Cover Crops: Widespread Adoption or Niche Conservation Practice?

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Research Agronomist
Survey Goals

• Quantify cover crop use in the Corn Belt.
• Identify impediments to adoption.
• Obtain greater knowledge about management practices.
A Survey of Farming Practices and Cover Crop Use
Iowa State University

For each question that follows, please circle the number that best represents your answer.

Background
1a. This year, in 2006, are you farming full-time, part-time, or not at all?
   1 = Farming full-time
   2 = Farming part-time
   3 = Do not farm at all
   b. If not at all, have you farmed in the last 5 years?
      1 = Yes (Please continue)
      2 = No (Please return the survey in the envelope provided.)

2. About how many years have you been farming (in charge of the operation)? ________ years

3a. Are you also currently employed off the farm?
   1 = Yes
   b. If yes, how many hours per week do you work off the farm?__________ hrs/week
   2 = No

4. What county do you live in? ______________________ County

5. What is your current age? __________ years

6. Are you male or female?
   1 = Male
   2 = Female

7. What is the highest level of education you have completed?
   1 = Eleventh grade or less
   2 = High School (includes GED)
   3 = Vocational or technical diploma/certificate
   4 = Some college but no Bachelor’s Degree
   5 = B.A., B.S., or equivalent
   6 = Graduate Degree, Master’s, Ph.D., M.D., etc.

-We developed a survey tool with 43 questions.
-Cover crops were defined as: grasses, legumes or small grains grown between regular grain crop production periods for the purpose of protecting and improving the soil. These crops are usually planted after harvest of the regular grain crop in the fall and killed before planting the next one in the spring.
Cover Crop Survey Results

- 3500 producers in IL, IN, IA, and MN (875 in each state).
- 36% overall response rate (Illinois 33.9%, Indiana 33.6, Iowa 42.1, and Minnesota 35.0).
- 18% had ever used cover crops.
- 11% used cover crops within past 5 years.
- 8% planted cover crops on their farm in the fall of 2005 (only on 6% of land). Only 4.8% (2.4, 7.2) in IA.
- Greater use in IL and IN.
- 80% using conservation practices.
- 43% using conservation practices with cost sharing, 57% w/out.
Survey Results Con’t

Reasons for not using cover crops included:
• Too much time involved (34.8%).
• Too costly (27.4%).
• Do not have a runoff problem (28.1%).
• Already use no-till practices (38.6%).
• Do not know enough about them (39.5%).
Table 5. Means and standard errors (SE) for the explanatory variables used in the logistic regression model for Illinois, Indiana, Iowa, and Minnesota.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Illinois</th>
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<th></th>
<th>Indiana</th>
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<th>Iowa</th>
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<td>Years farming</td>
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<td></td>
<td>251</td>
<td>33.2</td>
<td>0.8</td>
<td>250</td>
<td>33.5</td>
<td>0.8</td>
<td>309</td>
<td>32.7</td>
<td>0.7</td>
<td>265</td>
<td>31.9</td>
<td>0.8</td>
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<tr>
<td>Percent with more than high school education</td>
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<td></td>
<td>257</td>
<td>59.1</td>
<td>3.1</td>
<td>251</td>
<td>59.8</td>
<td>3.1</td>
<td>316</td>
<td>46.4</td>
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<td>55.6</td>
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<tr>
<td>Percent of land owned</td>
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<td>252</td>
<td>54.4</td>
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<td>62.4</td>
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<td>308</td>
<td>59.1</td>
<td>2.9</td>
<td>261</td>
<td>68.3</td>
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<td>Number of crops</td>
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<td>Percent enrolled in government program</td>
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<td>3.1</td>
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<td>Percent perceived soil improvement</td>
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<td></td>
<td>231</td>
<td>80.1</td>
<td>2.6</td>
<td>234</td>
<td>79.9</td>
<td>2.6</td>
<td>274</td>
<td>70.9</td>
<td>2.7</td>
<td>237</td>
<td>76.8</td>
<td>2.7</td>
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<tr>
<td>Percent perceived yield advantage</td>
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<td>32.0</td>
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<td>234</td>
<td>35.4</td>
<td>3.1</td>
<td>274</td>
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<td>27.9</td>
<td>2.9</td>
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<tr>
<td>Percent perceived soil water advantage</td>
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<tr>
<td></td>
<td>231</td>
<td>96.5</td>
<td>1.2</td>
<td>234</td>
<td>97.4</td>
<td>1.0</td>
<td>274</td>
<td>99.3</td>
<td>0.5</td>
<td>237</td>
<td>97.0</td>
<td>1.1</td>
</tr>
</tbody>
</table>
Survey Results Con’t

