Evaluating Optimum Side-Dress N Application Rates for Corn Following Soybeans

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Can nitrogen (N) rates be reduced if a majority of the corn’s N requirement is side-dressed when the crop is 12–20 inches tall?

- Minimize the threat of N loss by leaching and denitrification.
- Maximize N uptake because the crop has an established root system.
Materials and Methods

- 3-year study with 13 locations.
- Fields were planted to corn following soybeans.
- Four N rates were evaluated (80, 120, 160, 200 lbs. actual N per acre).
- N was side-dressed when corn was 12-20 inches tall.
- N was applied as anhydrous or 28%.
Materials and Methods (cont.)

- Each treatment was replicated 3 times.
- Each plot averaged 0.41 acres.
- Soil series ranged from:
  - Pella silt loam and Milford silty clay loam soils between 5-6% O.M.
  - Kidder silt loam 2% O.M.
Results and Discussion

- Corn yields did not respond to N above ~80 lbs. per acre at 75% of the sites.
- Although significant increases in yield were observed at 25% of the sites, additional N needed to produce those yields was often uneconomical.
Results and Discussion (cont.)

\[ Y = -9 \times 10^{-5}x^2 + 0.0314x + 95.887 \]

\[ R^2 = 0.0353 \]
An additional 93 units of N are needed to gain 8 bushel of corn.
Results and Discussion (cont.)

Anhydrous N = 93 units x $0.15 = $13.95
28% N = 93 units x $0.24 = $22.32

8 bushel extra yield at $2.00/bu. = $16

Gain of $2.05 per acre using anhydrous N
Loss of $6.32 per acre using 28% N
Significant yield differences were not observed above ~80 lbs. side-dressed N

<table>
<thead>
<tr>
<th>Year</th>
<th>Site</th>
<th>N rate (lbs./acre)</th>
<th>Yield (bu)</th>
</tr>
</thead>
<tbody>
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<td>2001</td>
<td>Novak</td>
<td>81</td>
<td>145</td>
</tr>
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<td>111</td>
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<td>145</td>
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<td>147</td>
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## Results and Discussion (cont.)

<table>
<thead>
<tr>
<th>Year</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept.</th>
<th>Oct.</th>
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<td>5.2</td>
<td>4.4</td>
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<td>1.5</td>
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</tr>
</tbody>
</table>

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**Rainfall (in.)**
Conclusions

- It appears that in most years, if N is side-dressed, application rates for corn after soybeans could be safely reduced from 120 to 80 lbs. per acre with little or no impact on yield.
- Side-dressing N and reducing application rates would save producers a minimum of $6 to $10 per acre in N fertilizer expenses alone.
Conclusions (cont.)

- N Losses appear minimal when side-dressed to 12-20 inch tall corn compared to fall or preplant applications.
- Side-dressing N when the crop can most efficiently use it can improve profitability and should reduce the potential of N contaminating groundwater.