Comparison of Incorporated and Surface Applied Swine Manure and Anhydrous Ammonia as Nitrogen Sources at Side-dress for Corn Yield

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Objective
To compare corn yield response to nitrogen applied at side-dress as incorporated swine finishing manure, surface applied swine finishing manure, and anhydrous ammonia

Background
Crop Year: 2011
Location: Shawtown, OH
County: Hancock
Soil Type: Hoytville clay
Drainage: Tile – 40 ft spacing
Previous Crop: Soybeans
Hybrid: Pioneer 33W84
Tillage: Conventional
Soil Test pH 6.3, P 60 ppm, K 210 ppm, OM 2.2%
Planting Date: June 4, 2011
Row Width: 30 inches
Harvest Date: October 15, 2011

Methods
A randomized block design with three treatments and four replications was used. Plots were 12 rows (30 feet) wide and 2,200 feet long. Liquid swine manure from a finishing building was applied via incorporation using a 5,250 gallon Balzer tanker equipped with a Detrick toolbar. The surface treatments were also applied in the same fashion by raising the toolbar. The farmer pulled an anhydrous ammonia toolbar through the surface applied manure treatments several hours after manure was applied in an effort to provide a level of tillage similar to the other two treatments.

The swine manure and anhydrous ammonia were applied on the same day while the corn was in the three leaf stage. Field conditions were firm at the time of application.

The anhydrous ammonia application rate was 180 units of nitrogen per acre. All swine manure replications received 6,000 gallons per acre. Manure samples indicated 32.1 pounds of available nitrogen per 1,000 gallons. Swine manure treatments received 193 pounds of nitrogen, 84.6 lb./ac P₂O₅ and 165 lb./ac K₂O.

Table 1 Swine Finishing Manure Analysis

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>lbs. per 1,000 Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (available the 1st year)</td>
<td>32.1</td>
</tr>
<tr>
<td>Phosphorus as P₂O₅</td>
<td>14.1</td>
</tr>
<tr>
<td>Potassium as K₂O</td>
<td>27.5</td>
</tr>
</tbody>
</table>

Weather conditions during the time of manure application were sunny with an ambient air temperature of 75 degrees. The plot received well above normal rainfall for the growing season.
Table 2 Treatment Summary

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment 1 (T1)</td>
<td>180#/ac anhydrous ammonia</td>
</tr>
<tr>
<td>Treatment 2 (T2)</td>
<td>6,000 gal/ac surface applied liquid swine manure</td>
</tr>
<tr>
<td>Treatment 3 (T3)</td>
<td>6,000 gal/ac incorporated liquid swine manure</td>
</tr>
</tbody>
</table>

Results

Table 3 Yield Summary

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Yield (bu/ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of four anhydrous reps (T1)</td>
<td>183.2&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Average of four surface manure reps (T2)</td>
<td>171.0&lt;sub&gt;c&lt;/sub&gt;</td>
</tr>
<tr>
<td>Average of four incorporated manure reps (T3)</td>
<td>176.8&lt;sub&gt;b&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

The results of this plot indicate that each of the treatments were statistically significant in yield difference (LSD (0.05) = 4.79).

Summary

The anhydrous ammonia cost $0.62 per pound or $112 per acre plus the cost of application. The manure was available from the farmer’s swine finisher building at no cost. The manure application cost, using the Minnesota Manure Distribution Cost Analyzer spreadsheet was calculated at $20 per 1,000 gallons or $.02 per gallon. The cost of applying 6,000 gallons per acre as sidedress nitrogen was $120 per acre.

Acknowledgement

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