Table 6. Descriptive statistics and significance tests for farmers in the study region who used cover crops compared to farmers who never used cover crops.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Used Cover Crops</th>
<th>Never Used Cover Crops</th>
<th>Z-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acres farmed</td>
<td>200</td>
<td>883</td>
<td>73</td>
<td>1.79</td>
</tr>
<tr>
<td>Number of crops</td>
<td>192</td>
<td>3.12</td>
<td>0.08</td>
<td>7.26</td>
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<tr>
<td>Percent who implemented conservation practices</td>
<td>167</td>
<td>86.0</td>
<td>2.5</td>
<td>2.37</td>
</tr>
<tr>
<td>Percent receiving incentives who would adopt conservation practices without incentives</td>
<td>43</td>
<td>60.8</td>
<td>5.9</td>
<td>0.68</td>
</tr>
<tr>
<td>Percent only growing crops</td>
<td>95</td>
<td>47.1</td>
<td>3.6</td>
<td>-3.57</td>
</tr>
<tr>
<td>Percent growing crops and raising livestock</td>
<td>100</td>
<td>51.6</td>
<td>3.6</td>
<td>3.44</td>
</tr>
</tbody>
</table>
Survey Results Con’t

• Respondents replied minimum payment $23/acre to plant cover crops.

• 56% said they would use cover crops with cost-sharing.

Singer et al. (2007), J. Soil and Water Conserv.
Survey Results Con’t

• 46% of respondents said they need more information about cover crops to make decisions about selection, use, and management.
• Source of information: Coop (13%), other farmers (27%), agribusiness (15%), extension (28%), NRCS (19%), SWCD (28%), ARS (4%).
Percent ± standard error for cover crops used during the period 2001-2005.

<table>
<thead>
<tr>
<th>Species</th>
<th>Indiana</th>
<th>Illinois</th>
<th>Iowa</th>
<th>Minnesota</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereal Rye</td>
<td>43.8 ± 6.2</td>
<td>49.9 ± 7.1</td>
<td>53.3 ± 9.2</td>
<td>18.4 ± 6.3</td>
</tr>
<tr>
<td>Winter wheat</td>
<td>49.9 ± 6.3</td>
<td>40.0 ± 6.9</td>
<td>13.3 ± 6.3</td>
<td>26.3 ± 7.2</td>
</tr>
<tr>
<td>Winter triticale</td>
<td>3.1 ± 2.2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Annual ryegrass</td>
<td>9.3 ± 3.6</td>
<td>15.6 ± 5.1</td>
<td>16.6 ± 6.9</td>
<td>15.7 ± 5.9</td>
</tr>
<tr>
<td>Oat</td>
<td>14.0 ± 4.3</td>
<td>19.9 ± 5.7</td>
<td>43.3 ± 9.2</td>
<td>52.6 ± 8.2</td>
</tr>
<tr>
<td>Red Clover</td>
<td>28.0 ± 5.6</td>
<td>35.9 ± 6.8</td>
<td>13.3 ± 6.3</td>
<td>18.4 ± 6.3</td>
</tr>
<tr>
<td>Hairy vetch</td>
<td>4.6 ± 2.6</td>
<td>11.9 ± 4.6</td>
<td>3.3 ± 3.3</td>
<td>2.6 ± 2.6</td>
</tr>
<tr>
<td>Other</td>
<td>11.0 ± 3.9</td>
<td>7.8 ± 3.8</td>
<td>6.6 ± 4.6</td>
<td>21.0 ± 6.7</td>
</tr>
</tbody>
</table>
Cover crop management

