Getting More Out of Manure Nitrogen: Direct Injection vs. Broadcast and Incorporation

(Interim Report)

Purpose:

The purpose of this project was to examine the potential for direct injection manure systems to result in significantly higher manure nitrogen use efficiency than traditional broadcast and incorporate systems. Direct injection systems have distinct advantages in terms of reducing odour from field applications of manure but little data is available to indicate the increase (if any) in the actual nitrogen credit to the following corn crop.

Methods:

Field scale plots consisted of late summer and fall applications of manure where the following comparisons where made: 1) Direct injection, 2) Surface application with incorporation by tillage in the range of 1 to 5 days following application, and 3)No manure application. Soil nitrogen levels were measured in the period following manure application and will be monitored throughout the early part of the 2006 growing season. Corn will be grown on all plots in 2006 using the farm co-operators normal practices for all aspects of production except nitrogen rate. All plots will be split at sidedress time to receive either Zero Nitrogen or Full Rate Nitrogen. Corn harvest from these plots will provide information that indicates how much N was utilized by the crop from the various manure application systems.

Results:

Soil sampling in the post application window at the project sites indicates some increases in available N due to injection at one of the sites. (see Table 1).

Table 1. Impact of manure application systems on nitrate-N in the top 30 cm of the soil profile for various dates following manure application.

Site	Manure Application	Application Date	Soil Nitrate (lbs NO_3^-N) (0-30 cm)		
Lucan		17-Aug-2005	30-Aug-05	28-Oct-05	10-Nov-05
	Injected		175	159	152
	Broadcast, incorporated after 1 day		127	110	99
	Broadcast, incorporated after 5 day		110	102	93
	No manure		68	74	70
Fullarton		19-Oct-2005	2-Dec-05		
	Injected		74		
	Broadcast, incorporated after 1 day		89		
	Broadcast, not incorporated		67		
	No manure		46		

Figure 1. S-Tine injection system on a Nuhn manure tanker (Lucan Site)

Figure 2. Setting up manure injections strips to be compared with surface applications

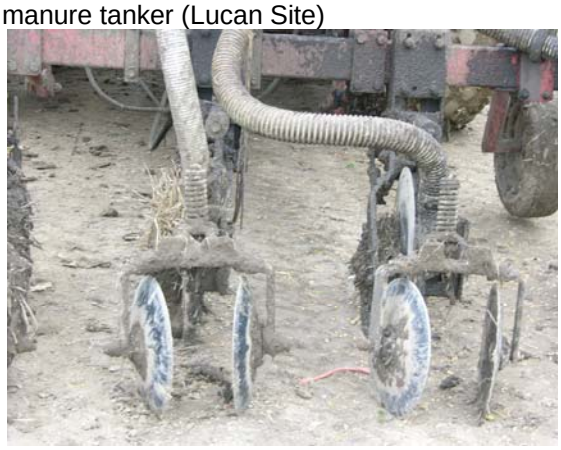

Figure 3. Injector knives (Yetter) with covering discs on manure tanker (Fullarton Site).

Figure 4. Shallow injection and covering of manure in strips with Yetter unit.

Summary:

Manure injection may increase manure N use efficiency compared to broadcast systems. Of the four sites included in this study to date the Lucan site showed nearly a 50% increase in nitrate N in the fall after an August 30 application. At the other sites where applications dates where later in the season, and where a less aggressive injection tool (Yetter) was employed, these advantages to injection did not exist.

Next Steps:

1) Monitor soil nitrate status on plots at corn planting time and sidedress time.
2) Assess manure N credit in the 2006 corn crop.
3) Repeat manure application studies in the late summer and fall of 2006.

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