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Eleanor Jacobs

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Starter P Project Provides a Win-Win

Dairy farmer John Maxwell is a believer. Based on soil tests and a demonstration plot located on his Geneseo, NY, dairy, Maxwell made a substantial reduction in starter phosphorus (P) fertilizer used for corn production.

At Maxwell Farms, rates were reduced from over 60 pounds of P_2O_5 per acre on all fields to 20 pounds on most fields. Actual rates are based on soil test P values. "We saved over \$5,000 the first year, and we only grow about 250 acres of corn annually," Maxwell said. "We have continued the lower rates and are not seeing any yield loss."

Although this was a phosphorus project, the Maxwell's and other cooperating farmers learned to make better use of soil tests and recycled nutrients. Nitrogen starter rates were reduced and are now based on manure rates and credits from sod crops in the rotation. Soil testing also helped the farms reduce potash applications. Other farmers have also saved thousands of dollars.

Farmers who base P application rates on soil test P levels and credit recycled nutrients can reduce fertilizer costs. They also lower the risk of P moving into surface and ground water. Farmers and those involved with water quality improvement see the win-win benefits.

Making better use of manure by reducing commercial fertilizer applications helps dairies to meet the requirements of their Concentrated Animal Feeding Operation (CAFO) permits, said Colleen Daly, a consultant with Rochester-based Agricultural Consulting Services (ACS). The consulting group has frequently collaborated with Cornell researchers and Extension educators on projects.

In response to the Starter P Project results, ACS eliminated phosphorus "altogether on fields testing very high, high and even some moderate for P, and we saw no negative effect on corn yields," Daly said. ACS consultants have in some cases recommended low rates of in-furrow phosphorus with good results. "And it's less expensive," Daly said.

Daly has seen no reluctance on the part of farmers to reduce or eliminate P. "They don't even want to use the in-furrow," she says. "And they know they can be more flexible with manure."

Extension leadership

Extension educators Nate Herendeen, Mike Stanyard and Nancy Glazier, with the Northwest New York Dairy, Livestock and Field Crop Extension/PRO-DAIRY team, worked with the Cornell Nutrient Management Spear Program (NMSP) staff to conduct demonstrations on reduced rates of starter P.



Corn yields have been maintained with substantial reductions in starter phosphorus and nitrogen fertilizer on cooperating farms in the Conesus Lake Watershed. Farmers saved money and reduced the risk of runoff to the lake.

The statewide Starter P Project fit into the Extension team's collaboration on a watershed project, funded through USDA and including the Maxwell dairy. "We were working on a project to reduce phosphorus in the Conesus Lake watershed, and the Starter P Project allowed us to tie the two projects together," said Glazier, Extension technical associate.

The Conesus Lake Watershed Project brought more collaborators to the study of phosphorus in crop production and the environment. They were SUNY Geneseo and Brockport, the Rochester Institute of Technology, and the Livingston County Soil and Water Conservation District (SWCD).

The Northwest Extension team arranged demonstration sites in each of three years of the projects at Empire Farm Days in Seneca Falls, Batavia Crops Research Farm and Maxwell Farms. Summer field days were held for agriculture professionals, farmers and Extension workers. Hundreds of farmers viewed the plots at Empire Farm Days. The plots at Maxwell Farms were used as part of Ag Environmental Management training for Natural Resources Conservation Service (NRCS), SWCD and consultants.

"Just that John Maxwell made the comment on the money saved and the less fertilizer needed had more impact," Glazier said. "When people, particularly other farmers, hear from a farmer about his real-world experience, they feel it's easier to do the same on their farm. It's a step beyond research."

Karl Czymmek concurs. The PRO-DAIRY specialist and a driving force in the statewide Starter

P Project said, "Farmers are understandably skeptical about small-plot results on research farms. They want to see results from commercial farms where it is often harder to control things."

