What's Cropping Up?

A NEWSLETTER FOR NEW YORK FIELD CROPS & SOILS VOLUME 14, NUMBER 5, SEPT-OCT, 2004

NEW YORK STARTER PHOSPHORUS PROJECT: DOES STARTER P FERTILIZER IMPACT SILAGE QUALITY?

Quirine Ketterings[1], Sheryl Swink[1], Greg Godwin[1], Karl Czymmek[2], Greg Albrecht[1], [1]Department of Crop & Soil Sciences and [2]ProDairy, Cornell University

Dairy producers have been facing increasing pressure to reduce phosphorus (P) inputs in the form of feed and fertilizer. These past three years, on-farm and research station trials were conducted to determine if band-applications of fertilizer P are needed for optimum yield and quality of corn for silage on fields that test high or very high in P. The results (see "What's Cropping Up?" (2004) 14 (1): 1-3) indicated that for sites that test *high* in P and have no manure applications planned for the season, no yield penalty is expected when P starter levels are *reduced* below 25 lbs P_2O_5/acre. On sites that test *very high* in P *or* when manure is applied to high testing sites, there is a low probability of a starter P response and P could be *eliminated* from

Table 1: Effect of starter phosphorus addition on corn silage quality in New York State.

	Research Station Trials (9 trials)				On-Farm Trials (62 trials)			
Quality parameter	No Starter	200 lbs 10-0-10 /acre	200 lbs 10-10-10 /acre	200 lbs 10-20-10 /acre	No Starter	N(+K) only	N(+K)+ 10-25 lbs P_2O_5/acre	N(+K)+ >25 lbs P_2O_5/acre
	---------- % of dry matter----------							
Moisture content	64	65	64	64	60	60	60	59
Neutral detergent fiber	43.5	42.3	43.4	42.8	42.1	42.6	42.7	41.6
	---------- % of NDF ----------							
Digestibility of NDF	62.2	62.2	62.2	62.6	62.3	60.8	61.7	61.6
	---------- lbs ----------							
Milk per ton of silage	*3692*	*3699*	*3700*	*3703*	*3734*	*3652*	*3683*	*3712*
	---------- % of dry matter ----------							
Crude protein	7.4	7.3	7.3	7.5	7.6	7.5	7.7	7.6
P	0.21	0.21	0.20	0.20	0.23	0.23	0.23	0.23
K	0.83	0.88	0.85	0.84	1.09	1.09	1.10	1.11
Ca	0.21	0.20	0.19	0.20	0.17	0.18	0.18	0.18
Mg	0.19	0.17	0.17	0.18	0.14	0.14	0.14	0.14
	---------- ‰ of dry matter ----------							
Zn	16.4	16.6	16.0	15.6	17.6	17.9	17.3	16.5
Cu	4.3	4.3	4.2	4.3	3.8	3.9	3.7	4.1

the starter without a yield penalty. The one question remaining was: What about silage quality? Table 1 shows the results of the quality analyses for the study. Bottom line is that differences were not significant and well within laboratory analytical uncertainty, indicating that **leaving P out of the starter fertilizer in high or very high P soils did not impact silage quality**.

Table 2: Phosphorus fertilizer guidelines for corn in New York State.

	lbs P_2O_5/acre	
Soil Test P	With manure	No manure
Very Low	20-30	60-70*
Low	20-30	50-60*
Medium	20-30	25-50*
High	0	0-25
Very High	0	0

* Put ~25 lbs P_2O_5/acre in the starter fertilizer band; balance may be included in the band or broadcast.

It is obvious that with the increased attention directed toward P non-point source pollution, it makes little sense to use more starter P than is necessary to support optimum yields, especially on fields where significant amounts of manure nutrients are regularly applied. Corn responds to N in the starter band more often than P and we continue to recommend 20-30 lbs of banded starter N, even where P is eliminated. We recommend that corn growers test their fields for soil fertility status at least once in three years, apply manure to low and medium P fields and adjust starter P application rates accordingly (Table 2).

For Further Information

For further information contact your local Cornell Cooperative Extension office. You could also contact Quirine M. Ketterings at (607) 255 3061 or qmk2@cornell.edu and/or visit the New York Starter P Project website: http://nmsp.css.cornell.edu/projects/starterp.asp.

