Making $ense with Cover Crops

Figure 1. Winter rye residues in reduced-tillage snap beans can help suppress weeds, retain moisture, and protect the soil.
Short term costs and benefits of cover crops

**Cover Crop Benefits**
- Moisture Retention
- N fixation
- Nutrient scavenging
- Wind-break
- Pest Suppression
- Irrigation savings
- Fertilizer savings
- Yield & quality improvement (hopefully!)

**Cover Crop Costs**
- Pest issues
- Crop interference
- Seed costs
- Labor & Fuel costs
- Establishment & termination
- “Opportunity” costs

\[
\text{Gross Revenue} - \text{Costs} = \text{Net Revenue}
\]
1. N fertilizer replacement
What is the cost per kg of N fixed from legumes?
## Estimated seed costs per kg of N fixed

<table>
<thead>
<tr>
<th>Crop Combination</th>
<th>Cost ($/kg N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>vetch</td>
<td>1.99</td>
</tr>
<tr>
<td>vetch + rye</td>
<td>1.13</td>
</tr>
<tr>
<td>cowpea</td>
<td>3.43</td>
</tr>
<tr>
<td>cowpea + sorghum sudangrass</td>
<td>3.19</td>
</tr>
<tr>
<td>cowpea + japanese millet</td>
<td>1.39</td>
</tr>
<tr>
<td>soybean</td>
<td>0.84</td>
</tr>
<tr>
<td>soybean + sorghum sudangrass</td>
<td>1.98</td>
</tr>
<tr>
<td>soybean + japanese millet</td>
<td>1.58</td>
</tr>
<tr>
<td>Approximate cost of N from Urea</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Brainard, Henshaw and Snapp (2012); Brainard and Drinkwater (unpublished)
2. Irrigation Savings
Strip Tillage with Living and Dead Mulches

Living mulch

Dead mulch

Moisture loss

Moisture gain
Soil moisture in strip-tilled sweet corn, 2012

Table 1: Effect of mulch on soil moisture

<table>
<thead>
<tr>
<th>Mulch Type</th>
<th>Soil Moisture Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Mulch</td>
<td></td>
</tr>
<tr>
<td>Rye Mulch</td>
<td></td>
</tr>
</tbody>
</table>

Rye mulch: 1.5 cm more water in crop root-zone
3. Wind Insurance
Strip-till and windbreaks in carrots

Early in season
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Supplementary Info
Seed costs per kg of N fixed

Hairy vetch

- Oregon
- Purple Prosperity
- Purple Bounty

Cost of N from urea

Cost of fixed N ($/kg)

Hairy vetch variety

- “New N” from legumes becoming more economical
- Grass legume mixtures can reduce costs (sometimes!)
Available N in the First Season

<table>
<thead>
<tr>
<th>Crop Type</th>
<th>Available N in the First Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vetch</td>
<td>2-4 % N</td>
</tr>
<tr>
<td>Red Clover</td>
<td>&lt; 2 % N</td>
</tr>
<tr>
<td>Crimson clover</td>
<td>2-4 % N</td>
</tr>
<tr>
<td>Oilseed Radish</td>
<td>2-4 % N</td>
</tr>
<tr>
<td>Mustards</td>
<td>2-4 % N</td>
</tr>
<tr>
<td>Cereal Rye</td>
<td>&lt; 2 % N</td>
</tr>
</tbody>
</table>

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