No-till planting into cover crops: opportunities and obstacles

ANGELA MCCLURE
SCOTT D. STEWART & LARRY STECKEL
100% black oats low biomass

Single grass/legume moderate biomass

multi species high biomass
Cover Crops have positive attributes that you are well aware of including …

- Erosion control
  - Prevention of water / nutrient / pesticide runoff
- Improved water infiltration
- Soil health (organic matter, fertility)
- Weed suppression or a reduction in herbicide use
- Resources for pollinators
- A nursery for natural enemies
- Payments to growers

The type of cover crop and when it is controlled (killed) relative to the planting date can have a major impact on the risks and benefits
Legume Improves Grass Biomass

- Alone
- Cereal Rye
- Wheat

Kilograms/ha

- Alone
- Cereal Rye
- Wheat

Legend:
- Alone
- Crimson
- Vetch

Bar Chart:
- E
- CD
- A
- B
- D
- BC
- B

Note: The chart shows the biomass improvement when legumes are added to cereal rye and wheat, with A being the highest and E being the lowest.
Legume improves corn stand and appearance compared to cereal rye
Plant Available Nitrogen from different cover mixtures (Sampled when grower terminated stand Spring 2017)

<table>
<thead>
<tr>
<th>County Location</th>
<th>Cover Type (drilled)</th>
<th>Visual % Legume In Cover</th>
<th>Dry Biomass (Ton/ac)</th>
<th>Total N in Cover Sample (lbs/ac)</th>
<th>Plant available N (lbs/ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Henderson</td>
<td>Black oats</td>
<td>0%</td>
<td>1.9</td>
<td>33.5</td>
<td>0</td>
</tr>
<tr>
<td>Gibson 1</td>
<td>Cereal rye, black oats, wheat, crimson clover, balansa clover, buckwheat</td>
<td>5%</td>
<td>1.6</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td>Gibson 2</td>
<td>Cereal rye, black oats, wheat, crimson clover, balansa clover, buckwheat</td>
<td>30%</td>
<td>1.6</td>
<td>46.8</td>
<td>14</td>
</tr>
<tr>
<td>Giles</td>
<td>Black oats, crimson clover, hairy vetch, Bayou Kale and radish</td>
<td>40%</td>
<td>1.4</td>
<td>60.6</td>
<td>22</td>
</tr>
<tr>
<td>Henry</td>
<td>Ryegrass, spring oats, crimson clover, Bayou Kale, African cabbage</td>
<td>15%</td>
<td>1.1</td>
<td>36</td>
<td>12</td>
</tr>
<tr>
<td>Madison</td>
<td>Cereal rye, annual rye, crimson clover, hairy vetch, winter pea, radish, buckwheat</td>
<td>30%</td>
<td>3.1</td>
<td>127.6</td>
<td>43</td>
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</table>
Robust Cover Crop Needed for Pigweeds
Termination issues

• Sometimes trade off between letting cover go for weed suppression and being able to establish a crop

• Cover biomass/species interferes with planting

• Something in cover mix won’t die
  • RR canola, vetch
Termination Options by Cover Crop
(Page 5 Weed control PB1580)

- **Cereals**
  - Glyphosate (Roundup)

- **Legumes**
  - Paraquat (Gramoxone), Liberty*, Dicamba*, 2,4-D
  - *Crop technology specific

- **Terminating big cereal/legume mixes**
  - Roundup + 2,4-D or dicamba (+PRE) best one pass program OR
  - Roundup 7-10 DPP → Plant → Gramoxone (+PRE)
Termination Options by Crop

**Corn**
- Preplant: Roundup + dicamba OR Gramoxone + atrazine
- Roundup + dicamba 7-10 DBP fb Gramoxone + PRE at planting

**Soybean**
- Preplant: Roundup + dicamba OR Gramoxone + metribuzin
- Before or after planting: Liberty*, Dicamba*, or 2,4-D for seed technology
Cover Terminated 14 DAP
Roundup Xtend Soybeans

- No row cleaners
- Rubber closing wheels
- Planted slightly deeper
- Skips in stand from 3 cornered alfalfa hopper
Roller Crimper?

- Need a roller to manage tall grasses!!!!
- Effective when cover is reproductive (cereal rye at dough stage or heading wheat + Roundup good control)
- Spray before or after rolling--Herbicide still helps with cover crop control
- Most effective on cereals
Soy Planting Rate into Multi Species Cover Crop  (Birdsong on-farm demo; Giles county)

<table>
<thead>
<tr>
<th>Planting Rate (seeds/acre)</th>
<th>Stand count (plants/ac)</th>
<th>Yield Bu/acre</th>
<th>$ Seed Cost/Acre</th>
<th>Net Economic Return/acre*</th>
</tr>
</thead>
<tbody>
<tr>
<td>109,000</td>
<td>96,565</td>
<td>89.64</td>
<td>46.75</td>
<td>$25.82</td>
</tr>
<tr>
<td>127,000</td>
<td>108,946</td>
<td>89.69</td>
<td>54.46</td>
<td>$18.58</td>
</tr>
<tr>
<td>143,700</td>
<td>131,505</td>
<td>88.32</td>
<td>61.63</td>
<td>(-$1.59)</td>
</tr>
<tr>
<td>154,500</td>
<td>142,235</td>
<td>86.38</td>
<td>66.26</td>
<td>(-$24.62)</td>
</tr>
<tr>
<td>172,600</td>
<td>155,440</td>
<td>86.52</td>
<td>74.02</td>
<td>(-$31.09)</td>
</tr>
</tbody>
</table>

*Assume $9.50 bean price. Net Economic Return equals cost savings and economic gain from yield when compared to the 143,700 benchmark seed cost and yield.