Acknowledgments

This project was funded by a research and extension grant from the Northeast SARE program (2002-2003 seasons). Fertilizer for the on-farm and station trials was donated by Agway's Lyon blend plant and Carovail and seed was donated by Pioneer Hi-Bred International Inc. Other contributors include the NRCS (2001 season) and the Northern New York Agricultural Development Program. This project would not have taken place were it not for the enthusiastic participation of Cornell Cooperative Extension field crop extension educators C. Albers, P. Barney, S. Bossard, P. Carey, J. Degni, M. Dennis, D. Dewing, A. Gabriel, K. Ganoe, N. Glazier, N. Herendeen, M. Hunter, J. Miller, and M. Stanyard. We thank J. Blumer, R. Brouillette, B. Brown, K. Burr, T. Cantwell, G. Coller, R. Cross, C. Decker, D. Fisher, D. French, G. Gaige, J. Greenwood, Greenwich Central School Ag Class with help from B. Elsworth, M. Grocott, L. Hargrave, Heiden Farms, Hendee Homestead Farm, R. Holdridge, J. Hourigan, A. Hunter, W. Hughson, M. Jahnke, B. Kilcer, L.A. King, D. and A. Kross, F. Lamport, R. Lott, J. Maxwell, K. McCollum, M. McMahon, T. Moskin, S. and G. Natali, S. Nemec, K. Pemberton, D. Post, C. Roberts, D.E. Schieferstine, J. and K. Schwasnick, M. Stoughton, Sykes Dairy Farms, R. and S. Talcott, G. and L. Taylor, G. Teel, G. Tiernan, J. Williams, R. Williams, W. Wood, and M. Young for collaborating with us and hosting trials on their farms. We thank E. Dalrymple (Schuyler County Soil and Water Conservation District), M. Davis (Willsboro Research Farm), Dr. A. Khan (Morrisville Technical College), M. Ochs (private consultant), Dr. G. Roth (Penn State University), and E. Thomas (Miner Institute) for their collaboration on this project.

Nutrient Management Spear Program
http://nmsp.css.cornell.edu/

A collaboration among the Department of Crop and Soil Sciences, Pro-Dairy, and Cornell Cooperative Extension.

The Phosphorus Fertility Status of New York Agricultural Land

Q.M. Ketterings, J.E. Kahabka, and W.S. Reid,
Dept. of Crop & Soil Sciences, Cornell University

Introduction

In New York State (NYS), an estimated 7.6 million acres equaling 25% of the total land area in the state were in agricultural production in 2002. For the long-term sustainability of NYS agriculture, it is important to maintain and increase farm profitability while protecting the environment. To evaluate crop fertilizer and manure management monitoring of soil test phosphorus (P) levels is important as P losses are known to increase with soil test P level. Our objectives were to determine at state and within-state regional scale: 1) the current status of P fertility, and 2) trends over time.

Methods and Materials

Three datasets were obtained:

- A set with 119,326 soil samples submitted to the Cornell Nutrient Analysis Laboratory in the period 1995-2001. This dataset contained fertility data for samples originating from commercial agriculture.
- A dataset of over 10,000 samples obtained in 2000-2001 from farms working with Agricultural Consulting Services Inc. (ACS).
- The complete soil test records for 30 dairy farms. Farms ranged in size from 319 to 2458 acres and were located in 14 different New York counties.

New York State was divided into regions using two different classifications: 1) the current Natural Resources Conservation Service (NRCS) classification (Figure 1), and 2) the Lathwell and Scott classification with eight major geographic farming regions (Figure 2). The latter allowed us to compare current within-state P distributions with those observed in 1957-1958. Soil sample results were analyzed for each of the regions and compared with current data.

Results and Discussion

Statewide assessment

The 1995-2001 dataset identified 28% of the samples submitted to CNAL as very low or low in available P (less than 4 lbs P/acre on the Morgan test), 25% as medium in P (4-8 lbs P/acre), 37% as high (9-39 lbs P/acre) and 10% as very high (40 lbs P/acre or more). Thus, 47% of all samples in the database were high or very high in P. The ACS Inc. dataset dating from 2000-2001, showed 44% of all samples to be high or very high in P. The 30 farm dataset showed a similar distribution: 47% of the fields and 49% of the acres testing high or very high in P. These results suggest a lack of a bias in the origin/history of samples submitted to Cornell University.

