

Liquid Swine Manure as a Fertilizer Source for Established Alfalfa

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Introduction

Manure application during the mid-summer months is a problem on many farms. Row crops occupy most of the crop acres. Producers inquire as to the advisability of applying liquid swine manure to established alfalfa fields. A series of studies was initiated in 1998 at the Northern Iowa Research Farm to investigate the suitability of liquid swine pit manure as a fertilizer source for alfalfa.

Materials and Methods

In 1998, a pilot study was also conducted to assess the “nitrogen/salt burn,” recovery, and general appearance effects of several rates of liquid swine pit manure on established alfalfa when applied at several growth stages and harvest sequences. Manure was ‘hand applied’ to individual plots using a PTO-driven pump. Manure rates of 0, 3000, 4500, 6000, and 9000 gallons/acre were applied. A tractor was driven across each treated plot to simulate the effect of additional wheel traffic by field-scale manure application.

In 1999, the same application equipment was used to apply liquid swine pit manure treatments to established alfalfa. Treatment rates for the alfalfa were 0, 2000 and 4000 gallons of manure per acre, and commercial fertilizer at levels approximately equivalent to the 4000 gallons of manure application. The 2000 and 4000 gallons/acre manure rates were applied to different sets of plots following each of the three harvest periods in 1999. The commercial N-P-K was applied after the first harvest only. The nutrient concentrations in the manure used were 37.9, 31.7 and 28.1 lb/1000 gallons of N, P₂O₅, and K₂O, respectively.

Plot yield estimates were recorded for the late summer harvest in 1999. Yields reported in Table 1 are for the second harvest of alfalfa. Due to the planned post-harvest manure applications, these yields do not reflect well all of the effects of the manure application treatments made in the application year; however, they do reflect the post-first-cut manure and commercial fertilizer treatments. Seasonal yield totals are not available.

First harvest yields (year 2000), of this study were taken to provide an indication of the residual effects of manure and fertilizer treatments of the previous year (Table 1). As part of a larger soil sampling and testing project at the farm, soil samples were taken in the spring of 2000 (Table 2).

Results and Discussion

The conclusions made from the 1998 pilot study were that alfalfa recovered satisfactorily following manure rates of 1500, 3000 and 4500 gallons/acre, and that the plot manure application apparatus was satisfactory for additional studies. Also, 6000 and 9000 gallons/acre reduced vegetative regrowth during the growing season to an unsatisfactory condition.

Commercial fertilizer and swine manure applied in this study increased alfalfa yields only modestly. These studies indicate that liquid swine pit manure can be surface applied at rates up to 4500 gallons/acre as a fertilizer nutrient source. At higher application rates, unacceptable plant tissue injury is likely. Plots have been retained for further evaluation.

The soil test data and those summarized in Table 2, indicate that applications of swine manure and commercial fertilizer increased the

soil test values for phosphorus, and that data from individual plots are verifying that soil pH and the different laboratory testing procedures

used have an influence on test indices. Work continues on interpretation of these soil testing results.

Table 1. Dry matter yields of alfalfa treated with swine manure and commercial fertilizer.

Treatment		Yield	
Manure or Fertilizer Rate	Application Time	1999 (Aug 18)	2000 (June 6)
lb or gallons/acre		-----dry matter, tons/acre-----	
0	--	3.52	1.56
2000 gal	Post 1 st cut (June 16)	3.16	1.72
4000 gal	Post 1 st	3.34	2.06
4000 gal equivalent (230 N /144 P ₂ O ₅ /110 K ₂ O)	Post 1 st	3.63	1.72
2000 gal	Post 2 nd (July 9)	3.40	1.69
4000 gal	Post 2 nd	3.93	1.66
2000 gal	Post 3 rd (August 25)	4.71	1.78
4000 gal	Post 3 rd	3.52	1.75

Table 2. Summary of soil test results taken in 2000.

Treatment Rate Averages	Soil test values and fertility level indices			
Treatment	Bray P	Olsen P	Mehlich-3 P	pH
control	20.1 (Low)	8.8 (Low)	24.0 (Optimum)	6.7
2000 gal	24.7 (Optimum)	10.1 (Low)	32.6 (V.High)	7.3
4000 gal	27.1 (High)	13.2 (Optimum)	40.5 (V.High)	7.1
NPK (4000 gal equ.)	34.3 (V.High)	15.7 (High)	43.8 (V.High)	6.9