Nitrogen Management

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Current Issue

- Nitrogen prices continue to increase (almost on a weekly basis)
- Short-term forecasts reveal that higher prices will be the norm
- Commodity prices are still rising, but with higher nitrogen prices – economic management of nitrogen inputs still key

Overview

- Nitrogen response - an historic perspective
- Economic-based nitrogen recommendations
- New (and some old) technologies for nitrogen management
  - Nutrisphere and agrotain

Nitrogen Response

- How have things changed?
  - Nitrogen response (on average has not changed that dramatically)
  - Corn is still responsive (but we are achieving higher yields than we have historically with less nitrogen)
    - Hybrid improvement
    - Transgenics
    - Improved agronomic practices
Nitrogen Response

**Corn response in the 70s**
- Yield, bu/acre vs. N rate, lb/acre
- Data from 38 sites:
  - AONR: 229 lb/acre
  - Yield: 158 bu/acre

**Corn response in the 80s**
- Yield, bu/acre vs. N rate, lb/acre
- Data from 13 sites:
  - AONR: 285 lb/acre
  - Yield: 160 bu/acre

**Corn response in the 90s**
- Yield, bu/acre vs. N rate, lb/acre
- Data from 19 sites:
  - AONR: 286 lb/acre
  - Yield: 205 bu/acre

**Corn response in the last 10 years**
- Yield, bu/acre vs. N rate, lb/acre
- Data from 87 sites:
  - AONR: 182 lb/acre
  - Yield: 179 bu/acre
Nitrogen Response

We have discovered that yield goal (potential) is not a good way to pick N rates.

Nitrogen Response

Corn after soybeans, 1998-2007

\[ y = 0.1838x + 139.93 \]

\[ R^2 = 0.0132 \]

Economic Changes

Not only has nitrogen response changed, but so have economic realities.

- Nitrogen prices near (or exceeding) $0.60 - $0.70 per pound (some sources are higher)
  - High natural gas prices (not necessarily the only player anymore)
  - Global demand
  - Weak dollar
- Commodity prices at record levels
  - Biofuels
  - Increased demand for animal feed globally

A “Brave” New World

What does this mean for you?

- Consider economics of your decision
- Make the best economic choice
  - i.e. utilize our new economic recommendations
Circa 1997

🔹 Corn prices of $2.50/bu

🔹 Nitrogen input cost - $0.12/lb N

🔹 Net return to nitrogen investment

Maximum return to nitrogen point:
160 lb N/acre

Today

🔹 Assuming a corn price of $5/bu
**Today**

- **Assuming N costs $0.50/lb of N**

- **Return to nitrogen**

- **Based on $1 less than the optimum point**

- **New Technologies**

  - **Do any of the new (and some old) products offer hope?**
    - **Nutrisphere**
    - **Agrotain**
Research Results

Western Research Station, 2006

All nitrogen materials applied preplant without incorporation in no-till systems

<table>
<thead>
<tr>
<th>Nitrogen source</th>
<th>Nitrogen rate, lb/acre</th>
<th>Yield, bu/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check</td>
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<td>94</td>
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<tr>
<td>Urea</td>
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<td>165</td>
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<tr>
<td>Nutrisphere</td>
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<tr>
<td>UAN</td>
<td>100</td>
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<tr>
<td>UAN+Nutrisphere</td>
<td>100</td>
<td>169</td>
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<tr>
<td>Urea+Agrotain</td>
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</tr>
<tr>
<td>UAN+Agrotain</td>
<td>100</td>
<td>157</td>
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<tr>
<td>LSD₀.₁</td>
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</tbody>
</table>

An inch of rain fell within three days of nitrogen application

Should have minimized risk of nitrogen loss

Research Results

Western Research Station, 2007

Again, all nitrogen materials applied preplant without incorporation in no-till systems

<table>
<thead>
<tr>
<th>Nitrogen source</th>
<th>Application method</th>
<th>Yield, bu/acre</th>
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<tbody>
<tr>
<td>Check</td>
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<td>157</td>
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<tr>
<td>Nitamin (conc. 1)</td>
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<td>215</td>
</tr>
<tr>
<td>Nitamin (conc. 2)</td>
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<tr>
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<tr>
<td>UAN+Nitrisphere</td>
<td>Dribble</td>
<td>200</td>
</tr>
<tr>
<td>Urea+Agrotain</td>
<td>Broadcast</td>
<td>243</td>
</tr>
<tr>
<td>Urea</td>
<td>Broadcast</td>
<td>224</td>
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<tr>
<td>UAN</td>
<td>Dribble</td>
<td>212</td>
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<tr>
<td>LSD₀.₁</td>
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<td>16</td>
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</tbody>
</table>

Nitrogen source | Application method | Yield, bu/acre |
--- | --- | --- |
Check | — | 157 c |
UAN+Agrotain | Broadcast | 195 b |
UAN+Agrotain | Dribble | 235 a |
UAN | Dribble | 231 a |
It did not rain for 11 days after the application. Essentially a worst case scenario for nitrogen loss after urea application.

Northwest Research Station, 2007
Fall tillage only (treatments were not incorporated)

<table>
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<tr>
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<th>Yield, bu/acre</th>
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</table>

Rained a quarter of an inch within 6 days of application. Again worst case scenario for nitrogen loss.
Summary of Research

- No clear advantage of using these products at all locations
- Not something that I would recommend widespread
- Additive rules
  - More likely to see benefit from surface applied urea in no-till
  - If using an additive, decrease your nitrogen application rate
  - Incorporated or injected urea unlikely to need a stabilizer

Questions?

- Thanks.
- For more agronomic information checkout:
  - http://agcrops.osu.edu/
  - http://agcrops.osu.edu/fertility/
  - http://corn.osu.edu/