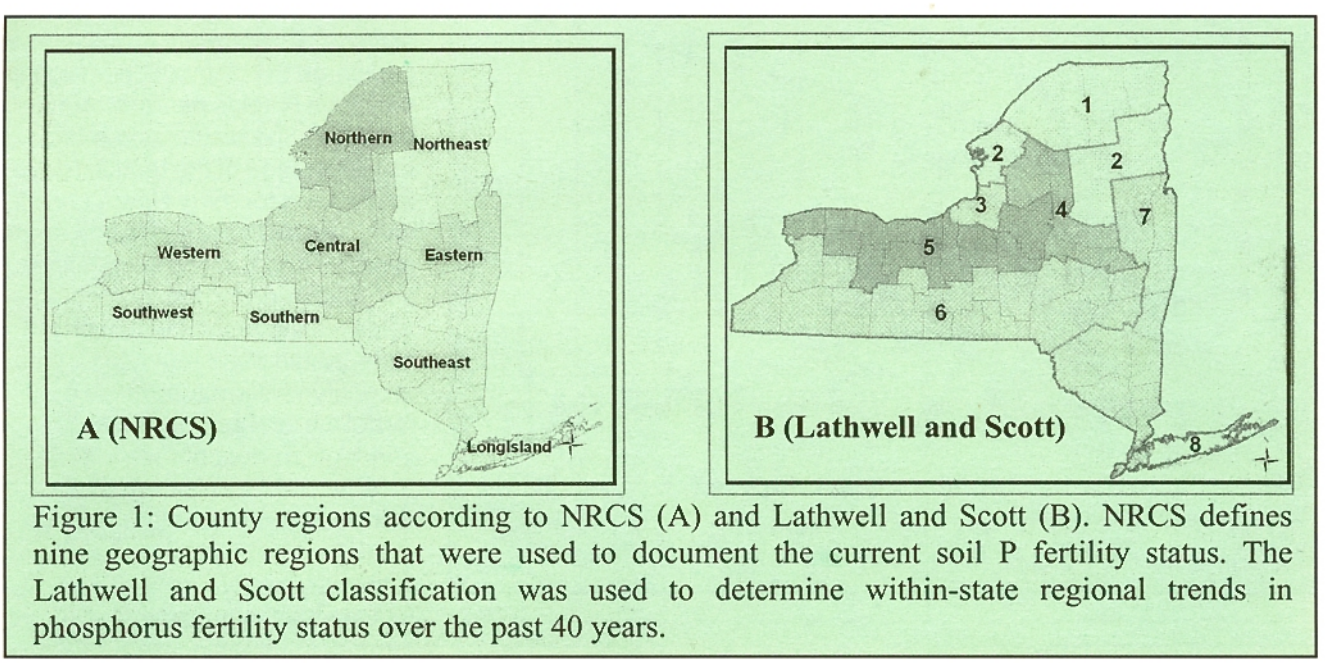

Figure 1: County regions according to NRCS (A) and Lathwell and Scott (B). NRCS defines nine geographic regions that were used to document the current soil P fertility status. The Lathwell and Scott classification was used to determine within-state regional trends in phosphorus fertility status over the past 40 years.

Within-state regional assessment

High and very high P sites were regionally distributed, identifying areas of high intensity dairy and vegetable agriculture. Of the 8 NRCS regions, the region with the highest P levels was Long Island where almost 87% of all samples tested high or very high in P. This is dominated by Suffolk County where nursery and greenhouse crops, vegetables and potatoes are the most important crops and large and frequent P fertilizer applications to these crops are not uncommon. NRCS regions with 45-60% of the samples testing high or very high in P included northeastern, western, central, southern, and southeastern regions where 36-46% of the samples tested high in P, while 9-14% of the samples were very high in P. Regions with less than 40% testing high or very high in P included northern, eastern, and southwestern New York. In these regions, 31-33% fell into the high P category while 3-8% of the soils were classified as very high in P.

