Nitrogen Rate Effect on Corn Yield

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Objective

To evaluate the effect of nitrogen rates on yield of corn.

Background

Cooperator: Jim Eckel
County: Wood
Nearest Town: Perrysburg
Drainage: Tile, well-drained
Soil type: Hoytville clay loam
Tillage: conventional
Previous Crop: wheat
Variety: Pioneer 36K69

Soil test: OM-3.4%, CEC-16.2, P-90 ppm, K-372, pH-6.8
Fertilizer: N rates below, all 28% solution
Planting Date: April 22, 2006
Planting Rate: 34,000 seed/acre
Row Width: 30-inch
Herbicides: AAtrex, 2,4-D
Harvest Date: 9-22-06

Methods

The entries were randomly replicated 4 times, plot size was 90 x 500 feet each entry. This plot compared 5 different nitrogen rates and application. After corn planting but before emergence (May 1), a broadcast application of liquid 28% nitrogen was applied at the following rates: 51 lb/ac actual nitrogen, 102 lb/ac, 153 lb/ac, and 204 lb/ac. The final comparison had 51 lb/ac nitrogen surface applied on May 1 followed by a sidedress surface application on June 7 with drop nozzles of 147 lb/ac nitrogen for a total of 198 lb/ac nitrogen. Soil nitrate and ammonium samples were collected at 12 inch depth on June 14, 2006. Harvest data was collected from 8 rows. Rainfall April 22 to May 31, 2006 = 7.25 in., June = 5.45 in., July = 6.0 in., August = 3.5 in. for total growing season rainfall = 22.2 inches.

Results

<table>
<thead>
<tr>
<th>Nitrogen application</th>
<th>Corn Yield</th>
<th>Soil Nitrate</th>
<th>Ammonium</th>
<th>$ Value corn – cost N/ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface apply 28%</td>
<td>Bu/ac</td>
<td>NO³ ppm</td>
<td>NH4 ppm</td>
<td></td>
</tr>
<tr>
<td>51 lb pre</td>
<td>111.6 A</td>
<td>15 A</td>
<td>15 A</td>
<td>$ 426.00</td>
</tr>
<tr>
<td>102 lb pre</td>
<td>117.2 A</td>
<td>21 AB</td>
<td>14 A</td>
<td>$ 428.00</td>
</tr>
<tr>
<td>153 lb pre</td>
<td>160.0 B</td>
<td>24 AB</td>
<td>15 A</td>
<td>$ 578.80</td>
</tr>
<tr>
<td>204 lb pre</td>
<td>188.5 C</td>
<td>28 B</td>
<td>17 A</td>
<td>$ 672.40</td>
</tr>
<tr>
<td>198 lb pre + sidedress</td>
<td>182.7 C</td>
<td>73 C</td>
<td>59 B</td>
<td>$ 649.20</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>15.8</td>
<td>10.0</td>
<td>8.0</td>
<td></td>
</tr>
</tbody>
</table>

Value corn = $4.00 / bu, cost of N = $.40 / lb.
Supplying more nitrogen resulted in increased corn yield in this comparison. Application of sidedress Nitrogen did not result in more corn yield when compared to the same rate applied pre-emerge. The most economical return was the highest nitrogen application rate of 204 lb/ac. Use of a sprayer to apply nitrogen to corn pre-emergence may be a viable solution to quickly applying nutrients over large acreages. The amount of surface residue and type of soil tillage performed may also have an impact on the availability of broadcast applied nitrogen.

For additional information, contact:
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