Cover Crop Economics

J. Alan Weber

January 14, 2014

Can we afford cover crops?

- Market Conditions
  - Declining commodity values
  - Shrinking margins
- Will producers look at long-term benefits or only short term economic impacts?

Corn/Soybean Baseline

- Primarily utilized MU 2014 Crop Assumptions
  - Yield
  - Price
  - Input Prices
- M4 Assumptions for remainder of analysis

Why are producers interested in cover crops?

- Hypothetical crop farm in Missouri with a two crop rotation (corn/soybeans)
  - Examine annual impacts (i.e. impacts that affect cash flow)
    - Nutrient & weed management
    - Machinery & labor impacts
    - Disease and pest pressure
  - Examine potential longer term impacts that impact farm profitability

Closer Look at the Economics

Cover Crops for Analysis

Year 1: crimson clover/annual rye (before corn)
Year 2: crimson clover/legume radish (before soybeans)
Annual Impacts

Nutrient Management—Nitrogen Fixation

• In the South crimson clover can fix 70 to 150 lbs of nitrogen by mid-May
  – Expect less before corn planting unless corn planting delayed
• For our analysis we will assume late April plant date for corn and a contribution of 30 lbs of N

Nutrient Management—Nutrient Cycling

• Yield benefits of side dressing nitrogen documented in literature and field experience
  – Significant N need beginning at V6
• Annual Ryegrass Becomes Nutrient “Catch and Release” Program
  – Could cycle 30 to 90 lbs of nitrogen

Other Considerations

• Cover crops can aid with weed control and disease suppression. For this analysis however, no reduction of herbicides or fungicides. Added qt 2,4-D with corn burn down.
• Annual ryegrass has demonstrated benefits of deep, fibrous root system. This, combined with year 2 use of tillage radish, eliminates use of in-line ripper.
• Ariel application of cover crop mix and chemical control in the spring.

Short-term Cash Flow Impact

• Notes
  – Aerial application vs. drilled
  – Additional herbicide is to ensure clover termination
  – NO Consideration for other soil health benefits
Other Yield Factors

Soil Health Benefits

Increased Organic Matter

- Increased Water Holding Capacity
  - A pound of SOM can absorb 18 to 20 lbs water
  - 1% SOM = 20 to 25,000 gal more water available

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Amount (lbs)</th>
<th>Value per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>1000</td>
<td>$18.80</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>100</td>
<td>$5.82</td>
</tr>
<tr>
<td>Potassium</td>
<td>negligible</td>
<td>negligible</td>
</tr>
<tr>
<td>Sulfur</td>
<td>100</td>
<td>$2.15</td>
</tr>
</tbody>
</table>

Drought States Crop Yields for 2012

Source: SARE/CTIC Survey, 2013

Disease Suppression (example)

- Annual Ryegrass may significantly reduce soybean cyst nematode populations.
  - Roots produce a chemical which causes soybean cyst nematode eggs to hatch in the fall.
  - As Annual Ryegrass is not a suitable "host" plant, the nematodes then starve.

Decreased Soil Erosion

- Use of cover crops to reduce soil erosion will
  - Maintain yield potential
  - Decrease loss of nutrients
- What is the most credible way to monetize this benefit?

And More……

- Economic benefits of grazing
- Rotation benefits of adding an additional crop
- Resistance to soil compaction
- Alleviation of soil compaction
Impact on Profitability

Baseline Rotation
- Net Return over Operating and Ownership Costs (corn) $64.13
- Net Return over Operating and Ownership Costs (beans) $62.81
- NET RETURNS FOR TWO (2) YEAR ROTATION $107.34

Cover Crop Rotation with 5% Long Term Yield Benefits
- Net Return over Operating and Ownership Costs (corn) $99.43
- Net Return over Operating and Ownership Costs (beans) $84.40
- NET RETURNS FOR TWO (2) YEAR ROTATION $183.82

Benefits Over Traditional Rotation $76.48

Other Points to Ponder

Land Value

- What if organic matter was a key component of land value (thus RENT)?
  - CSR2 in Iowa
  - $125 per point
  - this fall in Iowa

Water Quality

“Voluntary but not Optional”

<table>
<thead>
<tr>
<th>Total Nitrate-N Lost 2002-2012</th>
<th>Nitrate-N Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11-yr sum</td>
</tr>
<tr>
<td>Corn-soybean</td>
<td>454</td>
</tr>
<tr>
<td>Corn-Soyb w. Rye</td>
<td>206</td>
</tr>
<tr>
<td>Reduction</td>
<td>248</td>
</tr>
<tr>
<td>% Reduction</td>
<td>55%</td>
</tr>
</tbody>
</table>

Source: Tom Kaspar, USDA-ARS (Ames, IA)

Are Cover Crops Good Insurance?

- Yields on corn and soybeans in the drought states where cover crops were used were higher on average in 2012 than those where no cover crops were used (based on side by side field comparisons)
- This trend holds regardless of experience level with cover crops, although yield benefits from cover crops increase over time

<table>
<thead>
<tr>
<th>Experience Level with Cover Crops</th>
<th>Corn</th>
<th>Soybeans</th>
</tr>
</thead>
<tbody>
<tr>
<td>All respondents</td>
<td>9.9% Yield Increase</td>
<td>11.6% Yield Increase</td>
</tr>
<tr>
<td>More than 2 years of experience</td>
<td>10.5% Yield Increase</td>
<td>11.6% Yield Increase</td>
</tr>
<tr>
<td>2 years or less of experience</td>
<td>8.7% Yield Increase</td>
<td>11.4% Yield Increase</td>
</tr>
</tbody>
</table>

Source: NCICCTC Survey, 2013

Can we afford cover crops? The better question may be, “can we afford not to use cover crops in our operation”?