State and within-state regional trends over time

Comparing data summarized in 1961, 1979, 1981, 1983 and from 1995-2001 (the soil extraction method remained the same although equipment was updated over time), we see comparable data in 1957-58 and 1977-78 but a steady increase in soil test P levels from 1977-78 when 26% of the samples tested high or very high to 47% currently (Figure 2). This increase was observed in all eight regions classified by Lathwell and Scott in 1961 with the largest increases occurring in the Northern NYS region (more than 2-fold increase in percentage of samples testing high or very high in P in 40 years). The intensification of crop production, long-term P imbalances on dairy and livestock farms, and high P fertilizer rates on the vegetable farms could explain steady increases in soil test P levels. This increase in soil test P also increases environmental risk.

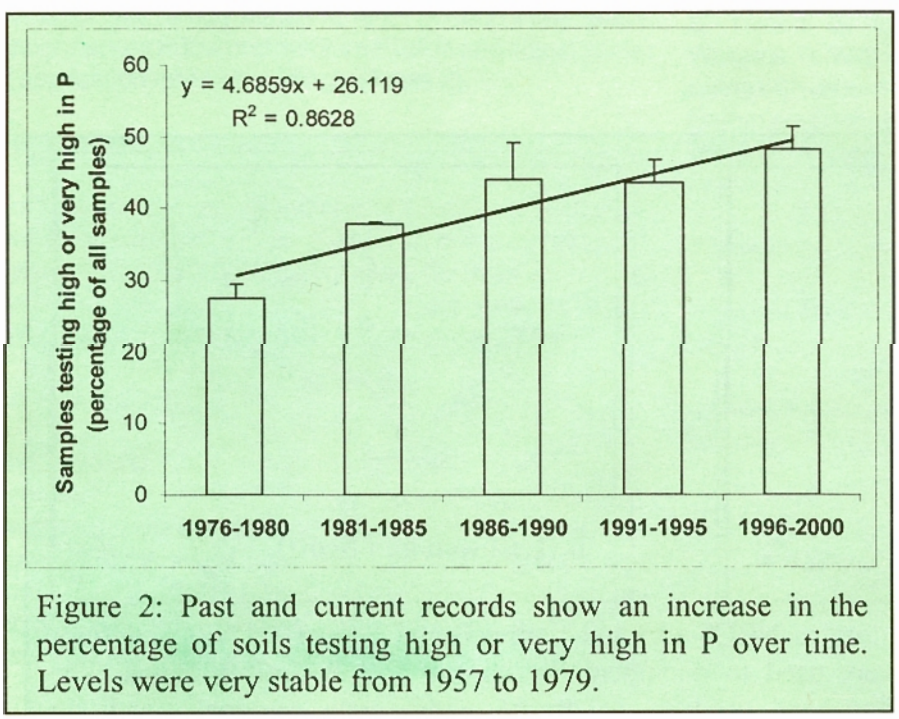

Figure 2: Past and current records show an increase in the percentage of soils testing high or very high in P over time. Levels were very stable from 1957 to 1979.

County assessment

The soil test P distributions for the top ten dairy, potato and cabbage producing counties in New York State are listed in Table 1. This table shows that 5 of the top 10 dairy counties had a greater percentage of soils testing high or very high in P than the state average, while for the potato and cabbage producing counties, 7 and 6 of the 10 counties showed elevated P levels, respectively.

Figure 3 shows the counties with less than 25% (white), between 25 and 50% (gray), and more than 50% (black) of the samples in the high or very high P categories. One may ask: are these results biased for small or large fields or fields? To answer this question, we compared the distribution of high and very high P fields per total number of fields with the distribution expressed as percentage of the total acreage of arable land for thirty New York State dairy farms. The results showed very similar P distributions suggesting that our estimates of the percentage of fields testing high or very high in P at state, within-state regional level, and at county-levels may be reliable indicators of the total acreage testing high or very high in phosphorus.

Summary and Conclusions

In the past forty years New York State has seen an increase in the percent-

Table 1: Distribution of phosphorus soil test levels for the top ten New York State counties for production of milk, potato and cabbage.

