Stability of Soil Test Levels in a Grid Soil Test System

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Objective

To measure grid soil-test-level changes in pH, phosphorus (P), and potassium (K) over three years.

Background

Cooperator:	OSU Unger Farm	Soil Test:	pH 6.2, P 43 lbs/A, K 225 lbs/A, OM 2.2%
County:	Crawford		
Soil type:	Pewamo	Planting Date:	May 5, 1999
Drainage:	Systemic	Planting Rate:	86 lbs/A
Tillage:	Field Cultivate 1x	Harvest Date:	October 9, 1999
Previous Crop:	Corn		

Methods

Unger Farm area A was grid soil sampled in April 1997, November 1998, and September 1999. Because smaller is considered better in regard to grid size, 0.33 acre was chosen as the standard grid size. Soil samples were taken in the middle of the grid (four soil probes 8" deep around the all-terrain vehicle) for each test in 1997, 1998, and 1999.

There was no crop on the farm in 1997. Variable rate P and K (low 200 lbs/acre to 500 lbs/acre) of 18-46-0 and 0-0-60 was applied on 4/23/98, and a uniform rate of 0-92-122 lbs/acre applied on 12/10/98 to the plot. A corn study was planted and harvested in 1998, with an average yield of 200 bu/acre. A soybean plot was in the sampled area in 1999 and average yield was 48 bu/acre.

Six grids were randomly selected from the 15 total grids to be further analyzed. What follows is an analysis of pH, P, and K in six randomly selected grids. To examine treatment effect, a one-way analysis of variance procedure was implemented.

Results

Year	Soil pH	Soil P (lbs/ac)	Soil K (lbs/ac)
1997	7.1	16.5	129.3
1998	6.8	29.8	143.3
1999	6.7	37.8	132.5
F test (P = 0.05)	1.1	25.8	<1
LSD (0.05)	NS	6.39	NS
CV	5%	18.50%	24.50%

Summary and Notes

Phosphorus (P) and potassium (K) grain removal rates for a 200 bu/acre corn crop and 48 bu soybean crop would be 113 lbs/acre P2O5 and 121 lbs/acre K2O. The base rate(s) of fertilizer applied the last two years were 184 lbs P2O5 and 242 lbs/acre K2O. The increase in applied P and K over use was 71 and 121 lbs/acre respectively. Thus, both P and K soil-test levels would be expected to go up. P soil-test levels went up in every grid. The increase in P was significant. Average phosphorus values went up 21.3 lbs P/acre. In 1999 K values went down for an average of 10.8 units after increasing in 1998. With fertilizer K applications in both years being in excess of use, the lower K soil test result is more likely a function of other factors such as soil sampling point, laboratory analysis quality control, or soil conditions at the time of sample. Soil pH did not change significantly and it was not expected to change.

In conclusion, pH and P soil test results were stable and predictable based upon crop use and fertilizer application. K soil test levels have been variable and less predictable in both comparison years (1998 and 1999). Retesting of these grids is planned in 2000.

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