19” rows
Burned down cover April 4
Asgrow 43X7 planted April 21 harvest Oct 5
With early termination, planting was not impacted by cover crop
Low seeding rate more profitable than high rate
Crop stand behind cover crops

- Planting rates
  - Slightly more
- Seed depth
  - Slightly deeper
- Yellow corn
  - N tie-up?
  - Allelopathy?
Planting Equipment

- Row cleaners (gently) if cover killed early otherwise probably not
- Row unit downforce should place depth gauge firmly in contact with soil but should be able to turn by hand
- Always check behind planter in field
Planting Issues:

- Sidewall or furrow compaction
  - Cover residues keeping soil wet
  - Too much row unit down pressure
- Seed furrows won’t close properly
  - Planting too wet
  - Not enough pressure on closing wheels
- Seed placement too shallow or variable
  - Not enough row-unit down pressure
  - Too much pressure on closing wheels
Planting into Covers - closing wheels

- Copperhead Agr
- Cast iron
- Rubber/Curvitine
- Rubber
Closing wheel study Jackson (clean no-till) vs Griggs farm (rolled dense cover crop)

Soybean stand affected by at-planting residue and closing wheel type

116K average in low residue vs 89K in high residue
Insects and the ‘green bridge’

Harbors beneficials as well as pests

Long-standing IPM recommendation - destruction of cover crops or winter vegetation should be accomplished at least 3-4 weeks prior to planting crop to reduce the potential insect problems.

If it ain’t brown don’t put seed in the ground.
Corn Behind Cereal Cover Crop, Arkansas, 2014

Looks Good!

Looks Bad!
The Midwest

Increased incidence and injury from true armyworm following rye

Field and Forage Crops

Increased Risk of Insect Injury to Corn Following Rye Cover Crop

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Abstract

Decreased pest pressure is sometimes associated with more diverse agroecosystems, including the addition of a rye cover crop (*Secale cereale* L.). However, not all pests respond similarly to greater vegetational diversity. Polyphagous pests, such as true armyworm (*Mythimna unipuncta* Haworth), black cutworm (*Agrotis ipsilon* Hufnagel), and common stalk borer (*Papaipema nebris* Guenee), whose host range includes rye have the potential to cause injury to crops following a rye cover crop. The objectives of this study were to compare the abundance of early-season insect pests and injury to corn (*Zea mays* L.) from fields with and without a rye cover crop on commercial farms. Fields were sampled weekly to quantify adult and larval pests and feeding injury to corn plants from mid-April until corn reached V8 stage, during 2014 and 2015. Measurements within fields were collected along transects that extended perpendicularly from field edges into the interior of cornfields. Adult true armyworm and adult black cutworm were captured around all cornfields, but most lepidopteran larvae captured within cornfields were true armyworm and common stalk borer. Cornfields with a rye cover crop had significantly greater abundance of true armyworm and greater proportion of injured corn. Both true armyworm abundance and feeding injury were significantly greater in the interior of cornfields with rye. Common stalk borer abundance did not differ between cornfields with or without rye cover. Farmers planting corn following a rye cover crop should be aware of the potential for increased presence of true armyworm and for greater injury to corn.
Corn Behind Austrian Winter Pea Cover Crop, Arkansas, 2013

Planted Green
Tennessee, 2015
TCAH behind legume or legume/grass cover

Threecornered alfalfa hopper
Observations on Pea Leaf Weevil in Soybean

Often abundant in fields behind winter pea cover crops or sometimes vetch

Larvae feed on nodules, and adults feed on foliage

Can be controlled with labeled insecticides but continue to come out of cover crop residue for extended period, resulting in multiple applications

- Cover crop residue and extended period of adult emergence can be problematic
Seed Treatments Help (e.g., Don Cook, MSU)
Insect Management Tips to Consider if Using a Cover Crop

Avoid the “green bridge” as much as feasible

Otherwise:

- Use an Insecticide Seed Treatment (the higher rates in corn)
- Consider a near-planting foliar insecticide treatment
- Scout fields early and often ... have a game plan with your consultant/crop scout
- Follow good IPM practices for other pests
Slugs.....

<table>
<thead>
<tr>
<th>Life Cycle in Indiana</th>
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<tbody>
<tr>
<td>Overwintering eggs</td>
</tr>
<tr>
<td>Egg laying</td>
</tr>
<tr>
<td>Egg laying</td>
</tr>
<tr>
<td>Overwintering eggs</td>
</tr>
<tr>
<td>Some slugs overwinter</td>
</tr>
<tr>
<td>Juvenile and</td>
</tr>
<tr>
<td>mature slugs</td>
</tr>
<tr>
<td>Some slugs overwinter</td>
</tr>
</tbody>
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<tr>
<th>Time of Attack to Corn</th>
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Slug management

Manage residue:
- Early CC termination (plant brown)
- Row cleaners to clean above row and help ground dry out
- Turbo tillage- last resort in 2017

Planting Tips:
- Don’t plant wet- Close furrow to minimize damage by keeping slugs from feeding 24/7
- Plant corn early before spring hatch (crop outruns the slug)

In wet springs and with dense cover biomass, management is difficult to impossible (metaldehyde bait @10 lbs/acre)
Questions?