		Distribution of field among soil test phosphorus classifications				
	No. of samples	Very Low + Low	Medium	High	Very High	High+ Very High
Top 10 Milk Producing Counties						
Genesee	2,572	11.9	20.1	53.0	15.0	68.0
Livingston	3,038	15.7	20.9	46.9	16.5	63.4
Wyoming	10,170	20.2	22.9	47.0	9.9	56.9
Cayuga	4,030	18.4	26.5	44.8	10.3	55.1
Washington	1,977	26.8	25.6	35.2	12.4	47.6
Madison	2,444	34.7	24.9	32.0	8.4	40.4
Jefferson	2,526	32.1	29.2	33.5	5.2	38.7
Lewis	2,070	33.4	29.0	33.3	4.3	37.6
St. Lawrence	4,323	39.5	25.6	30.7	4.2	34.9
Chautauqua	5,726	43.1	27.8	27.8	1.3	29.1
Top 10 Potato Producing Counties						
Suffolk	1,533	6.6	6.9	25.9	60.6	86.5
Genesee	2,572	11.9	20.1	53.0	15.0	68.0
Livingston	3,038	15.7	20.9	46.9	16.5	63.4
Oswego	833	26.2	16.7	29.1	28.0	57.1
Wyoming	10,170	20.2	22.9	47.0	9.9	56.9
Orleans	1,223	17.3	26.0	50.6	6.1	56.7
Erie	2,756	28.2	23.2	40.9	7.7	48.6
Wayne	1,297	30.5	23.7	33.5	12.3	45.8
Steuben	1,824	33.3	25.9	35.4	5.4	40.8
Franklin	1,956	30.2	31.4	35.4	3.0	38.4
Top 10 Cabbage Producing Counties						
Suffolk	1,533	6.6	6.9	25.9	60.6	86.5
Ontario	2,244	9.4	13.5	58.7	18.4	77.1
Genesee	2,572	11.9	20.1	53.0	15.0	68.0
Monroe	793	11.5	24.2	53.1	11.2	64.3
Orleans	1,223	17.3	26.0	50.6	6.1	56.7
Erie	2,756	28.2	23.2	40.9	7.7	48.6
Yates	1,733	24.7	28.2	36.8	10.3	47.1
Wayne	1,297	30.5	23.7	33.5	12.3	45.8
Onondaga	4,149	28.0	29.8	35.6	6.6	42.2
Niagara	1,049	29.4	29.9	36.0	4.7	40.7
State Total	*119,326*	*27.7*	*24.9*	*37.3*	*10.1*	*47.4*

age of fields testing high and very high for phosphorus. Given the current soil fertility distribution in the state (28% testing very low or low, 25% medium, and 47% high and very high which is above the agronomic optimum), fertilizer P use could be limited to small starter or top-dress applications for almost half of the field crop acreage in the state. As these soils reach progressively higher P levels they may require more attentive management to minimize environmental impacts.

Acknowledgments and for Further Information

This project was funded with grants from the Northern New York Agricultural Development Program and a 319 non-point source pollution grant from the Department of Agriculture and Markets. For further information contact Quirine M. Ketterings at (607) 255 3061 or qmk2@cornell.edu.