Farmers and others who participated in the Batavia Research Farm field day were surprised that they could not identify the corn that had received the high P rates. The yield data confirmed that eliminating or decreasing P rates did not cause a drop in yield or quality. Farmers are reducing P use as a result of these demonstration sites, field days, visual evaluations and yield data. "Even if they don't get a custom mix, at least they cut back on the rate for starter fertilizer," Glazier said.

"Having trials both on research stations where we have more control over experimental conditions and on farms throughout our agricultural counties is essential for most of the work we do in the Nutrient Management Spear Program," said Quirine Ketterings, NMSP leader and a faculty member in the Department of Crop and Soil Sciences at Cornell University. "Results need to apply to local situations and that means we need to do part of our work on the farms themselves."

The Extension team published articles each year in "AgFocus," their outreach newsletter. This newsletter reaches more than 900 farmers and agribusiness cooperators. The results from the Maxwell Farm have also been reported as part of the USDA multi-agency annual evaluation of the Conesus Lake Project. The project is a model for other small lake watersheds across the country.

Nate Herendeen included the starter P information from Maxwell Farms in his presentation at the International Association of Great Lakes Researchers at Waterloo, Ontario, in 2004.

Mike Stanyard uses the results from the Starter P Project as a tool in his Extension programs. He gives his crop discussion groups a test prior to their growing season field meetings, and one question is whether additional P is needed on fields testing high or very high for phosphorus. "More than half of them say yes," Stanyard said. "So I use the data from the Starter P project and the Conesus Lake Watershed Project as a tool for this program."

Far-reaching benefits

Fertilizer vendors and agricultural consultants who participated in the projects are changing their P recommendations. They are blending starter

formulations to meet needs based on soil tests. Farmers are applying at lower rates based on soil test P availability and crop response.

The requirement for Concentrated Animal Feeding Operation (CAFO)-sized farms to have nutrient management plans has improved implementation of reduced starter P rates and saved money for farmers, as John Maxwell shows.

"Phosphorus is recognized as an important nutrient for crops but in excess, it can be lost to streams and lakes and cause algae blooms," Ketterings said. "In our field management, we try to supply enough P so plants can grow but not so much that it becomes an environmental problem. One way of doing that is to test soils for the P availability and only apply P fertilizer if it is likely to result in a yield or quality response."

Collaboration was critical to bring together Cornell Starter P Project and the Conesus Lake Watershed Project to research best nutrient management practices, particularly related to phosphorus. About that collaboration between Cornell staff and the Extension team, Glazier said, "Working with Cornell researchers was helpful. It gave us another opportunity to work with the university and allowed us to get more research in the field on farms."

From Daly's perspective, there was a definite advantage for farmers because of her working with Cornell researchers and Extension. "It moved the farms to another level by getting them involved with Cornell," she said.

From Ketterings' perspective, Extension educators and producers "worked as a team towards a common goal: identification of P needs for optimum corn production. This network approach is what makes projects such as this a success. We generated a large database covering the great variety of soil types and growing seasons, and showed real life impact."

By Eleanor Jacobs



Cornell University
Cooperative Extension



The **New York Starter Phosphorus Project** was initiated to evaluate and demonstrate the value of P starter application on soils testing high or very high in soil P. Cornell University's Nutrient Management Spear Program (NMSP) faculty and staff, PRO-DAIRY staff and Cornell Cooperative Extension educators worked together to conduct 65 on-farm and 13 research station trials between 2001 and 2003. The project was funded by a NESARE research and education grant (LNE02-173) and contributions from New York State Natural Resources Conservation Service, Agway, Carovail, Pioneer Hi-Bred International Inc., AgriCulver Seeds and the Northern New York Agricultural Development Program. Based on the results of these three years, we conclude that on 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 P₂O₅ per 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 the starter without a yield or silage quality penalty. For more information, visit: <http://nmsp.css.cornell.edu/projects/starterp.asp> or contact Quirine Ketterings at gmk2@cornell.edu or (607) 255-3061.