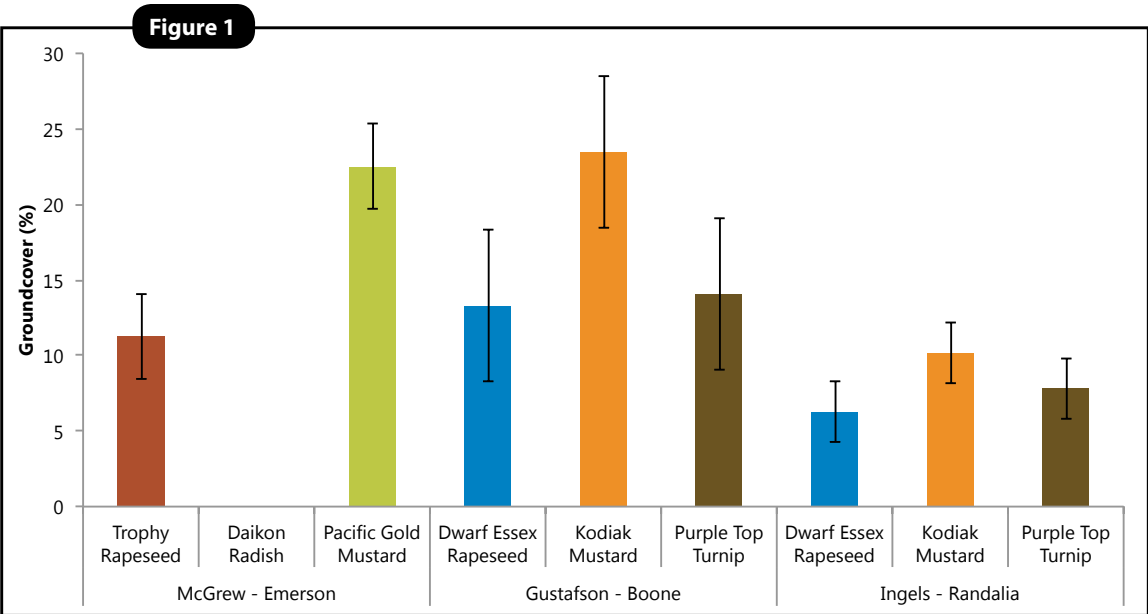


Figure 1. Average groundcover of spring-seeded cover crops at each site in 2017. By farm, error bars above and below columns represent the least significant difference (LSD) at the $P \leq 0.10$ level. By farm, if error bars overlap, the two cover crops are not significantly different.



Mustard, rapeseed and turnip seeds (~175,000 seeds/lb) (left) are much smaller than radish seed (right) (~25,000 seeds/lb).

Conclusions

It appears that mustard could be a good candidate for this spring “frost-seeding” cover crops technique. Also, because groundcover appeared to be related to GDD accumulated, it stands to reason that a farmer frost-seed as early as possible and let the cover crop grow as long as possible. “I might try this on a larger scale and try to plant [the cover crop] sooner,” McGrew says. “[This technique] might fit where the [fall-seeded] broadleaf cover crops don’t overwinter well. I am considering planting a winter-kill grass like oats or barley and then maybe mustard and rapeseed broadcast during the winter before corn.”



Dwarf Essex rapeseed frost-seeded into soybean residue at Jeremy Gustafson’s on March 2, 2017.



Pacific Gold mustard (left) and Trophy rapeseed (right) at Steve McGrew’s on May 3, 2017.

References

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