Utilizing Site-specific Technologies To Improve Farm Profitability And Environmental Quality

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Illinois Fertilizer & Chemical Association
Normal Practice
15.1 acres
100 ft Spacing

Managed Nitrogen
15.2 acres
100 ft Spacing
Tile Map

Historical field borders and cropping pattern
Field configuration in 2001

Soy 2015

Corn 2015

Soy 2015

Corn 2015
Woodchip bioreactors
Applied on Farm Nutrient & Water Quality Projects

• Clearly identify what you are looking for
• Work with your CCA to select fields
• Utilize 4R practices that would help reduce nutrient losses
• Document the trial.
• Try BMP’s that Minimize Environmental Impact, Optimize Harvest Yield and Maximize Input Utilization.
• On-Farm Nitrogen Rate Trials
• Maximum Return to Nitrogen Rate Calculator.
• Ag retailers, growers and the U OF I
• IFCA’S goal of 50 N Rate Trials in 2015(Done)
Note: Differences between fall and spring are so small that this is really the same line.
Soy-Corn-2 2014

- Yield vs. N rate

- Fall: ➧
- Spring: ➥
- Opt: ➢

Opt N Sp 183 Opt Y 231
Opt N FA 202 Opt Y 241
Lake Springfield 2014

• Under high-yielding, N responses were normal
• The average optimum N rate over the soy-corn sites was 169# of N/acre
• The average optimum N rate over the corn-corn sites was 216# of N/acre.
• High Yields: 234bu/acre corn following soybeans and 253bu/acre corn following corn
• 2015 N-Rate trials started. Sangamon Co.
Maximum Return To Nitrogen (MRTN)

Web Version

Choose state
- Illinois - Central
- Illinois - South
- Indiana - West & Northwest
- Indiana - East & Central
- Indiana - Remainder
- Michigan
- Minnesota
- Ohio
- Wisconsin – VH/HYP Soils
- Wisconsin – M/LYP Soils
- Wisconsin – Irr. Sands
- Wisconsin – Non-Irr. Sands

Choose rotation pattern(s)
- Corn following soybean
- Corn following corn

Include non-responsive sites

Set corn and nitrogen prices
- Anhydrous Ammonia (82% N): 820 ($/Ton)
- Nitrogen price: 0.50 ($/lb N)
- Corn price: 5.00 ($/bu)

App Droid/iPad

More information about the MRTN can be found at: http://extension.agron.iastate.edu/soilfertility/nrate.aspx

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The N Cycle

Figure 9.7. The nitrogen cycle.
We know when we are short of Nitrogen
How do we know when we have Too much N?
PURPOSE

- Inventory
- Track
- Verify
- Apply

N Management System

Teach about N transformation in the soil

A Management Tool

Not a Recommendation System
# Fall Soil Nitrate Sampling

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Counties Reporting</td>
<td>39</td>
</tr>
<tr>
<td>Total Number of Sites Tested</td>
<td>200</td>
</tr>
<tr>
<td>Number of sites with 2+ App.</td>
<td>78</td>
</tr>
<tr>
<td>N03-N PPM 0-12”</td>
<td>19</td>
</tr>
<tr>
<td>N03-N PPM 12-24”</td>
<td>13</td>
</tr>
<tr>
<td>Total LBS of N Both Depths</td>
<td>128</td>
</tr>
</tbody>
</table>
**N-Watch 2012**

**N Inventory Report**

- **Sampling Date:** 10/5/2012
- **Customer:** Actual Field Exmap.
- **Farm/Field Name:** U of I Nitrogen Trial
- **Latitude:** 39.67045
- **Longitude:** -88.1394

### AVAILABLE N

<table>
<thead>
<tr>
<th>Depth</th>
<th>NO₃-N (ppm)</th>
<th>NH₄-N (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-12&quot;</td>
<td>39.2</td>
<td>2.2</td>
</tr>
<tr>
<td>12-24&quot;</td>
<td>7.1</td>
<td>1.9</td>
</tr>
</tbody>
</table>

### Total Available N

<table>
<thead>
<tr>
<th>Total Available N</th>
<th>41.4</th>
</tr>
</thead>
</table>

### % N as NO₃:

<table>
<thead>
<tr>
<th>% N as NO₃</th>
<th>95%</th>
</tr>
</thead>
</table>

### % N as NH₄:

<table>
<thead>
<tr>
<th>% N as NH₄</th>
<th>5%</th>
</tr>
</thead>
</table>

### 2011-2012 N MANAGEMENT

- **Crop:** Corn
- **Yield:** 100

#### NH₃

- **Application Date:** Mar-12
- **Placement:** Preplant
- **Rate (N):** 190
- **Stabilizer Used:** None

