Comparison of Fall Applied Swine Finishing Manure and Urea as Nitrogen Sources for Wheat Yield

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Objectives:

To compare soft red winter wheat yield response to fall applied swine finishing manure compared to commercially applied fertilizer applied both in the fall and again in the spring.

Background

Crop Year:	2010	Tillage:	Conservation tillage
County:	Hancock	Variety:	Dyna Grow 9723
County/Town:	Shawton, OH	Soil Test:	pH 5.9, P 48 ppm, K 240 ppm, OM 2.9%
Soil Type:	Hoytville Clay		
Drainage:	Tile-40 ft spacing	Planting Date:	October 13, 2009
Previous Crop:	Soybeans	Harvest Date:	July 3, 2010

Methods

A randomized complete block design with four treatments and three replications was used. The manure plots were 39 feet wide and the urea plots were 40 feet wide. All plots were 1,100 feet in length. The center 30 feet of each replication was harvested.

Liquid swine manure from a finishing building was applied to the manure treatments at rates of 3,000, 5,000 and 7,000 gallons per acre. All manure was applied on October 4th approximately two weeks before the wheat was planted. Soil conditions were very dry when the manure was applied. Manure was incorporated at the time of application using a Gentil toolbar attached to a 6,700 gallon tanker. The commercial fertilizer treatment received 300#/acre of 9-23-30 prior to planting and 185#/acre of urea (46-0-0) on March 24th. The manure treatments did not receive any spring fertilizer.

Swine Finishing Manure Analysis

Nutrient	lbs. per 1,000 Gallons
Nitrogen (available the 1st year)	51.1
Phosphorus as P_2O_5	25.0
Potassium as K_2O	40.2

The plot received almost double the normal rainfall for the 2010 growing season. Yields were negatively impacted by Fusarium Head Scab and Stagonospora nodorum Blotch across all treatments.

Table 1Treatment Summary

Treatment	Description
Treatment 1 (T1)	150 #/ac 9-23-30 fall; 185#/ac 46-0-0 on March 24th
Treatment 2 (T2)	3,000 gal/ac swine finishing manure (153 pounds of N per acre)
Treatment 3 (T3)	5,000 gal/ac swine finishing manure (255 pounds of N per acre)
Treatment 4 (T4)	7,000 gal/ac swine finishing manure (357 pounds of N per acre)

Results and Discussion

Table 2 Yield Summary

	Yield (bu/ac)
Average of three commercial fertilizer reps (T1)	59.4 b
Average of three 7,000 gallons of manure per acre reps (T2)	63.9 a
Average of three 5,000 gallons of manure per acre reps (T3)	52.5 c
Average of three 3,000 gallons of manure per acre reps (T4)	45.1 d

The results of this plot indicate a statistical difference between the each of the treatments (LSD (0.05) =3.04). The high rate of fall applied swine manure (T2) appears to have supplied adequate nitrogen for this plot.

Farmers utilizing manure as a fertilizer source for wheat should plan to utilize the excess phosphorus and potassium applied in the following crop rotation. In addition, farmers should note the potential for water degradation when applying large amounts of nitrogen in the fall.

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