Strip-Till Corn Production Systems: The Known and the Unknown

Tony J. Vyn & Graduate Students, Colleagues & Farmers
Successful Strip Tillage after Soybean and Reasonable Soil Moisture Conditions

Source: Norm Larson, Elburn Co-op, IL
Fall Strip Tillage
Berms after Soybean Harvest
Berm Heights in Spring after Successful Strip Tillage
Corn Yield Response to Tillage and Planting Date in Indiana, 2003-04

- **Silty Clay, Corn-Soy**
  - Early: 240 (Strip-Till), 220 (No-Till), 220 (Chisel)
  - Normal: 220 (Strip-Till), 220 (No-Till), 220 (Chisel)

- **Loam, Corn-Soy**
  - Early: 240 (Strip-Till), 220 (No-Till), 220 (Chisel)
  - Normal: 220 (Strip-Till), 220 (No-Till), 220 (Chisel)

- **Loam, Cont. Corn**
  - Early: 240 (Strip-Till), 220 (No-Till), 220 (Chisel)
  - Normal: 220 (Strip-Till), 220 (No-Till), 220 (Chisel)
Spring Strip-till Berms
Other Spring Tillage Options?
Spring Strip-Till vs. Turbo-Till® or FC
North-East Purdue Ag Center, Columbia City (2004)

Courtesy: Phil Walker and Allen County SWCD
Fall Strip-Till vs. Turbo-Till® or FC

North-East Purdue Ag Center, Columbia City (2005-2006)
Strip Tillage for Corn after Corn?
Strip-Till Corn after Corn

Split the middle w/o guidance

Source: Norm Larson, Elburn Co-op, IL
Surface Residue Cover (%) after Planting
Loam Soil, Wanatah, IN, 2001-2005
Strip Tillage for Corn after Soybean and Corn in N. Indiana, Loam Soil (2001-07)

![Chart showing yield comparison between fall chisel, strip-till, and no-till in soybean and corn crops]
Tillage Effects on Corn Yields after Soybean and Corn in N. Indiana, Loam Soil (2007)

Yield (bu./ac)

Previous Crop

Soybean

Corn

244
238
237
226
230
226
225
207

Fall Plow
Fall Chisel
Strip-Till
No-Till

a a a
b
a a a
b

Tillage Effects on Corn Yields after Soybean and Corn in N. Indiana, Loam Soil (2007)
Management Issues Include Automatic Guidance, Fertility, Prior Compaction, and Seed Row Uniformity
Precision of Planting Following Strip Tillage?
Row Position is Critical

Source: Norm Larson, Elburn Co-op, IL
RTK Planting after Strip-Till
(West Lafayette, 2006)
RTK Plot Harvest 2006
Average Corn Yield Response to RTK Precision at West Lafayette, IN, 2006

Mean of April 11 and 27

- Strip-till RTK
- Strip-till Visual
- Strip-till off 7"
- No-till
- Chisel Plow
Strip Tillage with Fertilizer Banding
ARLINGTON, WI STRIP-TILLAGE PROJECT

- Tillage/rotation study since 1997
  - Plano silt loam soil
  - Strip-till added in 2000
  - Cont. corn, Soybean/corn, Corn/soybean
  - PK fertilizer: None, broadcast, deep, and row-placed at crop removal rate
  - Summarize 2001 – 2004, strip-till only
<table>
<thead>
<tr>
<th>Year</th>
<th>pH</th>
<th>Soil test P (ppm)</th>
<th>Soil test K (ppm)</th>
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<tbody>
<tr>
<td></td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>2001</td>
<td>6.7</td>
<td>41</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>6.7</td>
<td>51</td>
<td>110</td>
</tr>
<tr>
<td>2005</td>
<td>6.7</td>
<td>38</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>6.6</td>
<td>56</td>
<td>120</td>
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</table>

Source: D. Wolkowski, University of Wisconsin, 2007
CORN GRAIN YIELD AS AFFECTED BY FERTILIZER PLACEMENT IN STRIP-TILL
Four Year Avg. (2001 - 2004)

Source: D. Wolkowski, University of Wisconsin, 2007
Note: $P_2O_5$ rate = 88 pounds/acre, and $K_2O$ rate = 115 pounds/acre

All plots received a uniform 2 x 2” starter of 14 – 28 – 14 (N,P,K), plus a total N rate of 250 pounds/acre.
High Yield Corn Response to Placement

**Sponsor: PPI - FAR 2001-2003**

**Hybrids:**
1. Pioneer 34B24
2. Pioneer 34M95

**Population/ Acre:**
1. 32,000
2. 42,000

**P&K Fertilizer Placements:**
1. Control
2. Broadcast
3. Shallow Band (6”)
4. Deep Band (12”)
5. Shallow + Deep (6” and 12”)

**Note:** $P_2O_5$ rate was 88 pounds/acre, and $K_2O$ rate was 115 pounds/acre. All plots received a uniform 2 x 2” starter of 14 – 28 – 14 (N,P,K).

