Dairy Manure as a Spring Top-Dress Nitrogen Source on Wheat

Glen Arnold, Ohio State University Extension Educator, Agriculture
Jason Hedrick, Ohio State University Extension Educator, Youth Development
Albert Maag, Putnam County Soil and Water Conservation District

Objective
To compare wheat yield response to nitrogen applied at spring top-dress as dairy manure and as Urea.

Background
Crop Year: 2009     Soil test: pH 6.7
Cooperator: Dave Inkrott     P 70 ppm (140 lbs/a)
County: Putnam     K 210 ppm (410 lbs/a)
Nearest Town: Leipsic     Organic Matter 3.01%
Drainage: Tile-40 feet spacing     Planting Date: September 30, 2008
Soil type: Digby Loam     Plot Width: 26 feet
Tillage: Conservation tillage     Plot length: 790 feet
Previous Crop: Soybeans     Herbicide: N/A
Variety: Pioneer 25R47     Insecticide: N/A
Harvest Date: July 9, 2009

Methods
A randomized block design with two treatments and four replications was used. Manure plots were 26 feet wide and urea plots were 40 feet wide. All plots were 790 feet long. Liquid swine manure from an outside dairy storage pond was surface applied using a 3,000 gallon tanker equipped with a modified Pecan toolbar 13 feet in width. Urea was applied using a standard fertilizer buggy.

Urea application rate was 95 pounds of nitrogen per acre. The liquid dairy manure application rate was 11,300 gallons per acre. Manure sample results indicated 4.7 pounds of available nitrogen per 1,000 gallons of dairy manure. Dairy manure treatments received 53 pounds of nitrogen, 15 lb/ac P$_2$O$_5$ and 62 lb/ac K$_2$O. The dairy manure pond was not stirred prior to pumping and the manure was sucked from a depth of approximately three feet. Had the manure storage pond been stirred prior to pumping we would expect higher nutrients levels per 1000 gallons of manure.

Dairy Manure Analysis

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>lbs per 1,000 Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (available the 1$^{st}$ year)</td>
<td>4.70</td>
</tr>
<tr>
<td>Phosphorus as P2O5</td>
<td>1.33</td>
</tr>
<tr>
<td>Potassium as K2O</td>
<td>5.49</td>
</tr>
</tbody>
</table>
Weather conditions on April 3rd during the time of manure application were sunny and 65 degrees. The plot received above average rainfall for the 2009 growing season. Field conditions were firm during application.

<table>
<thead>
<tr>
<th>Treatment Summary</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment 1 (T1)</td>
<td>95 lbs./N/acre as Urea</td>
</tr>
<tr>
<td>Treatment 2 (T2)</td>
<td>11,300 gal/ac dairy manure</td>
</tr>
</tbody>
</table>

**Results and Discussion**

**Yield Summary**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield (bu/ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of four urea reps (T1)</td>
<td>92.3 A</td>
</tr>
<tr>
<td>Average of four surface applied manure reps (T2)</td>
<td>87.6 A</td>
</tr>
</tbody>
</table>

The results of this plot did not indicate a significant statistical difference for yield between the treatments (F= 2.57, P = 0.21). The nitrogen contained in the dairy manure appears to be a satisfactory source of top-dress nitrogen for this wheat research plot. Farmers utilizing manure as a spring fertilizer source for wheat should plan to utilize the excess phosphorus and potassium applied in the following crop rotation.

Urea cost was $0.65 per pound. Urea replications had $61.75 per acre in fertilizer expense plus the cost of application. The manure was available from the farmer’s manure storage pond at no cost. Application costs for the manure would vary depending on the farm’s equipment and labor costs.

**Acknowledgments:**

The authors would like to thank David Inkrott for his help with this research plot. The authors would also like to thank Ag Credit for their financial support of this research.

For more information, contact:
Glen Arnold
OSU Extension, Putnam County
124 Putnam Parkway
Ottawa, OH 45875
419-523-6294
arnold.2@osu.edu