No-Till Sugar Beets, Carbon County

Ted Nelson, NRCS District Conservationist, Columbus, MT

County: Carbon, near Fromberg  
Average annual precip: 14-15”  
MLRA: 58A, Northern rolling plains  
Dominant Soil Type: Fc - Fort Collins loam, 0-2% slope  
Acres: 80  
Planting Date: April 15, 2015  
Seeding Method: Double disc no-till planter  
Row Spacing: 24”  
Tillage: no-till for 2 years  
Previous Crop and Year: 2014, corn  
Fertilizer: Yes  
Irrigation: Center pivot  
Next Crop: 2016, malt barley

Fig. 1. No-till sugar beet, July 8, 2015. Ted Nelson.

Introduction: The producer has been active in soil health activities for several years and has planted fields to no-till sugar beets for the last two years in a corn-beet-malt barley rotation. Both the sugar beet and the corn are Roundup Ready™. In this case, “no-till” means that the only tillage is the beet harvesting operation. He also grows conventionally tilled beets which provides for comparison between the two systems. In 2015, both systems were grown side-by-side in two 80 acre fields. Overhead sprinkler irrigation in these fields makes the possibility of reduced-tillage more feasible.

Results: Refer to Figure 5 for a summary comparison of the two systems in 2015. It should also be noted that in 2015, this producer had Fusarium head blight (FHB) in his malt barley in a separate no-till field, leading to rejection at the malting elevator.

Summary and Discussion: The producer has been very pleased with the results of his no-till sugar beets. The producers estimates that no-till saves him at least $120/ac compared with conventional tillage. Besides the reduced inputs of herbicide, fungicide, and fuel, he is also disturbing the soil as little as possible and he has noticed a reduced incidence of fungal pressure on the beets compared to conventional management. He also reports that weed pressure is less in the no-till system. Yield is likely similar if harvested in the same system. Software modeling using the NRCS Wind Erosion Prediction Software (WEPS) indicates that average annual wind erosion can be reduced from 21 t/ac/year with conventional tillage to 2 t/ac/yr with no-till, bringing the system well under the allowed soil loss tolerance of 5/t/ac/yr for this particular soil. While this is very positive for soil health improvement, it is important to recognize there can be negative consequences to a no-till beet system. Specifically, the increased grass crop residue in no-till creates the perfect conditions for growth and spread of FHB, leading to rejection of malt barley at the elevator, due to increased toxin (DON) levels. As a result, producers implementing a reduced-till beet system need to carefully design their crop rotation for disease management. A long, diverse crop rotation is the best management tool to control FHB in a reduced or no-till system. Back-to-back years of grass crops (barley, wheat,
and corn) should not be grown, and specifically, malt barley should not follow corn. FHB is not carried on the residue of broadleaf crops, therefore, a rotation similar to alfalfa-alfalfa-alfalfa-barley-beets may provide control of this disease in a reduced-till system.

![Fig. 3. Comparison of no-till beets on the left and conventional beets on the right, June 10, 2015. Ted Nelson.](image)

<table>
<thead>
<tr>
<th>Field Operations</th>
<th>Conventional Sugar Beets</th>
<th>No-Till Sugar Beets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk Ripper / Roller Harrow 2X / Level 2X / Ridge 2X</td>
<td>Disk Ripper / Roller Harrow 2X / Level 2X / Ridge 2X</td>
<td>No-till</td>
</tr>
<tr>
<td>Harvest Date</td>
<td>Early Dig Sept. 15-17</td>
<td>October</td>
</tr>
<tr>
<td>Yield</td>
<td>32 t/ac</td>
<td>35 t/ac</td>
</tr>
<tr>
<td>Sugar %</td>
<td>17%</td>
<td>17.30%</td>
</tr>
<tr>
<td>Pros</td>
<td>Easier digging</td>
<td>Less inputs, no waiting on irrigation or rain for germination, soil was holding enough moisture under the residue to provide adequate germination, greater soil health benefit</td>
</tr>
<tr>
<td>Cons</td>
<td>High equipment and fuel costs, decreased soil health benefit, waited on rain for germination, germinated 10 days later.</td>
<td>Tougher digging</td>
</tr>
</tbody>
</table>

![Fig. 4. Comparison of no-till vs. conventional sugar beets in 2015 crop year.](image)

![Fig. 5. Corn residue present in no-till sugar beets, July 8, 2015. Ted Nelson.](image)