Evaluation of Starter Fertilizers for Field Corn

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Objective

The objective of this study is to evaluate the yield response of several different starter fertilizer programs and fertilizer placement locations at planting in field corn.

Background

Crop Year: 2008
Cooperator: Farm Focus/Marsh Foundation
County/Town: Van Wert/Van Wert
Drainage: Nonsystematic tile
Soil Type: Hoytville clay, Hoytville silty clay loam, Haskins loam
Previous Crop: Soybeans
Tillage: Fall strip-till
Fertilizer: Starter fertilizer- variable, see Methods
120 lb/A nitrogen sidedressed as 28% UAN (June 18)
Herbicide:
PRE (May 23): Guardsman Max at 4.5 pt/A + Roundup PowerMax at 22 oz/A + 2,4-D LVE6 at 10 oz/A + AMS at 17 lb/100 gal
Variety: Brodbeck Seeds SX 708
Insecticide: Cruiser 250 on seed, Aztec 2.1 G at 6.7 oz/1000 row ft
Row width: 30 inches
Planting Rate: 32,000 seeds/A
Planting Date: May 23, 2008
Harvest Date: October 21, 2008

Methods

This study intended to evaluate the addition of phosphorus, potassium, and other additives to different starter fertilizers was set up as five treatments with four replications of each treatment in a randomized complete block design. The target rate for nitrogen, phosphorus and potassium was 45 lb/A, 10 lb/A, and 10 lb/A, respectively. Plot size was 30 feet wide by 1,030 feet long. The treatments were:

1) Untreated check, no phosphorus, potassium or additives (95 lb/A 45-0-0 2x2 banded)
2) 136 lb/A 32-9-8 granular fertilizer blend 2x2 banded
3) 2-20-18 liquid fertilizer in seed furrow + 95 lb/A 45-0-0 2x2 banded
4) 2-20-18 liquid fertilizer + Avail SD in seed furrow + 95 lb/A 45-0-0 2x2 banded
5) 2-20-18 liquid fertilizer + sugar and biological additive in seed furrow + 95 lb/A 45-0-0 2x2 banded

The liquid starter fertilizer treatments were applied in the furrow directly behind the dropped seed at a rate of 5.5 gallons per acre per recommendations by the product manufacturer. The Avail SD phosphorus fertilizer enhancer was blended in with the 2-20-18 liquid fertilizer at a rate of 0.5% prior to application in the seed furrow. The sugar and biological additives were blended with the 2-20-18 liquid fertilizer at a rate equivalent to 1 pt/A for each product. The granular fertilizer blend supplied equivalent amounts of nitrogen, phosphorus, and potassium as compared to the 2-20-18 blends with the 45-0-0 urea 2X2 banded. The placement of the dry fertilizers (2X2 banded) was 2 inches to the side and 2 inches below the seed. All plots also
received 120 pounds of nitrogen per acre from 28% UAN sidedressed with a coulter/injector applicator on June 18 when corn was at the V4 stage of growth.

Harvest populations (October 17 & 21) were estimated by counting the number of plants with harvestable ears on each side of a 17 feet 5 inch measured distance at 3 different locations in each plot. The average of the number of plants per 17 feet 5 inches was converted to plants per acre. The plots were harvested with a John Deere 6620 combine equipped with a calibrated AgLeader PF3000 yield monitor. Yields were calculated from grain weights measured with a calibrated weigh wagon. Moistures were taken from the combine yield monitor average moisture reading for each plot. All yields were adjusted to 15% moisture.

Results

Table 1. Harvest population, moisture, and yield means for each treatment.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Harvest Population (plants/A)</th>
<th>Moisture (%)</th>
<th>Yield (bu/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated check (Urea only)</td>
<td>28,500</td>
<td>16.7</td>
<td>123.8</td>
</tr>
<tr>
<td>32-9-8 granular fertilizer blend</td>
<td>30,000</td>
<td>16.8</td>
<td>127.3</td>
</tr>
<tr>
<td>2-20-18 blend</td>
<td>29,500</td>
<td>15.9</td>
<td>131.5</td>
</tr>
<tr>
<td>2-20-18 blend + Avail SD</td>
<td>29,400</td>
<td>16.3</td>
<td>130.0</td>
</tr>
<tr>
<td>2-20-18 blend + sugar + bio</td>
<td>28,700</td>
<td>16.5</td>
<td>126.1</td>
</tr>
</tbody>
</table>

LSD (P=0.05) NS NS NS
F-test 1.5 < 1 < 1
CV (%) 3.5 5.1 6.9

NS= not significant

Summary

The results from this one year study did not show any statistically significant differences in harvest population, moisture, or yield for any of the starter fertilizer applications over the untreated check plot. This is the second year for a study looking at starter fertilizers on corn at Farm Focus. The 2007 study looking at several different liquid fertilizer assays also showed no significant difference between the treatments and the untreated check. Results of this study can be accessed on the Farm Focus website at (http://farmfocus.osu.edu/corn_pop-up_fertilizer-07.pdf).

Soil tests taken in fall of 2007 for the 2008 test field showed phosphate levels at 40 ppm, and potash levels at 182 ppm with a CEC of 19 meq/100g. According to the Tri-State Fertility Recommendations (bulletin E-2567) critical soil test levels for phosphorus and potassium (at 19 CEC) are 15 ppm and 125 ppm respectively. Soil at this study location was in the drawdown category for phosphorus and potassium, as such additional phosphorus and potassium are not required to produce a high yielding corn crop at the soil test levels measured in the study field. The 2007 study field also had phosphorus and potassium concentrations well above critical soil test levels. Both studies would indicate that even small amounts of phosphorus and potassium in a starter fertilizer blend are not likely to increase yields if a field is not calling for additional phosphorus and potassium.
For more ingredient information on the proprietary blend of 2-20-18 fertilizer, sugar, and biological additives contact P & L Fertilizer at (419) 968-2230. Avail SD is a product from Specialty Fertilizer Products that according to the manufacturer reduces tie-up of phosphorus in the soil making it more available for absorption by the plant.

Acknowledgements

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