Strip-till Research Results: Rotation, Automatic Guidance, and Fertilizer Placement

Tony J. Vyn & Graduate Students, Colleagues & Farmers
Berms after Soybean Harvest
Berm Heights in Spring after Successful Strip Tillage
No-till vs. Strip-till Following Soybean
Wanatah, IN, 2008
Corn Yield Response to Tillage and Planting Date in Indiana, 2003-04

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

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

- Turbo once
- Field Cultivate
- Strip-till
- No-Till

Courtsey: Phil Walker and Allen County SWCD
Fall Strip Tillage
Strip-till versus No-till Corn after Wheat (Ontario)
Wheat Residue Effect on No-till Corn vs. Strip-till Corn

Centralia & Wyoming, Ontario (1994-96)

Yield (bu/ac)

- Fall Strip-till: 149
- No-till (not baled): 135
- No-till (baled): 142
- No-till (bare): 149

Opoku, Vyn & Swanton (Agron. J. 89:549)
Strip Tillage for Corn after Corn?
Strip-Till Corn after Corn

Source: Norm Larson, Elburn Co-op, IL

Split the middle w/o guidance
Surface Residue Cover (%) after Planting
Loam Soil, Wanatah, IN, 2001-2005

Previous Crop

Soy  Corn

Chisel
Strip-till
No-till
No-Till vs. Strip-till following Corn (Wanatah, IN, 2008)
Strip Tillage for Corn after Soybean and Corn in N. Indiana, Loam Soil (2001-07)
RTK Automatic Guidance
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)
Maximum soil temperature at 2-inches deep in row, first 2 weeks after planting, ACRE, 2007
RTK Plot Harvest 2006
Average Corn Yield Response to RTK Precision at West Lafayette, IN, 2006-2007

Mean of April 11 and 27

- Strip-till RTK
- Strip-till Visual
- Strip-till off 7"
- No-till
- Chisel Plow
RTK + Pre-plant UAN Application 2006
RTK Planting after Pre-plant UAN
(West Lafayette, 2006)
RTK and Pre-plant UAN at Wanatah, IN, 2006

200 N at 5” versus 200 N at 0”

200 N at 5” (background) vs. 200 N at 0” (foreground)
RTK Row Position Effects on Plant Population Response to Pre-Plant UAN Rates
Wanatah, IN, 2006-2007

Population/acre

On-Row  5" beside  10" beside

Zero Pre  50 Pre  100 Pre  200 Pre

Population/acre

a a a a
b

a a a a

a a a a

c
RTK Row Position Effects on Corn Yield Response to Pre-Plant UAN Rates

Wanatah, IN, 2006-2007

Corn Yield (bu/acre)
Strip Tillage with Fertilizer Banding
Strip-till Corn Yield Results in Illinois
(Mean of 11 site years 1999-2002)

• 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
### Arlington Soil Test

<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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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>None</td>
<td>Bdct.</td>
</tr>
<tr>
<td>2001</td>
<td>6.7</td>
<td>6.7</td>
<td>41</td>
</tr>
<tr>
<td>2005</td>
<td>6.7</td>
<td>6.6</td>
<td>38</td>
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</tbody>
</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
Corn Response to P Fertilizer Placement in Iowa
(Malarino et al.)

Grain Yield (bu/acre)

Soil-test Classification

- Control
- Control + Coulter
- Broadcast
- Deep-banding
- Starter
Strip Tillage with Nutrient Banding in Small-plot Research (West Lafayette, IN)

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.
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)

Yield (bushels/acre)

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<tbody>
<tr>
<td>Soil-test P (0-4”):</td>
<td>22</td>
<td>21</td>
<td>104</td>
<td>94</td>
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<tr>
<td>Soil-test K (0-4”):</td>
<td>186</td>
<td>94</td>
<td>164</td>
<td>125</td>
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<tr>
<td>Soil-test P (4-8”):</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Soil-test K (4-8”):</td>
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</tbody>
</table>

Legend:
- Control
- Broadcast P & K
- Deep-Band P & K

* Starter was 10-34-0
Soil P conc. (ppm) in spring 2008 following third strip-till corn cycle for a corn-soybean rotation

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Broadcast P &amp; K</th>
<th>Deep Banded P &amp; K</th>
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</thead>
<tbody>
<tr>
<td>In-row 0-4&quot;</td>
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<tr>
<td>In-row 4-8&quot;</td>
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<tr>
<td>Middle 0-4&quot;</td>
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<tr>
<td>Middle 4-8&quot;</td>
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Soil K conc. (ppm) in spring 2008 following third strip-till corn cycle for a corn-soybean rotation
Root zone optimization in Strip-till?


2. RTK Guidance may be beneficial for centering on the berm even when fertilizer is not deep banded.

3. Spring Pre-plant N application in the row area?
4. Who is going to do the Research!
Acknowledgments

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- Fluid Fertilizer Foundation
- John Deere & Co.

Equipment:
- John Deere Cropping Systems Unit
  - Case-DMI (Goodfield, IL)
  - Remlinger (Kalida, OH)

Seed:
- Pioneer Hi-Bred, Int.
Thanks!

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