Reducing the Health Impacts of the Nitrogen Problem

A Virtual Workshop from the Environmental Health Matters Initiative

Cover Crops by Region: The Good, the Bad, and the Ugly in the Midwest
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What is a cover crop?
• A plant that covers the soil between cash crops

Why use cover crops? (THE GOOD)
• Water Quality
• Soil Health (↓ soil erosion)
• Pest management (?)
• Iowa Nutrient Reduction Strategy:
  % reduction in Nitrogen load 29%
  % reduction in Phosphorus load 28%

Adoption rate? (THE BAD)
• Iowa 1% in 2012 to 4% in 2017 (Census of Ag)
Why is the adoption rate so low?

1. In crop-only Midwestern production systems, cover crops are not profitable for most farmers (THE UGLY)

2. Cost-share payments make net returns less negative among program participants, but only few experience positive profits

3. In mixed production systems with cows, cover crops can be profitable under the “right” conditions

Study 1: Regional Online Survey
Study 2: Statewide Mail Survey (Iowa)
Study 3: Experimental Plots in Iowa
Partial Budgets

Fall/Winter

Spring-Fall

CHANGES IN COSTS AND REVENUES:

Corn after Cover Crops

VERSUS

Corn after fallow

The National Academies of
SCiences • Engineering • Medicine
### Regional Online Survey
MN IA IL ND IN NE OH MI MO SD WI (n=79) 2017

https://works.bepress.com/alejandro-plastina/23/

<table>
<thead>
<tr>
<th>Sources of changes in net profits</th>
<th>Cover crops terminated with herbicides followed by corn for grain ($/acre)</th>
<th>Cover crops terminated with herbicides followed by soybeans ($/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Changes in revenue:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Cash Crop Yield</td>
<td>-9.18</td>
<td>31.74</td>
</tr>
<tr>
<td>2. Cost-share program</td>
<td>25.33</td>
<td>28.07</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>16.16</strong></td>
<td><strong>59.81</strong></td>
</tr>
<tr>
<td>B. Changes in costs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Cover crop planting</td>
<td>31.84</td>
<td>31.14</td>
</tr>
<tr>
<td>2. Herbicide expenses</td>
<td>4.05</td>
<td>3.82</td>
</tr>
<tr>
<td>3. Other Costs</td>
<td>1.02</td>
<td>-0.27</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>36.91</strong></td>
<td><strong>34.69</strong></td>
</tr>
<tr>
<td><strong>Net change in profit (A-B):</strong></td>
<td><strong>-20.76</strong></td>
<td><strong>25.13</strong></td>
</tr>
<tr>
<td><strong>Net change in profit without Cost-Share</strong></td>
<td><strong>-46.09</strong></td>
<td><strong>-2.95</strong></td>
</tr>
</tbody>
</table>

1. **Average Extra Costs:** $35-$37 per acre
2. **Average Payments from Cost-Share Program:** $25-$28
3. **Corn yield drag ~ 2 bushels/acre**
   **Soy yield bump ~ 3 bushels/acre**
   **Average Net Returns to cover crops:**
   - $21 preceding corn
   + $25 preceding soy
4. **Net Returns Excluding Cost-Share:**
   - $46/acre preceding corn
   - $3/acre preceding soy
Statewide Mail Survey IA
(n=440; 35% Resp. rate) 2017
https://docs.lib.purdue.edu/jafe/vol2/iss2/2/

<table>
<thead>
<tr>
<th>Source of Change in Profits</th>
<th>Median Value of Change in $/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CC followed by Corn</td>
</tr>
<tr>
<td>CC Seed cost</td>
<td>$16</td>
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<tr>
<td>CC Planting</td>
<td>$16</td>
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<tr>
<td>Extra herbicide cost</td>
<td>$3</td>
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<tr>
<td>+/- Other costs</td>
<td>$0</td>
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<tr>
<td><strong>A. Subtotal Extra Costs</strong></td>
<td><strong>$35</strong></td>
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<tr>
<td>Cost-share</td>
<td>$20</td>
</tr>
<tr>
<td>Value of yield change</td>
<td>$0</td>
</tr>
<tr>
<td><strong>B. Subtotal Extra Revenue</strong></td>
<td><strong>$20</strong></td>
</tr>
<tr>
<td><strong>C. Net Returns (B-A)</strong></td>
<td>-$15</td>
</tr>
<tr>
<td>Feed cost savings</td>
<td>$22</td>
</tr>
<tr>
<td><strong>D. Net Returns w/ Livestock</strong></td>
<td><strong>+$7</strong></td>
</tr>
</tbody>
</table>

1. Median Extra Costs: $34-$35 per acre
2. Median Payments from Cost-Share Program: $15-$20
3. Median Corn and Soy yields same as following fallow
   Median Net Returns to cover crops (including cost-share payments):
   - $15/a preceding corn
   - $19/a preceding soy
4. Net Returns in Mixed Crop-Livestock system (incl. feed cost savings):
   +$7/a preceding corn
   +$1/a preceding soy
Net Returns to Cereal Rye preceding Corn Treated vs. check plots (324 data points)

Pls: Alison Robertson and Mark Licht.

Cereal Rye Planted Fall 2018

North-West  South-East  Central

Avg. 2018 Net Returns
No Cost-share: -$39 per acre

Cereal Rye Planted Fall 2019

North-West  South-East  Central

Average 2019 Net Returns
No Cost-share: -$52 per acre

Net Returns to Cereal Rye preceding Corn Treated vs. check plots

PIs: Alison Robertson and Mark Licht.
Final considerations

Feed cost savings from grazing cover crops (in mixed production systems) depend on above-ground biomass in early spring → Little biomass, little value

Social benefits from cover crops also depend on biomass and precipitation:
- No precipitation, little runoff/leaching, little social value
- Little biomass, little social value

The Iowa Nutrient Reduction Strategy ranks Cover crops 11th and 12th in Nitrogen and Phosphorous load reduction, respectively

Cost-share payments are not always sufficient to cover all costs incurred by farmers

Long-term: monetization of soil health, carbon seq. limited by disagreement on soil health metrics