ORGANIC SOYBEAN DEMONSTRATION

Cooperators:  Producer: Todd Henley  
Extension: Keith Balderson, Essex  
NRCS: Chris Lawrence, State Agronomist  
Three Rivers SWCD: Michelle Carter, District Manager 

Planting Date:  May 25, 2006 for Vigoro 435  
May 31, 2006 for USG 440 

Tillage:  Vigoro 435: 2 cultivations  
USG 440: primary tillage (3 passes), plus 4-5 cultivations 

<table>
<thead>
<tr>
<th>Variety</th>
<th>%Moisture</th>
<th>Yield (bu/A)</th>
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</thead>
<tbody>
<tr>
<td>Vigoro 435 (rolled down rye)</td>
<td>12.9</td>
<td>35.0</td>
</tr>
<tr>
<td>Vigoro 435 (rolled down rye)</td>
<td>13.6</td>
<td>44.5</td>
</tr>
<tr>
<td>USG 440 (high tillage)</td>
<td>13.1</td>
<td>45.0</td>
</tr>
<tr>
<td>USG 440 (high tillage)</td>
<td>13.0</td>
<td>50.5</td>
</tr>
</tbody>
</table>

Discussion:
Organic Grain Production: Weed Control Challenge

Todd Henley has been producing certified organic feed grains for as long as 15 years on some fields in King & Queen County. He is now growing about 400 acres of organic corn and soybeans annually. Todd will tell you that organic commodity crops command price premiums and can open up significant marketing opportunities. He’ll also tell you that they bring with them lots of production headaches. Todd often says that organic crops take up one-third of his acreage, but three-quarters of his time.

In eastern Virginia, one of the biggest challenges in organic grain production is weed control. Since all chemical herbicides are prohibited, tillage becomes the obvious choice for killing cover crops and weeds. Multiple tillage passes every year eats up lots of time and money. It’s also hard on the land, causing erosion in steeper areas and destroying soil structure and organic matter on all fields regardless of slope.

Experimenting with “No-Herbicide No-Till” Soybeans

To save time, money, and soil, Todd has started experimenting with “no-herbicide no-till” seeding of soybeans. The practice involves growing a thick cereal rye cover crop and rolling it down flat in late spring to form a mat of residue. Soybeans are then no-tilled into the residue mat. In theory, this practice has two weed control advantages. First, when properly timed and executed, the process of rolling can kill the cover crop without tillage or herbicides. Second, the mat of residue can slow emergence of weeds, especially annuals, until the cash crop canopies. This can reduce or eliminate the need for post-emergence cultivation.

This year Todd used the cover crop roller available from Three Rivers Soil & Water Conservation District in Tappahannock to roll his rye ahead of no-tilling. When used on a heavy stand of tall rye at the grain-fill stage, this specially-designed “crimper” roller should achieve close to 100% kill without herbicides. This year, Todd waited until the rye reached full
physiological maturity before rolling it. Therefore, we can’t make any observations at how well the roller did with respect to killing the cover crop.

Todd no-tilled about 30 acres of organic soybeans into rolled rye. Todd planted in 30-inch rows, which allowed him to row cultivate the organic beans twice with a high-residue cultivator. Plenty of weeds broke through the residue mat and the row cultivation was very much needed. Overall, Todd still saved himself between four and six tillage passes compared to his normal practice. His normal practice is to make two or three full-width tillage passes to prepare the seedbed before planting, plus four or five passes with a rotary hoe or row cultivator after planting.

Yields were checked in two places in the organic no-till soybean field. Yields were also checked in two places in a nearby field where Todd grew organic soybeans using his normal, high-tillage approach. Varieties, planting dates, and soil types were different in the two fields. So these yields have very little research value, but they are still interesting.

Conclusions:
1. The yield checks show that good organic soybean yields are possible in eastern Virginia using both clean-till and no-till establishment methods. Note that this was a relatively dry summer at Todd’s with soybeans definitely experiencing periods of moisture stress. Also note that both checked fields have been in continuous certified organic corn and soybean production (with cover crops every winter) for at least eight years.
2. Rolling down a thick stand of tall rye can cause planting challenges. Todd did not plant in the same direction in which he rolled his rye, so his coulters and furrow-opening disks had to cut through large quantities straw. There was a lot of residue hairpinning, but he still got an acceptable stand overall.
3. In fields with no major pre-existing weed infestations, an acceptable level of weed control can be achieved with organic soybeans no-tilled into rolled rye. But even a thick residue mat will not suppress all weeds, so planting in rows to allow for post-plant row cultivation is probably a good option.
4. In fields with major pre-existing weed infestations, organic no-till won’t achieve acceptable weed control. One edge of Todd’s no-till field has a heavy cocklebur infestation that has been slowly spreading for a number of years. The residue mat, even where it was thickest, had no impact on slowing the seedlings of this aggressive weed. Note that heavy pre-plant tillage might not have done much better on the cocklebur. The reality is that when herbicides are not an option in continuous corn and soybean production, weed control can be a huge challenge, regardless of tillage methods.
5. The jury is still out on whether rolling down cover crops has a place in conventional, non-organic grain production in eastern Virginia. But in organic, herbicide-free grain production systems, it is clear that rolling down cover crops has major potential. Even if Todd experienced a yield drag on the no-till field, he saved the time and cost associated with four to six tillage passes. He plans on continuing to experiment with this practice.
Organic soybeans planted into rolled down rye cover crop. This picture taken looking down rows shortly after planting (May 31, 2006).

Organic soybeans planted into rolled down rye cover crop. This area had low weed pressure. Picture taken prior to any row cultivation (July 03, 2006).
Organic soybeans planted into thick mat of rolled down rye cover crop. This area had low weed pressure. Picture taken prior to any row cultivation (July 03, 2006).

Cocklebur-infested area in no-till organic soybean field. Rows of beans on 30-inch spacing are barely visible among the cocklebur seedlings. Picture taken prior to any row cultivation (July 03, 2006). This level of cocklebur infestation in organic row crops is a no-win situation, whether the crop is established with or without tillage.