2002

Swine Manure Management Study

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Abstract
Manure can be a valuable resource if applied properly to utilize its nutrient content. To better define the value of manure, a multiyear research project was begun in 1998 at the Southeast Research Farm to study the fertilizer rate of effect and the best method of manure application in corn–soybean rotation. In 1997, the land where this trial is being conducted was in winter wheat. In 1998, the corn–soybean rotation was being established. And 1999 was the first year that the full rotation and manure treatments were in place.

Disciplines
Agricultural Science | Agriculture

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Introduction

Manure can be a valuable resource if applied properly to utilize its nutrient content. To better define the value of manure, a multiyear research project was begun in 1998 at the Southeast Research Farm to study the fertilizer rate of effect and the best method of manure application in corn–soybean rotation. In 1997, the land where this trial is being conducted was in winter wheat. In 1998, the corn–soybean rotation was being established. And 1999 was the first year that the full rotation and manure treatments were in place.

Methods

The research trial consists of seven treatments replicated three times; manure is applied on five of the treatments (Table 1). Each year in November, application is made of manure obtained from local producers. Samples of the manure are taken during application to each plot. While nutrient content varies from year to year (Table 4), testing has shown nutrient content for any given year to be uniform. The commercial fertilizer ammonium nitrate is applied at 150 lb N/acre immediately prior to planting. Normal weed and insect control practices are used.

Results and Discussion

There has been statistically significant corn yield response (40–70 bushels/acre) for all of the treatments over the check treatment (tables 1,2,3). Also, application of additional 50 lb N/acre to the surface applied manure resulted in an 8–15 bushels/acre response. In most cases, yield differences between the remaining treatments was insignificant.

On manured ground, a soil nitrate test of 20–25 ppm should provide adequate nitrogen for one corn crop. The check treatment has always indicated an N deficiency, and by itself, surface applied manure often was marginal on this test. An end-of-season stalk test of 200–700 ppm usually is considered marginal, and 700–2000 ppm is adequate, with more than 2000 ppm being excessive. In most cases, it appears that only the check treatment and the surface applied manure treatment resulted in low nitrogen at the end of the growing season. It also appears that the 8000 gal/acre rate does not increase yields but always appears to be excessive on end-of-season stalk test results.

On the soybean plots, only treatment 5 received any manure or fertilizer for the soybean growing season (tables 1, 2, and 3). With treatment 5, there was a trend towards higher yield; but only in 2001 was the yield significantly higher than in treatments other than the check.

The plots are being expanded in 2002, with a lower manure rate and several N-serve treatments.

Acknowledgments

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Table 1. 1999 Manure management study results.

Trt.	Corn	Soybeans	Late spring N test ppm	Stalk test ppm	Corn bu/acre	Soybean bu/acre
1	Check		12	49	137	47.7
2	4000 gal. surface		20	65	177	49.0
3	4000 gal. surface + 50 N		25	1288	185	49.3
4	4000 gal. injected		25	2613	186	50.3
5	4000 gal. injected	4000 gal. inject	41	2749	193	52.3
6	8000 gal. injected		33	6863	182	50.1
7	150 lb commercial N		37	2636	185	50.4
					LSD P=.05 5	NS

Table 2. 2000 Manure management study results.

Trt.	Corn	Soybeans	Late spring N test ppm	Stalk test ppm	Corn bu/acre	Soybean bu/acre
1	Check		10	21	126	41.8
2	4000 gal. surface		18	46	164	44.4
3	4000 gal. surface + 50 N		26	1230	179	44.3
4	4000 gal. injected		22	442	179	45.5
5	4000 gal. injected	4000 gal. inject	26	1670	170	46.1
6	8000 gal. injected		24	3950	172	47.7
7	150 lb commercial N		35	1080	171	44.4
					LSD P=.05 9	LSD P=.05 2.6

Table 3. 2001 Manure management study results.

Trt.	Corn	Soybeans	Late spring N test ppm	Stalk test ppm	Corn bu/acre	Soybean bu/acre
1	Check		11	22	129	36.5
2	4000 gal. surface		21	27	187	41.4
3	4000 gal. surface + 50 N		26	259	199	41.5
4	4000 gal. injected		37	552	201	42.3
5	4000 gal. injected	4000 gal. inject	24	1005	204	45.9
6	8000 gal. injected		42	2075	196	44.1
7	150 lb commercial N		24	350	194	41.1
					LSD P=.05 9	LSD P=.05 2.8

Table 4. Manure Test Results

Sampling date	Total N lb/1000 gal	NH3 N lb/1000 gal	P2O5 lb/1000 gal	K2O lb/1000 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