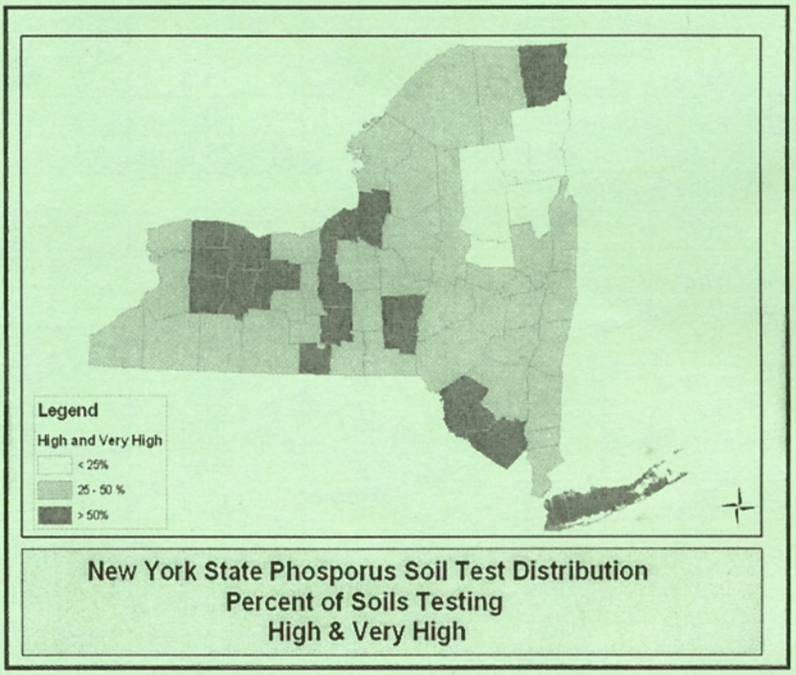

Figure 3: Counties with more than 50% of the samples in the high or very high P categories are colored dark.

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2004 Field Crop Dealer Meetings Agenda

FCDM

Cornell Cooperative Extension's
2004 FIELD CROP DEALER MEETINGS

October 26 - Comfort Suites, 7 Northside Drive, Clifton Park, NY
October 27 - Ramada Inn, 141 New Hartford St., New Hartford, NY
October 28 - Batavia Party House, Rt. 5, between Batavia and Leroy, NY
October 29 - Holiday Inn, 75 North Street, Auburn, NY

Registration begins at 9:00 a.m. with the program underway at 10:00. Registration (including lunch) at the door–*no preregistration*–will be $25.00. Registration alone will be $15.00. The agenda features topics of current interest to those involved in field crop production. Copies of the 2005 Cornell Guide for Integrated Field Crop Management will be available. (Please let Pam Kline (607-255-2177) know in advance of meetings if you will be needing 10 or more copies of the Guide). Share this announcement with others who may be interested in attending. Pesticide recertification and CCA credits will be offered. We look forward to seeing you at one of these sessions. If you have questions, call Pam Kline at 607-255-2177.

Time	Topic	Speaker
10:00 a.m.	INTRODUCTION	Host Agent
10:15	Phosphorus Trends in New York	Q. M.. Ketterings/ G. L. Albrecht
10:35	Weed Interference and Timing of Roundup Affect Corn Silage Yield and Quality	W. J. Cox
11:05	Weed Interference and Timing of Roundup Affect Yield Components of Corn	R. R. Hahn
11:25	Nutrient Management Research Update	Q. M. Ketterings/ G. L. Albrecht
11:45	Questions and Discussion	
12:00	LUNCH	
1:00	Pest Management Guide - The Web Version	J. K. Waldron
1:20	Asian Soybean Rust and Other Emerging Diseases of Field Crops	G. C. Bergstrom
2:00	Weed Management Research Update - Hedge Bindweed, Ragweed and More	R. R. Hahn
2:30	Soybean Aphid: New Insect Pest, New Concern?	J. K. Waldron
2:50	Questions and Discussion	
3:00	ADJOURN	

Calendar of Events

October 26, 2004	Field Crop Dealer Meeting, Comfort Suites, 7 Northside Drive, Clifton Park, NY
October 27, 2004	Field Crop Dealer Meeting, Ramada Inn, 141 New Hartford St., New Hartford, NY
October 28, 2004	Field Crop Dealer Meeting, Batavia Party House, 5762 E. Main Rd., Batavia, NY
October 29, 2004	Field Crop Dealer Meeting, Auburn Holiday Inn, 75 North St., Auburn, NY
Nov 1-4, 2004	ASA-CSSA-SSSA Annual Meeting, Seattle, WA
Nov 30-Dec 2, 2004	Northeast Region Certified Crop Advisor Conference

What's Cropping Up? is a bimonthly newsletter distributed by the Crop and Soil Sciences Department at Cornell University. The purpose of the newsletter is to provide timely information on field crop production and environmental issues as it relates to New York agriculture. Articles are regularly contributed by the following Departments at Cornell University: Crop and Soil Sciences, Plant Breeding, Plant Pathology, and Entomology. **To get on the mailing list, send your name and address to Pam Kline, 234 Emerson Hall, Cornell University, Ithaca, NY 14853.**

Cornell Cooperative Extension

Dept. of Crop and Soil Sciences
234 Emerson Hall
Cornell University
Ithaca, NY 14853

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