<table>
<thead>
<tr>
<th>Question</th>
<th>n</th>
<th>Percentage ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you use CC on rented land</td>
<td>22</td>
<td>14.1 ± 2.8</td>
</tr>
<tr>
<td>Do you use CC on owned land</td>
<td>75</td>
<td>45.1 ± 3.9</td>
</tr>
<tr>
<td>Do you use CC on both</td>
<td>69</td>
<td>40.7 ± 3.9</td>
</tr>
<tr>
<td>Establish CC using a drill</td>
<td>119</td>
<td>67.5 ± 3.6</td>
</tr>
<tr>
<td>Establish CC using broadcast spreader</td>
<td>39</td>
<td>21.0 ± 1.8</td>
</tr>
<tr>
<td>Establish CC by aerial seeding</td>
<td>14</td>
<td>7.8 ± 2.0</td>
</tr>
<tr>
<td>Do you use tillage to kill overwintering CC</td>
<td>39</td>
<td>32.9 ± 4.3</td>
</tr>
<tr>
<td>Do you use chemicals to kill overwintering CC</td>
<td>65</td>
<td>53.9 ± 4.5</td>
</tr>
<tr>
<td>Do you use both to kill overwintering CC</td>
<td>16</td>
<td>13.1 ± 3.1</td>
</tr>
<tr>
<td>Do you harvest CC for feed</td>
<td>49</td>
<td>27.2 ± 3.3</td>
</tr>
<tr>
<td>Do you harvest CC for other uses</td>
<td>19</td>
<td>10.3 ± 2.3</td>
</tr>
<tr>
<td>Do not harvest CC</td>
<td>117</td>
<td>62.3 ± 3.6</td>
</tr>
<tr>
<td>Prefer CC that does not winterkill</td>
<td>577</td>
<td>68.4 ± 1.6</td>
</tr>
<tr>
<td>Prefer CC that fixes nitrogen</td>
<td>539</td>
<td>64.3 ± 1.6</td>
</tr>
</tbody>
</table>

What did we learn?

• Develop additional educational materials. We need to make using cover crops easy (management, seed sources, etc.).
• Diversified farming operations are more likely to use cover crops.
• Focus on multiple cover crop functions.
• Find management systems that add value.
Iowa Cover Crop Acreage in 2006

Our survey estimated 12,500 acres of cover crops planted in the fall of 2005 in Iowa, which represents 0.0543% of the roughly 23 million acres planted in row crops in 2006.
Ongoing Research

• Compare cover crop nutrient uptake in low vs. high disturbance manure injection systems.

• Quantify fate of manure N and the cumulative effect of coupling manure and cover crops on nutrient cycling.
Using a Rye Cover Crop to Help Manage Beef Feedlot N

- Large feedlots are required to collect runoff water in lagoons
- Field was center pivot irrigated to empty lagoon
- Stockpiled manure was also applied
- Rye was harvested the end of May as silage
- Corn planted for silage
Cover Crop

- Reduced spring soil nitrate from 146 lb N/acre to 33 lb/acre
- Produced 2.9 tons DM/acre containing 200 lb N/acre
- Offers protection from soil erosion after corn silage
- Potentially increases net seasonal silage production
Average Natural Aphid Infestation

Indicates P=0.05, d.f.=1,3, (Proc GLM)

Schmidt et al. (2007), Environmental Entomology
Targeting Cover Crops on the Landscape

West Nishnabotna River

South Fork - Iowa River

Figure credit: Mark Tomer, NLAE
**Additional Sources of Cover Crop Survey Information**

### Iowa Cover Crop Acreage Inventory

**Fill in info about fall-planted COVER CROPS in your area**

- **What county do you farm in?** 
- **Have you heard of cover crops?** 
- **Have you ever planted cover crops?**

**Help us assess # of COVER CROP acres in Iowa!**

**How many cover crop acres did you plant in:**
- Fall 2006 _______
- Fall 2007 _______
- Fall 2008 _______

**Which species did you plant?**
- Winter rye
- Winter wheat
- Winter canola
- Winter triticale
- Winter oat
- Hairy vetch
- Red clover
- Alfalfa
- Other _______

Please contact Sarah Carlson, 515-232-5661 x 105, or e-mail sarah@practicalfarmers.org, if you have cover crop stories to share or projects you want to conduct.

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**2010 Iowa Farm Poll**
How do we Increase Adoption?

• Work with NRCS on cost-sharing and writing standards.
• Quantify benefits at multiple scales.
• Identify early adopters in your communities.
• Work with producers that could adopt w/out significant changes.
• Keep talking and writing.