Nutrient Placement using RTK Guidance in Corn Production Systems

Tony J. Vyn & Graduate Students, Colleagues & Farmers
RTK Automatic Guidance
RTK + Pre-plant UAN Application
2006-2008
RTK Planting after Pre-plant UAN
(West Lafayette, 2006)
Treatment Description for RTK Guided Row Positions Relative to Pre-plant UAN

- UAN rates (0, 50, 100, 200 N per acre)
- Positions (0”, 5”, and 10” from UAN band)
- Two locations in 2006-2008: 1. Wanatah (loam), and 2. West Lafayette (silty clay loam)
- Third location in 2007-2008: Lafayette, IN (silt loam)
- Starter versus no starter split at West Lafayette and Lafayette: 10-34-0 at 220 pounds/acre.
- Starter at Wanatah: 19-17-0 at 125 pounds/acre
- All treatments received a total of 200 pounds of N as UAN (whether pre-plant and/or early sidedress)
RTK and Pre-plant UAN at Wanatah, IN

50 N at 0” versus 200 N at 0”

100 N at 0” versus 100 N at 10”
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, 2006-2008

Population/acre

0 5000 10000 15000 20000 25000 30000 35000 40000

On-Row      5” beside    10” beside

Zero Pre     50 Pre       100 Pre       200 Pre

ab           a a          a b           c d

Purdue Agronomy
Purdue University
crop, soil, and environmental sciences
RTK Row Position & V8 Plant N Concentration (%)
Response to Pre-Plant UAN Rates
Wanatah, IN, 2006-2008

Plant N concentration (%)

- On-Row
- 5" beside
- 10" beside

Zero Pre
50 Pre
100 Pre
200 Pre

Responses indicated by different letters:
f, c, d, de, de, ef, a, c, ef
RTK Row Position & Plant Mn Concentration (ppm)
Response to Pre-Plant UAN Rates
Wanatah, IN, 2006-2008 (soil pH=5.5)
RTK Row Position Effects on Corn Yield Response to Pre-Plant UAN Rates

Wanatah, IN, 2006-2008

Corn Yield (bu/acre)

- On-Row
- 5" beside
- 10" beside

Variations in corn yield (bu/acre) at different pre-plant UAN rates and row positions:
- Zero Pre:
  - On-Row: ab
  - 5" beside: ab
  - 10" beside: a

- 50 Pre:
  - On-Row: ab
  - 5" beside: a
  - 10" beside: ab

- 100 Pre:
  - On-Row: ab
  - 5" beside: ab
  - 10" beside: ab

- 200 Pre:
  - On-Row: ab
  - 5" beside: b
  - 10" beside: ab

Legend:
-각 차트의 색상과 수치는 각각의 요소를 나타냅니다.
- On-Row: 적색
- 5" beside: 초록색
- 10" beside: 파란색

Purdue University
Purdue Agronomy
RTK after Pre-Plant UAN at West Lafayette

200 N @ 0” w/o & w Starter

200 N @ 0”
RTK Row Position Effects on Corn Yield Response to Pre-Plant UAN Rates (With Starter, Soil-test P=34)

West Lafayette, IN, 2006-2008

<table>
<thead>
<tr>
<th>Corn Yield (bu/acre)</th>
<th>On-Row</th>
<th>5&quot; beside</th>
<th>10&quot; beside</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero Pre</td>
<td>240</td>
<td>220</td>
<td>240</td>
</tr>
<tr>
<td>50 Pre</td>
<td>230</td>
<td>220</td>
<td>240</td>
</tr>
<tr>
<td>100 Pre</td>
<td>220</td>
<td>230</td>
<td>240</td>
</tr>
<tr>
<td>200 Pre</td>
<td>210</td>
<td>230</td>
<td>240</td>
</tr>
</tbody>
</table>

b, ab, a, b

Purdue Agronomy

Purdue University
RTK Row Position Effects on Plant Population Response to Pre-Plant UAN Rates Lafayette, IN 2007-2008

Population/acre

0 50000 10000 15000 20000 25000 30000 35000 40000

On-Row  5" beside  10" beside

Zero Pre  50 Pre  100 Pre  200 Pre

a a a a a a a
RTK Row Position & V8 Plant Mn Concentration
Response to Pre-Plant UAN Rates
Lafayette, IN, 2007-2008

Plant Mn concentration (ppm)

<table>
<thead>
<tr>
<th></th>
<th>On-Row</th>
<th>5&quot; beside</th>
<th>10&quot; beside</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero Pre</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 Pre</td>
<td>bcdbcd</td>
<td>ab</td>
<td>abc</td>
</tr>
<tr>
<td>100 Pre</td>
<td></td>
<td>abcd</td>
<td>cd</td>
</tr>
<tr>
<td>200 Pre</td>
<td></td>
<td>a</td>
<td>a</td>
</tr>
</tbody>
</table>

Purdue Agronomy

crop, soil, and environmental sciences
RTK Row Position & Plant Zn Concentration
Response to Pre-Plant UAN Rates
Lafayette, IN, 2007

Plant Zn concentration (%)

On-Row  5" beside  10" beside

Zero Pre  50 Pre  100 Pre  200 Pre

Plant Zn concentration (%)
0  10  20  30  40  50

d  bcd  cd  abcd  ab  ab  a

abcd
RTK Row Position Effects on Corn Yield Response to Pre-Plant UAN Rates (With Starter)
Lafayette, IN, 2007-2008
Starter Influence on Corn Yield Response to Row Position at 3 N Rates in 2007-2008 (Soil-test P=43)
UAN Placement Conclusions

1. RTK precision offers advantages for corn planting after pre-plant UAN application (population, yield).

2. When pre-plant N rates in the form of UAN exceed 50 pounds/acre, corn rows 5” to the side are “safer” than those directly over the UAN band.

3. Corn yield response to row position relative to pre-plant UAN bands may also depend on starter formulation and rate.

4. UAN rate and RTK row position also affect micronutrient concentrations in young corn plants.
Acknowledgments

Funding:
Fluid Fertilizer Foundation
Foundation Agronomic Research
PPI & IPNI
Purdue University
(Mary Rice & Mission Oriented)

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

Seed:
Pioneer Hi-Bred, Int.
Thanks!

tvyn@purdue.edu

home page:
//www.agry.purdue.edu/staffbio/vyn