Yield (bu/acre)

```
220
200
180
160
140
120
100

2001 2002 2003
```

“CONTROL”
Soil-test P (0-4”):  15   25   30
(4-8”):  15   15   21
Soil-test K (0-4”):  94   143  161
(4-8”): 107  101  110

- Control
- Broadcast
- Band 6"
- Band 12"
- Band 6" and 12"
Placement Effects of P plus K on Leaf K % for Pion. 34M95 in 2003

<table>
<thead>
<tr>
<th>Plants/acre</th>
<th>Control</th>
<th>Broadcast</th>
<th>Band 6&quot;</th>
<th>Band 12&quot;</th>
<th>Band 6&quot; &amp; 12&quot;</th>
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</thead>
<tbody>
<tr>
<td>32,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>42,000</td>
<td></td>
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</table>
Corn Yield Response of Pion. 34M95 to Alternate P plus K Placements in 2003

Corn Yield Response of Pion. 34M95 to Alternate P plus K Placements in 2003
Corn Response to Deep Banding at 6” Depth
2005 – 2006 Experimental design

Field 54-55 July 7, 2006

Split-split Plot Design

A) Block
   - 2005: 5
   - 2006: 6

B) Hybrid
   1_ Pioneer 31N28 (119 CRM)
   2_ Pioneer 31G68 (118 CRM)

C) Fertility Placement
   1_ Check
   2_ Broadcast P+K
   3_ Banded P+K
   4_ Banded P
   5_ Banded K
   (applied in the previous fall)
Residual Effects of Fertilizer P and K Placement in Corn on Subsequent No-till Soybean (2002-2006)

Planting 5/10/04

Soil sampling (June/04)
Six inch Band P and K Placement Effects on Strip-till Corn Yield (mean of 2 hybrids, 2001-2006)

Soil-test P (0-4”): 22 104
Soil-test P (4-8”): 21 94
Soil-test K (0-4”): 186 164
Soil-test K (4-8”): 94 125

* Starter was 10-34-0
Corn grain yield relationships, within fertility treatments, to soil-test P or K at the plot level.

Medium P

* Grain yields (2005)

\[ y = 77.663x + 10825 \]
\[ R^2 = 0.43 \]

Very high P

* Grain yields (2006)

\[ y = 8.0532x + 12614 \]
\[ R^2 = 0.26 \]
**ACRE 2001-2006 Experiment**

Corn grain yield relationships, within fertility treatments, to ear leaf-P or K at the plot level.

**Medium P Soil**

* Grain yields (2005)

- **Broadcast P+K**
- **Banded P+K**
- **Banded K**
- **Banded P**
- **Check**

**Very high P**

* Grain yields (2006)

- **Broadcast P+K**
- **Banded P+K**
- **Banded K**
- **Banded P**
- **Check**

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**Graph Details**

- **Medium P Soil (2005)**
  - Equation: \( y = 35614x + 5032.5 \)
  - \( R^2 = 0.66 \)

- **Very high P (2006)**
  - Equation: \( y = 876.28x + 12815 \)
  - \( R^2 = 0.23 \)
Strip-till Corn: The Known

1. Strip-till corn yields are no better than no-till corn yields when corn follows soybean.
2. The biggest advantages for strip-till over no-till are increased planting date flexibility, early soil warmth, and the opportunity for fertilizer banding.
3. Strip tillage is clearly superior to no-till on medium to fine-textured soils (with poor drainage) when corn follows corn.
Strip-till Corn: The Unknown


2. What are the best options in spring when wet falls prevent completion of fall strip-till?

3. Can strip-till equal the erosion control of no-till on steep slopes?
Strip-till Corn: The Unknown (Continued)

4. Relative importance of the shank design versus the berm configurations in achieving higher yields on different soils.

5. Optimum row position when strip-till corn follows corn?

6. The additional yield and profitability gains with automatic guidance & controlled traffic systems in future.
7. Who is going to do the Research!
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Remlinger (Kalida, OH)

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Thanks!

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