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Swine Manure Management Study

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Abstract
Manure can be a valuable resource if properly applied to utilize its nutrient content. To better define the value of manure, a multi-year research project began in 1998 at the Southeast Research Farm. The fertilizer effect of rate and method of manure application in a corn-soybean rotation is being studied. In 2002, several treatments were added that included N-Serve with the manure.

Disciplines
Agricultural Science | Agriculture

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Introduction

Manure can be a valuable resource if properly applied to utilize its nutrient content. To better define the value of manure, a multi-year research project began in 1998 at the Southeast Research Farm. The fertilizer effect of rate and method of manure application in a corn-soybean rotation is being studied. In 2002, several treatments were added that included N-Serve with the manure.

Methods and Materials

In 2002, the research trial was expanded from seven treatments to 10 treatments each replicated three times. Manure is applied on eight of the treatments (Table 1). For treatments 9 and 10, N-Serve was mixed with the manure at a rate of 2 quarts/acre as called for by the product label.

Manure was obtained from local producers and applied in November each year. Although the nutrient content varied some from year to year (Table 3), testing showed the nutrient content for a given year was very uniform. On the commercial fertilizer treatment, maintenance levels of phosphorous and potassium along with ammonium nitrate at 150 lb N/acre were applied just prior to planting. Normal weed and insect control practices were used.

Results and Discussion

Yield and nitrogen test results are given in Table 1 for 2002, and the 4-year averages are given in Table 2. Over the 4 years, there was a statistically significant corn yield response (50–70 bushels/acre greater) with all of the treatments compared with the check treatment. Also, applying an additional 50 lb N/acre to the surface applied manure resulted in a 13 bushels/acre yield increase. For the 4 years of the trial, yield differences between the remaining treatments were not significant.

In 2002, the 2,250 gallon/acre injected treatment had a 71 bushels/acre greater corn yield than the check treatment but a 37 bushel/acre lower yield than the 4,000 gallon/acre injected treatment. For the 2,250 gallon/acre rate, the addition of N-Serve gave a nine bushel/acre greater yield, but this was not statistically significant.

On manured ground, a soil nitrate test of 20–25 ppm should provide adequate nitrogen for that year's corn crop. The check treatment always showed an N deficiency, and the surface applied manure by itself was often marginal on this test. An end-of-season stalk test of less than 200 is usually considered inadequate with over 2,000 ppm being excessive. In most cases it seemed that only the check treatment and the surface applied manure treatment were short on nitrogen by the end of the growing season. Also, the 8,000 gallon/acre rate did not increase yields but had excessive end-of-season stalk test levels. In 2002 most of the treatments had deficient end-of-season stalk tests. This may have been in part because of the lower N content of the manure that was applied the previous November. In 2002, other N test plots also showed lower than expected end-of-season stalk test levels.

On the soybean plots, only treatment number 5 received any manure or fertilizer for the soybean growing season. With treatment 5, the 4-year average showed a significantly greater yield over most treatments.

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Table 1. 2002 manure management study results.

Trt.	Corn	Soybeans	Late spring N test, ppm	Stalk test ppm	Corn bu/acre	Soybean bu/acre
1	Check		9	15	103	43.0
2	4,000 gal. surface		10	15	185	47.4
3	4,000 gal. surface + 50 N		17	46	199	47.0
4	4,000 gal. inject		10	16	211	46.7
5	4,000 gal. inject	4,000 gal. inject	12	439	224	57.1
6	8,000 gal. inject		12	411	227	53.0
7	150 lb. commercial N		26	120	212	43.9
8	2,250 gal. inject		12	44	174	*
9	2,250 gal. inject w/ N-Serve		11	18	183	*
10	4,000 gal. inject w/ N-Serve		16	113	206	*
	LSD P=0.05				15	6.8

*These plots did not have a previous history of manure treatments.

Table 2. 1999–2002 manure management study average results.

Trt.	Corn	Soybeans	Late spring N test, ppm	Stalk test ppm	Corn bu/acre	Soybean bu/acre
1	Check		11	27	124	42.3
2	4,000 gal. surface		17	38	178	45.6
3	4,000 gal. surface + 50 N		23	706	191	45.5
4	4,000 gal. injected		23	906	194	46.2
5	4,000 gal. injected	4,000 gal. inject	26	1,466	198	50.4
6	8,000 gal. injected		28	3,325	194	48.7
7	150 lb. commercial N		31	1,046	191	44.9
	LSD P=0.05		11	1,650	21	3.4

Table 3. Manure test results.

Sample	Total N lb/1,000 gal.	NH3 N lb/1,000 gal	P2O5 lb/1,000 gal	K2O lb/1,000 gal	% Solids
11/13/97	39	30	27	28	3.0
11/25/98	50	38	61	27	8.1
11/17/99	52	35	57	30	5.8
11/2/00	68	60	35	40	6.1
11/2/01	39	31	20	20	3.0