**Note:** ppm conc. below 5 ppm not significant. May be caused by interfering ions in soil.

#### Available N at 0 to 12" Depth

- **NO₃-N (ppm):** 25 ppm

#### Available N at 12 to 24" Depth

- **NO₃-N (ppm):**

**Diagram:**

- Surface
- Subsurface
SAMPLED NOV. 2012 (Residual N)

Available N (ppm)

Surface

Avg. 23.1 ppm

Subsurface

Avg. 17.2 ppm

NO3-N (ppm)

NH4-N (ppm)

25 ppm
## N-Watch 2014

### 0-1’ Sampling Depth

<table>
<thead>
<tr>
<th>Date</th>
<th>N03-N</th>
<th>NH4-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/18/13</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>04/01/14</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>05/06/14</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>06/02/14</td>
<td>29</td>
<td>7</td>
</tr>
<tr>
<td>08/25/14</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>09/02/14</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

### 1-2’ Sampling Depth

<table>
<thead>
<tr>
<th>Date</th>
<th>N03-N</th>
<th>NH4-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/18/13</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>04/01/14</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>05/06/14</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>06/02/14</td>
<td>21</td>
<td>13</td>
</tr>
<tr>
<td>08/25/2014</td>
<td>33</td>
<td>4</td>
</tr>
<tr>
<td>09/02/14</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Date</td>
<td>NO3-N</td>
<td>NH4-N</td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>09/02/14</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8/25/2104</td>
<td>33</td>
<td>4</td>
</tr>
</tbody>
</table>
N-Watch Site, 2014 Growing Season

140 lb N as NH₃ + NS applied 11/11/2013

- NO₃-N top ft
- NH₄-N top foot
- NO₃-N 2nd ft
- NH₄-N 2nd ft
- Total N 2 ft

Sampling date:
- 11/2/2013
- 1/1/2014
- 3/2/2014
- 5/1/2014
- 6/30/2014
- 8/29/2014
# Fall N-Serve/No Serve

## Fall NH3 No N-Serve

<table>
<thead>
<tr>
<th>AVAILABLE N</th>
<th>0-12</th>
<th>12-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO3-N ppm</td>
<td>20.3</td>
<td>7.7</td>
</tr>
<tr>
<td>NH4-N ppm</td>
<td>11.0</td>
<td>3.2</td>
</tr>
<tr>
<td>Total</td>
<td>31.3</td>
<td>10.9</td>
</tr>
</tbody>
</table>

| % N as NO₃: | 65% | 71%  |
| % N as NH₄: | 35% | 29%  |

## Fall NH3 With N-Serve

<table>
<thead>
<tr>
<th>AVAILABLE N</th>
<th>0-12</th>
<th>12-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO3-N ppm</td>
<td>12.3</td>
<td>6.2</td>
</tr>
<tr>
<td>NH4-N ppm</td>
<td>24.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>36.7</td>
<td>8.6</td>
</tr>
</tbody>
</table>

| % N as NO₃: | 33% | 72%  |
| % N as NH₄: | 67% | 28%  |
## Estimated N conversion, 2001-02 (warm winter, wet spring)

<table>
<thead>
<tr>
<th></th>
<th>NH(_3) without N-Serve</th>
<th>NH(_3) with N-Serve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DeKalb</td>
<td>Bondville</td>
</tr>
<tr>
<td>Nov. 1 to Apr. 1</td>
<td>30</td>
<td>39</td>
</tr>
<tr>
<td>Dec. 1 to Apr. 1</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>Apr. 1 to Apr. 25</td>
<td>17</td>
<td>20</td>
</tr>
</tbody>
</table>

---Percent of ammonia converted to nitrate---

Conversion to NO\(_3\) is not “loss” – it only enables loss

Loss requires denitrification or leaching:

- denitrification estimated at 4 to 5%/day in saturated soils at 70°;
  <1%/day at 50°
- leaching measured by tile flow or deep sampling

Source: Hoeft
APPLICATION CONSIDERATIONS

- Early
- Pre-plant
- Post-emerge

It's not about increasing N rates. It's about increasing N utilization.
"We have a surplus of solutions, so I need you to create a bunch of new problems."
“We’re seeing a significant drop in customer complaints since we stopped answering our phones.”

Contact Information
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