Diverse Team Researches Manure Incorporation on Cayuga County Farm

By Sara Zglobicki

"One of the tough things about farming is that the playing field keeps shifting. Our farmers are being asked to produce more than ever before and to have less impact on the environment at the same time. With energy prices trending upwards, the next challenge is to look for systems that use energy most efficiently to produce food, feed and fiber," remarked Brian Aldrich, field crops educator with Cornell Cooperative Extension of Cayuga County. Aldrich is part of a team of farmers, extension educators, agricultural consultants and researchers across New York State working together on a manure incorporation study to help farmers reduce nutrient losses in ways that are compatible with reduced tillage, as well as save on fuel.

The work began in 2008 and is continuing this year. The team established ten farm trials where manure is spring-applied and (1) not incorporated, (2) incorporated with a chisel plow or (3) shallowly incorporated with an aerator. They sample soil before manure application and at planting, sidedress and harvest. They also measure moisture, compaction, and residue coverage. These data, together with the results of the Illinois Soil Nitrogen Test, Pre-sidedress Nitrate Test, and Late Season Stalk Nitrate Test, allow the team to examine the impact of application methods on corn yield and quality, nitrogen recycling and losses, soil conservation, and fuel costs.

Growing in Genoa

Bill Kilcer of Windstott Farms is participating in the study. Kilcer's farm is located in the rolling hills of Genoa in the Finger Lakes region of New York, bordered by Cayuga Lake to the west and Owasco Lake to the east. Growing up on his family's dairy in the Hudson Valley, Kilcer always wanted to farm. Following his dream, in 1992 he headed away from the suburban pressure near his family's farm and started Windstott Farms in Cayuga County on Honeoye soil, considered some of the most productive soil in upland areas of New York.

At Windstott, Kilcer applies reduced tillage principles on his 200 acres of silage corn, alfalfa, timothy and triticale. He typically injects manure in the spring and spreads some manure on the surface in the fall. Kilcer immediately said yes when he was approached to participate in the project. "I had no hesitations about joining the team for this study," said Kilcer. "I participated in a phosphorus study a few years ago and received good results."

Bill Kilcer (left) of Windstott Farms in Cayuga County and Brian Aldrich (right), field crops extension educator with Cornell Cooperative Extension of Cayuga County measure corn yields from the manure study at Windstott Farms.

Key Issues

As Aldrich reflects, the study addresses a key issue for farmers. "There is an historic conflict between the ideal recommendations for manure nutrient management versus soil conservation. To maximize the capture of nutrients, minimize nutrient runoff and reduce odor, we recommend that manure be incorporated immediately after application. On the other hand, to reduce soil erosion, we recommend farmers leave as much residue on

the surface as possible. Tillage tools like the Aerway, which partially incorporate manure but leave some residue on the surface, are an attempt to balance nutrient and soil conservation." Together, the team hopes the results of the trials can help them refine manure incorporation recommendations.

A Team Effort

"We involved farmers around the state to capture the impact of varied weather and soil conditions in our results," says Anne Place, a graduate student who is coordinating the study as part of her Masters degree in Soil and Crop Sciences at Cornell University. The study has its roots in a three-year field trial on the Musgrave Research Farm at Aurora. Funding from the New York Farm Viability Institute and the Northern New York Agricultural Development Program provided the opportunity to conduct the trials.

Aldrich agrees and adds, "The collaborative approach shows that the thoughts, ideas, skills and talents of farmers are not only highly valued, as they should be, but essential to the successful adoption of new practices."

Student Leadership

In working with Place, Aldrich remarks that her upbringing on a dairy farm, "allows her to communicate easily with the farmers. She understands their operations and the farmers respect and enjoy that. The stresses of working in hot, humid weather and sampling and harvesting on a tight schedule are not easy to deal with, and Anne carries it all without ever losing her patience."

Quirine Ketterings, leader of the Cornell Nutrient Management Spear Program at Cornell's Department of Animal Science and Place's main academic advisor, agrees. "It is important that students with an interest in nutrient management have a good understanding of the day to day realities of farming. They will then better understand the opportunities we have to address challenges when we truly work together with the farmers and their advisors on relevant, farmer-driven, on-farm research. Anne's farming background and her Bachelors of Technology degree in Agronomy from SUNY Cobleskill made her an ideal candidate for the project."

Results and Next Steps

At Windstott, there were no differences in yield or nitrogen conservation between chisel and Aerway incorporation in 2008. Yields averaged 27.3 tons/acre. Kilcer noticed the Aerway incorporated manure reasonably well and pulled up fewer stones than the chisel plow, supporting the view that the Aerway can be a good tool to use on gravelly soils.

"Where I am, when the soil is wet, the Aerway pokes holes and smears the ground without incorporating the manure very well. When the soil moisture is right though, it does a fantastic job," Kilcer added.

As Place observed, "Shallow incorporation with a tool like the Aerway is not a silver bullet, but rather an option we are investigating for farmers with the right soil type or conditions. We've seen it work best in drier fields or with gravelly soils."

After this final year of the project, the participating farmers will receive a report with the results of their trial and a summary of all ten trials. The results will be shared with farmers throughout the state at grower meetings and in written publications.

As Aldrich summarized, "I look forward to sharing the results in my newsletter and winter meetings. In addition to assisting producers, another part of my job is explaining agricultural practices to the general public. The manure incorporation study provides me with another example of how farmers in my county are continually working to improve their practices and reduce their impact on the environment."

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The **Nutrient Management Spear Program** (NMSP) is an applied research, teaching and extension program for field crop fertilizer and manure management on dairy and livestock farms. It is a collaboration among faculty, staff and students in the Department of Animal Science, Cornell Cooperative Extension, and PRO-DAIRY. Our vision is to assess current knowledge, identify research and educational needs, facilitate new research, technology and knowledge transfer, and aid in the on-farm implementation of strategies for field crop nutrient management including timely application of organic and inorganic nutrient sources to improve farm profitability while protecting the environment. An integrated network approach is used to address research, extension and teaching priorities in nutrient management in New York State. For more information on NMSP projects and extension/teaching activities, visit the program website (http://nmsp.css.cornell.edu) or contact Quirine Ketterings at qmk2@cornell.edu or (607) 255-3061.