Strip Till: Tillage for Today and Tomorrow

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Strip Tillage

- Fall: 7-9” strips are cleared
- P and K are banded within strips in fall
- Shovel shank lifts soil and closing discs creates a berm
- Seed planted directly in cleared strips in Spring
- Nitrogen can be applied during fall pass, at planting or side-dressed
Strip Tillage

- Loosens the soil in the row
- Maintains surface residue between the rows
- Potential for one-pass across field
- Increases water infiltration
- Less energy required and less erosion than conventional systems
Other Strip Till Benefits

- Love and admiration by your neighbors
- Can qualify for EQIP programs
- May qualify for Carbon crediting
Strip Till Machines
Coulter Style
ST Units
Want to have a clean berm about 3-6” high

By Spring the berm will be 0-2”
Concerns About Strip Till

- Soil won’t warm up as fast
- Too much residue to manage
- Sacrifice yields
- Equipment costs
- No one to talk to about problems or concerns
Soil Temperatures

- 58.1°C in ST row at 2" depth
- 53.6°C between row at 2" depth
Monsanto COE, Madison, MN
2 inch depth

Strip Till
Conventional Till
Strip Tillage Study – NDSU
Pre-Plant Soil Temps

L. Overstreet, N. Cattanach, S. Gegner

Prosper, ND
Moorhead, MN

L. Overstreet, N. Cattanach, S. Gegner
Cont. Corn Tillage Study - UMN

- Tillage treatments:
  - MBP (Moldboard Plow)
  - Rip (Disc-ripped)
  - ST (Strip Tillage)

- Evaluate:
  - Carbon loss, soil temps, % residue, stands, yield, test weight, % moisture

J. DeJong-Hughes, L. Stahl
Soil Temps at Planting

<table>
<thead>
<tr>
<th>TRT</th>
<th>2006</th>
<th>2007</th>
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<tbody>
<tr>
<td>MBP</td>
<td>65.3</td>
<td>55.7</td>
</tr>
<tr>
<td>DR</td>
<td>62.3</td>
<td>54.7</td>
</tr>
<tr>
<td>ST</td>
<td>65.4</td>
<td>54.2</td>
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LSD (0.05) NS 0.54

Planted May 19\textsuperscript{th}, 2006 and May 11\textsuperscript{th}, 2007, Jeffers, MN
Residue Management and Yield
Southern MN Tillage Research

- Field size research
- Corn following soybeans
- 10 sites in 2004 and 2005
- Four tillage treatments:
  - No Till (NT)
  - Strip Till (ST)
  - Spring cultivation (OP)
  - Fall chisel plow with Spring cultivation (CP+)
Residue Cover
Corn Following Soybeans

Average for UMN sites only. Residue counts taken after planting.
Corn Grain Yields

Yields are averaged over 10 site locations per year.
2006 Residue and Yield
Cont. Corn – Jeffers, MN

Yield LSD (.10) = NS  Residue LSD (.05) = 9
Monsanto COE, Corn Yields 2000-2002

Yield (bu/acre)

<table>
<thead>
<tr>
<th>Year</th>
<th>Strip Till</th>
<th>Conventional</th>
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<tbody>
<tr>
<td>OLeary</td>
<td>162</td>
<td>161</td>
</tr>
<tr>
<td>Olson</td>
<td>157</td>
<td>154</td>
</tr>
<tr>
<td>Olson</td>
<td>170</td>
<td>170</td>
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<tr>
<td>Average</td>
<td>163</td>
<td>164</td>
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OLeary 2000  Olson 2001  Olson 2002  Average
Economics
### Economics of Tillage

<table>
<thead>
<tr>
<th></th>
<th>NT</th>
<th>ST</th>
<th>OP</th>
<th>CP+</th>
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<tbody>
<tr>
<td>CP</td>
<td>6.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST 12 row</td>
<td>6.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cult. 40’</td>
<td></td>
<td>5.48</td>
<td>5.48</td>
<td></td>
</tr>
<tr>
<td>Planter</td>
<td></td>
<td>8.38</td>
<td>8.38</td>
<td>8.38</td>
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<tr>
<td>Min-Til Ptr</td>
<td>9.99</td>
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</table>

UMN Farm Machinery Econ. Costs Estimates - 2005
### Economics of Corn Fertilizer

<table>
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<tr>
<th>Treatment</th>
<th>P (lbs)</th>
<th>K (lbs)</th>
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<tbody>
<tr>
<td>Banded</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Bdcst</td>
<td>45</td>
<td>80</td>
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| Difference per acre | $7.05 | $7.20 |

**Total savings** $14.25 per acre

UMN Fertilizer Rec's for a medium testing soil and a 175 expected yield.

P = 0.47/lb., K = 0.24 /lb. Spring 2007 on actual
Issues with Estimating Economics

- Differing definitions for ST
- 18+ different ST machines
  - Cost can range from $15,000 to $130,000
  - Different attachments and options
- Reduced fertilizer costs not always used
- Difficult to put a price on improvements to soil quality
Economic Summary

- Strip Till has a potential for one pass across the field, saving time and fuel.

- 30” rows in a C-SB rotation can save on stalk chopping ($9.90/ac).

- If banding P and K, reduce cost by a third.

Courtesy of IPNI.net
Other Benefits
Strip Tillage Study – NDSU
In-Row Soil Moisture (°% MC)

Overstreet, Cattanach, Gegner

June 21, 2007

July 3, 2007

Prosper, ND

Moorhead, MN

BEET BEANS WHEAT CORN

ST CT
Inches of Soil Moisture in Corn Tillage Systems in 2002

Strip Tillage

Conventional Tillage

Field Capacity

Wilting Point

04/15/02 05/02/02 05/17/02 05/31/02 06/14/02 06/29/02 07/12/02 07/26/02 08/12/02

SAMPLING DATE

INCHES OF SOIL MOISTURE

0.00 0.50 1.00 1.50 2.00 2.50 3.00 3.50
Management
Proper Set-up of Equipment is Crucial
Don’t stagger wheel traffic. 80% of compaction happens on the first pass.
Spring vs. Fall ST

- Benefit of Fall ST is due to soil warm-up before planting
- Can be done but should be used only if fall ST was not completed
- Spring ST has the potential for:
  - Cooler soil
  - Wetter soil
  - Cloddy seed bed
To Chop or Not to Chop…

- **Upright stalks:**
  - Helps with water infiltration
  - Dries out faster
  - Plant between 30” rows
  - Don’t drive combine on the stalks

- **Chopped stalks:**
  - May be better for 22” rows
  - Helps residue move through machine
  - Staggered bar will manage residue better than straight
Combine and ST Directions
ST Management

- How aggressive do you need to be?
  - Moisture savings?
  - Crop rotation?

- Match equipment to needs

- Combine should spread out chaff

- Residue managers on planter
ST Management

- Use a starter or pop-up at planting
- Band P and K for better economics
- Good drainage is beneficial
- Avoid ST up and down hills
- Auto guidance can be helpful
  - Placement of fertilizer
  - Planting on berm
  - Other
Strip Till Summary

- Cool and/or wet soils can benefit from ST
- ST maintains yields while saving you time and money
- ST builds soil structure, preserves organic matter, and reduces erosion
- It is a win-win situation
Don’t Drink and Farm!