Poly-Coated Urea Rate Influences Sweet Corn Yield

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Objective:
To determine if lower rates of poly-coated urea (PCU) applied prior to planting will provide the same yield and quality performance in sweet corn as split applications of 150 pounds of nitrogen per acre applied as regular urea.

Summary:
Differences were found between the five treatments in tons/acre, dozen ears/acre, ear diameter, above ground plant weight and final plant height. Three treatments (150# nitrogen/acre as standard urea and 150# and 125#/acre nitrogen as poly-coated urea) were similar in tons/acre and dozen ears/acre. Sweet corn producers could apply nitrogen at the 125#/acre rate as poly-coated urea and obtain similar yields as 150#/acre applied in split applications of standard urea. Using poly-coated urea would give producers the option of a onetime only application rather than split applications.

Methods:
Fertilizer treatments
Prior to planting, 175 pounds of 0-0-61, 25 pounds of sulfur, and two pounds of actual boron were broadcast over the entire trial area and worked into the soil. Nitrogen was supplied at the following rates as either standard urea (46-0-0) or ESN poly-coated urea (44-0-0):

1. 150# as ESN prior to planting.
2. 125# as ESN prior to planting.
3. 100# as ESN prior to planting.
4. 75# as ESN prior to planting.
5. 50# as urea prior to planting followed by a 50# side dress when plants were approximately 16” tall and again at 24” tall.

Applications prior to planting were worked into the soil by disking. Side dressing was done with a push style lawn fertilizer broadcast spreader followed by irrigation.

Planting
Soil type was Selfridge loamy sand with 0 to 3% slopes. Cabo (Syngenta Seed Company) sweet corn was planted 16 June, 2015 in rows 30” apart and 6” in the row (34,848 plants to the acre) using a Monosem vacuum seeder. Plots consisted of six
rows, 75-feet long surrounded by 10-foot alley ways between plots. The two best of the interior four rows were chosen as data rows. Plots were set up and analyzed as a completely randomized design with four replications.

Weed control
After planting, pre-emergent weeds were controlled on 17 June by applying Dual Magnum 7.6E and Aatrex 4L at a rate of 1.5 pints and 1 quart per acre, respectively.

Plant care
The planting was irrigated as needed with overhead sprinklers. No insecticides or fungicides were applied.

Harvest and data collection
Data on plant height was collected on 1, 14, 21 July and 2 August. At harvest on 25 or 29 August above ground plant weight (including the ear), marketable ear number from 50-foot of row and the weight, length and diameter of ears was determined.

Results:
Poly-coated urea (PCU) is a slow release, more uniform way to provide plants with nitrogen. Standard urea releases nitrogen quickly requiring sweet corn growers to side dress once or twice during the growing season. The slow release nature of PCU makes it possible to apply all the nitrogen prior to planting, freeing equipment and man hours for other activities during busier periods in the growing season. However, PCU is slightly lower in nitrogen analysis and more expensive. This trial was set up to determine if lower rates of a slow release product would provide similar yield and quality as urea.

Significant differences between treatments were found for several of the traits measured (Table 1). From an economic standpoint, the most significant traits are tons/acre and dozen/acre. Results from this trial found no difference between 150# nitrogen/acre as urea and 150# or 125# nitrogen /acre as PCU (Table 1) in these two traits. The 125# nitrogen as PCU rate was also similar to 150# nitrogen as urea in every other trait measured, whereas the 150# PCU rate differed slightly only in ear diameter. The 75# PCU rate gave the poorest performance differing from the leaders in tons/acre, dozen/acre, stalk weight and final stalk height. Visible differences in plant color and vigor where observed between the 75# and 100# rate of nitrogen and the other three treatments (Figures 1 and 2). Plants were more yellow with the lower two rates and the stands appeared thinner. Results from this trial indicate a PCU rate of 125# nitrogen/acre would provide the same performance as 150# nitrogen as PCU or urea.
Table 1. Growth and yield characteristics of Cabo sweet corn in response to five nitrogen treatments at the Southwest Michigan Research and Extension Center, Benton Harbor, Michigan in 2016. Plant spacing was 30 inches between rows and six inches in the row (34,848 plants/acre).

<table>
<thead>
<tr>
<th>Nitrogen Amount</th>
<th>Tons/A</th>
<th>Dozen/acre</th>
<th>Ear length</th>
<th>Ear dia.</th>
<th>Stalk weight</th>
<th>Ht. 1</th>
<th>Ht. 2</th>
<th>Ht. 3</th>
<th>Ht. 4</th>
<th>Ht. 5</th>
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</thead>
<tbody>
<tr>
<td>150# PCU</td>
<td>7.85</td>
<td>2316</td>
<td>9.09</td>
<td>2.01</td>
<td><strong>1.43</strong></td>
<td>4.4</td>
<td>11.0</td>
<td>17.1</td>
<td>43.6</td>
<td><strong>75.9</strong></td>
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<tr>
<td>125# PCU</td>
<td>7.04</td>
<td>2156</td>
<td>9.09</td>
<td>2.10</td>
<td><strong>1.45</strong></td>
<td>4.2</td>
<td>11.6</td>
<td>18.2</td>
<td>45.1</td>
<td><strong>76.5</strong></td>
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<tr>
<td>100# PCU</td>
<td>6.29</td>
<td>2149</td>
<td>9.26</td>
<td>2.09</td>
<td><strong>1.26</strong></td>
<td>4.2</td>
<td>11.3</td>
<td>18.0</td>
<td>45.7</td>
<td><strong>74.3</strong></td>
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<tr>
<td>75# PCU</td>
<td>5.76</td>
<td>2091</td>
<td>8.95</td>
<td>2.05</td>
<td><strong>1.02</strong></td>
<td>3.9</td>
<td>9.8</td>
<td>16.0</td>
<td>40.8</td>
<td>69.5</td>
</tr>
<tr>
<td>150# Urea</td>
<td><strong>8.35</strong></td>
<td><strong>2316</strong></td>
<td><strong>9.28</strong></td>
<td><strong>2.12</strong></td>
<td><strong>1.81</strong></td>
<td>3.9</td>
<td>11.5</td>
<td>17.5</td>
<td>44.3</td>
<td><strong>73.6</strong></td>
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<tr>
<td>Lsd .05</td>
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<td>213</td>
<td>ns</td>
<td>0.09</td>
<td>0.58</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Numbers in bold are similar to the highest number for that trait.
Figure 1. ‘Cabo’ sweet corn fertilized with 75#/acre nitrogen as poly-coated urea (top) or 100#/acre nitrogen as poly-coated urea (bottom). Grown at the Southwest Michigan Research and Extension Center in Benton Harbor, Michigan in 2016.
Figure 2. ‘Cabo’ sweet corn fertilized with 125#/acre nitrogen as poly-coated urea (top) or 150#/acre nitrogen as poly-coated urea (middle) or 150#/acre nitrogen as split applications of standard urea (bottom). Grown at the Southwest Michigan Research and Extension Center in Benton Harbor, Michigan in 2016.