SOIL TESTING LABORATORY
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SOIL TEST NOTES

NOTE 6: Use of Manures

INTRODUCTION

Manure is a valuable source of plant nutrients. When properly handled and applied to land, manure can lead to substantial savings in fertilizer costs. Manure applications have other benefits as well - they can increase soil organic matter content thus increasing water-holding capacity, infiltration rate, and general soil tilth.

However, all manures are not the same and one should take steps to know both the rate of application and the nutrient content of the manure. This is best accomplished by: 1) careful calibration of the manure spreader, and 2) having manure analyzed for nutrient content (local laboratories can provide this analytical service). In most respects, applying manure is no different than applying fertilizer - one needs to know the rate of application, and the analysis, to properly feed the crop.

The following information is intended only as a set of general guidelines for manure application to crop land. Several, more detailed publications concerning efficient handling and application of manure are available from University of Delaware Cooperative Extension. Growers with manure available are urged to contact their County Extension Office to obtain this important information. In the absence of a laboratory analysis, the following guidelines will provide approximate nutrient values for applications of various manures.

ADJUSTING YOUR FERTILIZER PROGRAM FOR USE OF MANURES

Different manures vary widely in their nutrient content. Significant losses of nitrogen can occur if manure is spread and not immediately incorporated into the soil. Also, somewhat more N is available from manures after

maximum recommended rate is indicated on the soil test report form. For liquid handling, the maximum recommended rates are 6,000 gal/A for liquid pit and oxidation ditch swine manure, and 10,000 gal/A for lagoon swine manure and dairy cattle manure.

ADDITIONAL INFORMATION

Additional information may be obtained from University of Delaware Cooperative Extension offices in Newark, Dover, and Georgetown.

several years of continuous, yearly applications. The following steps allow an approximate calculation of the net nutrient value of an application of manure.

1. **Select Manure Nutrient Value** - Using either Table 1 for solid handling systems, or Table 2 for liquid handling, find the amount of available N, P_2O_5, and K_2O in the type of manure available. Please note that the values are in pounds per ton for solid handling, and in pounds per 1000 gallons for liquid handling.

   EXAMPLE: One ton of crusted, stockpiled poultry manure contains 25 lbs. N, 35 lbs. P_2O_5, and 25 lbs. K_2O.

2. **Correct N Value for Losses** - Losses of N as volatile ammonia gas will occur at a rate of about 10% of the available N for each day that passes between spreading and incorporation. The maximum loss is approximately 50 to 60 percent.

   EXAMPLE: Four days delay between spreading and incorporation equals 40% loss of N:
   25 lbs/ N - (.40 x 25) = 15 lbs. N

3. **Adjust N Value for Continuous Applications** - If manure has been applied continuously for more than 3 years, about 50% more N is available to the crop.

   EXAMPLE: 15 lbs. N + (.50 x 15) = 23 lbs. N

4. **Determine Total Nutrients to be Applied** - Multiply the adjusted nutrient content by the planned rate of application to get the total amount of nutrients you will be applying.

   EXAMPLE:
   4 tons/A x 23 lbs N/ton = 92 lbs/A N
   4 tons/A x 35 lbs P_2O_5/ton = 140 lbs/A P_2O_5
   4 tons/A x 25 lbs K_2O/ton = 100 lbs/A K_2O

5. **Adjust Fertilizer Program** - Subtract the total nutrients to be applied in the manure from the suggested rates given on the soil test report. The fertilizer adjustment for manure applies only to broadcast, not banded, applications. In subsequent years, the residual P and K from the manure can be evaluated by a soil test.

TABLE 1. Manure Nutrients Available to Plants in First Year Following Application - Handling Systems.

Manure Type	Dry Matter (%)	N	P_2O_5	K_2O
		lbs/ton of manure		
Dairy Cattle	25	5	4	8
Poultry, clean-out	70	50	80	45
Poultry - crusted	50	25	35	25
Horse	45	4	3	11
Sheep	30	2	8	20
Swine	20	5	6	6

TABLE 2. Manure Nutrients Available to Plants in First Year Following Application - Liquid Handling Systems

Manure Type	Dry Matter (%)	N	P_2O_5	K_2O
		lbs/1000 gal of manure		
Dairy Cattle	8	15	12	20
Swine-liquid pit	4	25	25	20
Swine-anaerobic lagoon	1	3	2	3
Swine - oxidation ditch	3	14	25	20

MAXIMUM RATES

Generally, manure should be applied at a rate that will supply as much of the required nutrients as possible. However, maximum rates are recommended for each type of manure. For solid handling manures, the