



Nitrogen in corn research improves the bottom line and the environment

Research to study the nitrogen (N) needs of corn following sod came at just the right time for Tom Kilcer, Cornell Cooperative Extension agronomist in eastern New York, and the LaGrange family dairy in Fuera Bush.

"Marvin (LaGrange) and I were having a discussion on N and whether Cornell University recommendations account for higher yields," Kilcer said. LaGrange wondered about N needs for corn planted after plowdown of a field that had run-out alfalfa (30% legume). The field was close to the barn and normally a target for manure immediately before sod plowdown.

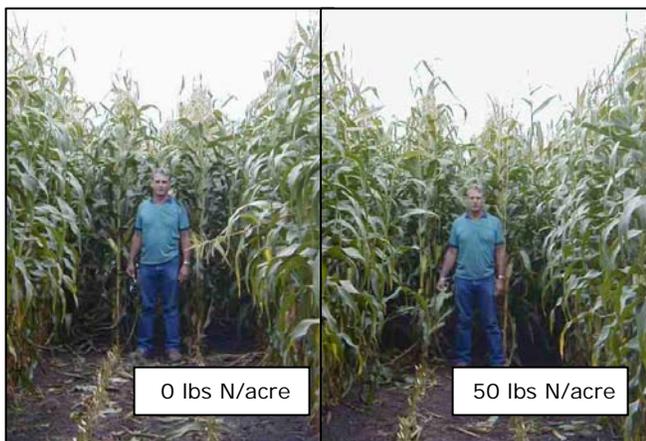
"We had questions and at the same time Quirine Ketterings (of the Cornell Nutrient Management Spear Program) was looking for collaborators," Kilcer said. In New York State, an estimated 990,000 acres of corn was planted in 2005, with 520,000 of that grown for silage. Everyone wanted more information on the most efficient use of N in corn silage production.

"Nitrogen prices and environmental concerns have caused many dairy producers to rethink their current N management practices," Kilcer said. "With N prices climbing – up 8% since last year in eastern New York – producers want to ensure they get a return on their fertilizer investment, raising questions about N needs for first-year corn."

Spearheading the research on N needs for first year corn following alfalfa and/or grass sods in the rotation was Joe Lawrence, a graduate student in Cornell's Department of Crop and Soil Sciences in the College of Agriculture and Life Sciences. "The scientific literature describes more than 60 field trials with corn *grain* following legumes in the rotation," said Lawrence, who is pursuing a Master's degree. "For almost all of these trials, the conclusion was that no additional N was needed. We set out to test if we needed starter and side-dress N for corn *silage* here in New York and looked at not just dry matter yields but also silage quality and N use efficiency."

"In cooperation with Cornell Cooperative Extension field crops Extension staff, the private sector, and corn producers we conducted 16 trials in 2005 and 2006 to determine corn N needs for first-year corn from grass/legume sods," explained Karl Czymmek, Senior Extension Associate with Cornell's PRO-DAIRY program and a key collaborator on the project.

The LaGrange dairy, which also includes Doug, Ron and David LaGrange, was one of those 16. "Doing on-farm research like this is good," says Marvin LaGrange. "It spreads the research around the state and improves farmers' buy-in of the results."



Tom Kilcer, field crops educator with Cornell Cooperative Extension of Rensselaer County, stands in front of first year corn grown on Marvin LaGrange's farm in eastern New York. Side-dress N application did not increase yields. The 30% legume sod released enough N for this 22.4 ton/acre corn silage crop. No extra N beyond a 30 lbs N/acre starter was needed.

Science on the farm

"The research looked out for the best economic interest of farmers," Kilcer said. "Farmers realize that N is a place to save." There's no need for insurance fertilizer."

Saving on the cost of fertilizer and using manure effectively were two motivators for the LaGrange family to participate in the research. They learned that "there's no need for insurance fertilizer," as Kilcer said. Additional N beyond 30 pounds in the starter wasted money since corn did not respond.

Like the successful Starter P Project, conducted on farms across New York by Ketterings, Czymmek, extension educators and agribusiness, the N in corn research brought science to farmers' fields.

"The research is more than on-farm research; it has statistic rigor behind it," Kilcer said. "It's on-farm test plots done with scientific validity that stands up to the rigors of analysis."

That assures farmers, such as the LaGranges, that they can trust the research results. For the LaGranges, results were very positive. In 2005, the dairy saw above average yields – 22 tons per acre – in spite of a dry growing season. They learned there was no response to added sidedress N; sod residue supplied all the N their crop needed to grow.

"These results were not uncommon," Lawrence added. "In fact, not a single one of the 16 first year corn trials was responsive to N beyond a small starter N application and silage quality was not impacted either". "And none of these sites received manure," Czymmek adds.

"We changed our practices," LaGrange said. "We used to apply manure to first year corn fields. Now we use just 30 lbs of N in the starter band for first year corn and we target the second year corn fields with manure."

"Like the starter P project, the research was timely, done quickly with 16 trials in just 2

years, the results were available in a short time and the information is accurate," said Kilcer. "By getting farmers involved in the research, it raises the credibility of the results."

Funding for the N for corn research came in part from the New York Farm Viability Institute. Its support for applied research projects such as this one is essential, said Ketterings. "Without such support, and the support of our College of Agriculture and Life Sciences, we would not be able to deliver on stakeholder requests for local and applied on-farm research."

"New York Farm Viability Institute is committed to funding practical research projects that result in increased farm profits and provide models for other farms to follow," said Thomas Sleight, NYFVI executive director. "Precise application of nitrogen to field corn has the potential to reduce the cost of fertilizing where it is not needed and reduce environmental impact without hurting crop yield."

"The collaboration with local Cornell Cooperative Extension offices and consultants allows us to conduct trials on farms with different soil types and in different parts of the state," Ketterings said. "This is essential to test nitrogen needs, to evaluate new tools for nitrogen management, and to increase awareness of environmentally sound nitrogen management for corn throughout the state. Through these collaborative projects we can address issues of importance for the sustainability of agriculture in New York and have impact on the farmers' bottom line and the environment."

By Eleanor Jacobs



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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 (NMSPP) 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 6 management tools that might help identify fields that don't need the additional N.