



Saving Money *and* Reducing Environmental Loss

By Kate Birchenough

First year corn fields have long been a favorable place to apply manure. Fertility levels may have been drawn down during the hay period and hay fields are more accessible when soil conditions are wet. Now, thanks to applied research conducted by Cornell's Nutrient Management Spear Program staff and students in collaboration with Cornell Cooperative Extension educators, farmers may think twice before adding extra nitrogen (N) to their first year corn fields.

"A lot of people were wondering about applying extra N for first year corn either from fertilizer or from manure, and with the fertilizer prices so high, they wanted to see if they could cut back on fertilizer or manure without hurting the crop yields," said Joe Lawrence, Cornell graduate student on the project.

Sixteen trials were conducted in 2005 and 2006. These included trials on two fields of David Fisher's 3,400 acre dairy farm in Madrid, St. Lawrence County, New York.

"One of the two sites yielded 27 tons of silage, the other was almost 28 tons per acre. Both were Swanton fine sandy loams and corn following fall-tilled sod with less than 10 percent alfalfa yet neither one showed a response to side-dress N," said Fisher.

"The economics of growing corn with just a starter N application are very good. This research showed I can make better use of manure N by applying it to second or third year corn," Fisher added.

The results were the same at all test sites; no benefit of adding N beyond a small starter.

"We conducted the project to see if the amount of legume in the sod and timing of sod kill made a difference in N needs for the following corn crop and it did not," added Quirine Ketterings, leader of the Nutrient Management Spear Program and Associate Professor in the Department of Crop and Soil Sciences at Cornell University.

Lawrence worked with Pete Barney of Cornell Cooperative Extension of St. Lawrence County to conduct the research on Fisher's farm.

"The research confirmed that even with today's hybrids, there is enough N provided by decomposition of the sod that first year corn needs no additional N," said Barney. "Given the high N prices today, this research has given many producers the confidence to eliminate sidedress fertilizer on first year corn and save a substantial amount of money", said Karl Czymmek, Senior Extension Associate with PRODAIRY and key collaborator on the project.

"We have been able to use the information in meetings and in one-on-one farm visits explaining to people how much N is supplied by the sod and showing them they can reduce purchase and application costs," said Barney. "We're also working with farmers to see where manure nutrients are best used – corn after sod doesn't need more than 30 lbs N/acre in the starter, so they can allocate the manure to a site that has higher N requirements and reduce N fertilizer use on that field as well."



Peter Barney, field crops extension educator of St Lawrence County Cornell Cooperative Extension in front of Dave Fisher's corn crop grown with just a starter N application.

"It is good to have research done on farms and in different places around the state," said Fisher.

"This study has been very useful as we now know and have shown through local research that we don't need the extra N. Conducting research on farms throughout the state, in addition to the work done on Cornell University research stations, enables Cornell Cooperative Extension to supply relevant science-based work applicable to local soil and weather. Local research done within the county and the community is a very strong educational tool," Barney said.

"On-farm research is a great teaching tool. As more farmers try growing first year corn without additional N and see that it works, we'll find that more of them will reallocate manure as well," Barney said. "It's a matter of economics."

"Most of the nitrogen benefits from the sod occur in the first year after sod kill," said Lawrence. "We are determining optimum N rates for corn following the alfalfa/grass sod, two and three years after sod kill so we can study different tools that might help predict yield response to additional N in the second or third year of corn after sod."

These tools include a new soil N test, the Illinois Soil Nitrogen Test or ISNT, as well as the end-of-season stalk nitrate test.

The ISNT is a laboratory test in which potentially mineralizable organic N is determined. This fraction is much more stable than nitrate and tends to remain in the soil for a longer period of time. So far, the ISNT has been a good predictor of responsiveness to extra N, meaning that based on ISNT results and organic matter levels in the fields, the researchers have been able to accurately predict if corn was going to respond to side-dress N or not for eleven of twelve second-year

corn sites. It also accurately predicted the need for additional N for two corn trials following soybeans.

"The end-of-season stalk nitrate test is evaluated as a tool that might help determine if the corn had insufficient, sufficient, or excess N during that growing season", Lawrence adds.

"We are really happy to work with Dave [Fisher]. His commitment to the project allowed us to follow the same site for two years in a row and calibrate these two tools. We still have to complete this year's trials to draw final conclusions but we hope both tests will help producers and consultants fine-tune their N fertilizer and manure management," said Lawrence.

"If these tests are done for several years, producers can build up a database that is specific to their farm, allowing them to make appropriate adjustments in fertilizer and manure management over time," Lawrence said.

The on-farm trials at Fishers were sponsored in part by the Northern New York Agricultural Development Program (NNYADP). Its Co-Chair Jon Greenwood says, "The precision nitrogen management for corn project is a good way to marry science and practicality with the goal of developing efficient, cost-effective production practices that are environmentally-friendly and can be used by farmers throughout the region and the NNYADP is happy to support such projects."

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Cornell University
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The **Nitrogen for Corn Project** was initiated to evaluate the need for starter and side-dress N for corn following plow-down of grass or legume sods. Cornell University's Nutrient Management Specialist Program (NMSP) faculty and staff, PRO-DAIRY staff and Cornell Cooperative Extension educators worked together to conduct 16 first year corn trials and 12 second year corn trials on-farm and on Cornell research stations in 2005 and 2006. The project was funded with grants from the New York Farm Viability Institute (extension-industry grant), the Northern New York Agricultural Development Program (NNYADP, for NNY sites in the project), and federal formula funds (feed quality component). The results of the first year corn trials show us that (1) no additional N beyond a small (30 lbs N/acre) starter is needed for optimum yield and quality of first year corn, independent of sod composition or turnover time – fall vs. spring, and (2) we can skip the PSNT for first year corn. As for second year corn sites, five of the twelve sites showed a significant yield increase, with the average optimum economic N rate ranging from 90 to 110 pounds of N per acre, plus the 30 pounds N per acre as banded fertilizer. The other seven sites did not show a yield response upon side-dress N addition. This included a field that yielded 30 tons per acre in the second year following spring plow-down of a 20% alfalfa sod and no manure or side-dress N. We are currently evaluating management tools that might help identify fields that don't need the additional N.