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?”:)

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

Quirine Ketterings¹, Sheryl Swink¹, Greg Godwin¹, Karl Czymmek², Greg Albrecht³, ¹Department of Crop & Soil Sciences and ²ProDairy, Cornell University

(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/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

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

<table>
<thead>
<tr>
<th>Quality parameter</th>
<th>Research Station Trials (9 trials)</th>
<th>On-Farm Trials (62 trials)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Starter 200 lbs/acre 10-10-10</td>
<td>No Starter N+K only N+K+</td>
</tr>
<tr>
<td></td>
<td>10-10-10</td>
<td>10-25 lbs P₃O₅/acre P₃O₅/acre</td>
</tr>
<tr>
<td>Moisture content</td>
<td>64 65 64 64 60 60 59</td>
<td>60 60 60 59</td>
</tr>
<tr>
<td>Neutral detergent fiber</td>
<td>43.5 42.3 43.4 42.8 42.1 42.6 42.7</td>
<td>41.6</td>
</tr>
<tr>
<td>Digestibility of NDF</td>
<td>62.2 62.2 62.2 62.2 62.3 60.8 61.7</td>
<td>61.6</td>
</tr>
<tr>
<td>Milk per ton of silage</td>
<td>3692 3699 3700 3703 3734 3652 3683</td>
<td>36 52 5712</td>
</tr>
<tr>
<td>Crude protein</td>
<td>7.4 7.3 7.3 7.5 7.6 7.6 7.7 7.6</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>0.21 0.21 0.20 0.20 0.23 0.23 0.23 0.23</td>
<td></td>
</tr>
<tr>
<td>Ca</td>
<td>0.83 0.88 0.85 0.84 1.09 1.09 1.10 1.11</td>
<td></td>
</tr>
<tr>
<td>Mg</td>
<td>0.17 0.17 0.17 0.18 0.14 0.14 0.14 0.14</td>
<td></td>
</tr>
<tr>
<td>Zn</td>
<td>16.6 16.6 16.0 15.6 17.6 17.9 17.3 16.5</td>
<td></td>
</tr>
<tr>
<td>Cu</td>
<td>4.3 4.3 4.2 4.3 3.8 3.9 3.7 4.1</td>
<td></td>
</tr>
</tbody>
</table>
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 all 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.

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 when 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).

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

<table>
<thead>
<tr>
<th>Soil Test P</th>
<th>With manure</th>
<th>No manure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>20-30</td>
<td>60-70*</td>
</tr>
<tr>
<td>Low</td>
<td>20-30</td>
<td>50-60*</td>
</tr>
<tr>
<td>Medium</td>
<td>20-30</td>
<td>25-50*</td>
</tr>
<tr>
<td>High</td>
<td>0</td>
<td>0-25</td>
</tr>
<tr>
<td>Very High</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* Pol. ≤25 lbs P₂O₅/acre in the starter fertilizer band; balance may be included at the band or broadcast.

For Further Information.

For further information contact your local Cornell Cooperative Extension office. You could also contact Quinn M. Kettzerngets 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 Cerovall 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. Degen, M. Dennis, D. Dewing, A. Gabriell, K. Ganoe, N. Glazier, N. Herendeen, M. Hunter, J. Miller, and M. Stainyard. We thank J. Blumer, R. Brouillette, B. Brown, K. Burr, T. Cantwell, G. Coller, R. Cross, C. Dockert, D. Fisher, D. French, G. Gage, J. Greenwood, Greenwich Central School Ag Class with help from B. Elsworth, M. Grootzitt, L. Hargrave, Helden Farms, Hennessey-Honestead Farm, R. Holbridge, J. Hourigan, A. Hunter, W. Hughson, M. Jahnke, B. Kilcer, L.A. King, D. and A. Kroes, F. Lampert, R. Lott, J. Maxwell, K. McCollum, M. McMahone, T. Moskin, S. and G. Natall, S. Nienke, K. Pemberton, C. Post, C. Roberts, D. E. Schluetskere, J. and K. Schwarznick, M. Stoughton, Sykes Dairy Farms, R. and S. Talcott, G. and L. Taylor, G. Teel, G. Ternam, J. Williams, R. Williams, W. Wood, and M. Young for collaborating with us and hosting trials on their farms. We thank E. Dalrymple (Schenley County Soil and Water Conservation District), M. Davis (Wellsboro Research Farm), Dr. A. Khan (Morrisville Technical College), M. Ochs (private consultant), Dr. G. Roth (Penn State University), and E. Thomas (Miler 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.
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 levels. 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 119,328 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 (9-30 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 45% 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 dairying 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 height regions classified by Lathwell and Scott in 1961 with the largest increases occurring in the Northern NYSC 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.

**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 8 of the 10 counties showed elevated P levels, respectively.

![Figure 2](image.png)

**Summary and Conclusions**

In the past forty years New York State has seen an increase in the percent-
<table>
<thead>
<tr>
<th>Table 1: Distribution of phosphorus soil test levels for the top ten New York State counties for production of milk, potatoes and cabbage.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Distribution of field among soil test phosphorus classifications</strong></td>
</tr>
<tr>
<td><strong>No. of samples</strong></td>
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<tr>
<td>---------------------</td>
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<tr>
<td>Top 10 Milk Producing Counties</td>
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<tr>
<td>Genesee</td>
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<td>Livingston</td>
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<td>Wyoming</td>
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<td>Cayuga</td>
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<td>Lewis</td>
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<td>St. Lawrence</td>
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<td>Chaumont</td>
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<td>Top 10 Potato Producing Counties</td>
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<td>Suffolk</td>
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<td>Genesee</td>
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<td>Livingston</td>
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<td>Steuben</td>
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<td>Franklin</td>
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<tr>
<td>Top 10 Cabbage Producing Counties</td>
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<td>Erie</td>
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<td>Yates</td>
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<td>Wayne</td>
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<tr>
<td>Onondaga</td>
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<tr>
<td>Niagara</td>
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<tr>
<td>State Total</td>
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</table>
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 nonpoint source pollution grant from the Department of Agriculture and Markets. For further information contact Quintin 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.

Nutrient Management Spear Program
http://nmsp.ccss.cornell.edu/
A collaboration among the Department of Crop and Soil Sciences, Pro-Dairy, and Cornell Cooperative Extension.
# 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 pre-registration—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.

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

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

*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.

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**Helping You Put Knowledge to Work**

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*What's Cropping Up?* Vol. 14 No. 4