Comparison of cover crop establishment methods

Written by Sarah Carlson

Abstract

Cover crops have recently become more popular. Iowa’s unreliable weather can pose challenges for establishment and effectiveness of these potentially soil and nutrient preserving crops. In 2010, earlier aerial seeding of a cover crop mix led to higher average biomass weight by spring in spite of high variability in stand.

Method

A cover of hairy vetch, tillage radish and rapeseed was established in strips by both aerial seeding into standing soybeans and drilling after soybean harvest (see Table 1).

Table 1

<table>
<thead>
<tr>
<th>Seed Mix &amp; Cost</th>
<th>Seeded Mix (lbs./ac)</th>
<th>Seed (cost/lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hairy Vetch</td>
<td>15</td>
<td>$1.60</td>
</tr>
<tr>
<td>Tillage Radish</td>
<td>3</td>
<td>$3.20</td>
</tr>
<tr>
<td>Rapeseed</td>
<td>2</td>
<td>$1.00</td>
</tr>
</tbody>
</table>

Aerial Establishment

Aerial test plots were seeded September 14, 2010. The pilot seeded strips, skipping areas in between to allow for the drilled cover crop treatment. The aerial seeding received almost an inch of rainfall within three days of seeding. This method of cover crop establishment cost $10/A.

(Above) Aerial seeded test plot.

Cooperator

Steve McGrew, McGrew Brothers’ Farm, Emerson

Project Timeline

Fall 2010 to Spring 2011

Staff Contact

Sarah Carlson, 515.232.5661
sarah@practicalfarmers.org

Web Link

http://tinyurl.com/ccplantingmethods

Funding

Sustainable Agriculture Research and Education Program (SARE), and Walton Family Foundation

About the Cooperator

Steve McGrew farms with his three brothers—Bill, David and Robert—in southwest Iowa near Emerson. They produce mainly corn and soybeans. They post regular updates about happenings around their farm on their website at http://showcase.netins.net/web/mcgrewbr/index.shtml#us

Background

Cover crops are planted without the intention of a direct harvest. Instead, they provide alternative benefits to the farmer or environment. A few of these include improving soil quality by protecting soil from erosion (Lal et al, 1991, Karlen and Cambardella, 1996), increasing soil microbial activity and cycling nutrients (Karlen and Cambardella, 1996), decreasing excess nitrogen (Kaspar et al., 2007), or adding to soil carbon. Additionally, the cover can be a potential source of forage if a shortage exists.
Drill Establishment
After the soybean crop had been harvested, Steve returned to drill strips of the same seed mix where no cover crop had been aerial seeded. This seeding took place on October 6, 2010. Rain did not occur immediately after planting but soil moisture was sufficient for establishment. Iowa State Extension estimates the cost of equipment, fuel and labor to drill small grains to be $13.55/acre (Edwards et al., 2011).

Sampling
Samples for cover crop growth were collected December 5, 2010 and April 27, 2011. Multiple one-by-one-foot quadrates

Data Analysis
Data were analyzed using a fit model one-way analysis of variance (ANOVA) to determine treatment effects at each location. Steady-state infiltration rates were log-transformed for analyses. All reported means are the least-squares means. Comparisons of means were analyzed using the Student’s t-test. All data analyses were performed using the JMP9 software (SAS Institute Inc., Cary, NC).

Results and Discussion
The earlier, aerial seeded cover crop mix had higher average fall and spring biomass accumulation per acre in spite of high variability in stand compared to the drilled mix (see Tables 2 and 3, above).

Conclusions
In this study, aerial cover crop seeding allowed more time for crop establishment in the fall and a stronger start in the spring. The fall-drilled cover crop produced less total biomass, but still established and overwintered acceptably.

References


<table>
<thead>
<tr>
<th>Table 2</th>
<th>Fall Biomass</th>
</tr>
</thead>
<tbody>
<tr>
<td>(lbs./acre dry matter)</td>
<td>Aerial</td>
</tr>
<tr>
<td>Plot 1</td>
<td>4.3</td>
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<tr>
<td>Plot 2</td>
<td>56.4</td>
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<td>Plot 3</td>
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<tr>
<td>Mean</td>
<td>43.0</td>
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<table>
<thead>
<tr>
<th>Table 3</th>
<th>Spring Biomass</th>
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<td>(lbs./acre dry matter)*</td>
<td>Aerial</td>
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<td>Plot 1</td>
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<td>Plot 2</td>
<td>719.0</td>
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<tr>
<td>Mean</td>
<td>527.4</td>
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</table>

*Hairy vetch weight only, brassicas do not overwinter

Tuber growth and above ground biomass
This photo shows growth samples of two different brassicas and the aerial versus drilled planting date and planting type comparison.