



Applied Research Experience Benefits Agricultural Sciences Undergraduate Miriam Goler

By Kate Birchenough

Can the Illinois Soil Nitrogen Test (ISNT) detect nitrogen released from the incorporation of alfalfa root or shoots?

That's how Miriam Goler began her research project with Cornell University's Nutrient Management Spear Program (NMSP).

Goler, a New York City native, was an Environmental Engineering undergraduate at Cornell University when she discovered an interest in agriculture. She began volunteering at Dilmun Hill, Cornell's student-run organic farm, and working with Farm to Cornell, a student group trying to increase the availability of local foods on campus. She was interested in trying her hand in the research world, when she discovered the work of Quirine Ketterings', leader of the NMSP and Associate Professor in Nutrient Management of Agricultural Systems.

"I was looking for a project that related to agriculture," said Goler. "I was interested by what I read about Quirine's work, especially since she works in extension as well--it was important to me to be doing research on something that would be practical for farmers. When I met with her, Quirine had a project that I could take responsibility for independently, and it sounded interesting."



Miriam Goler, Agricultural Science major at Cornell University.

"Miriam seemed really interested in gaining some skills in applied research. I was working with Joe Lawrence on his masters project on tools for N management of corn and that was generating a few very interesting hypotheses that we thought could be tested in an independent research project. Because of her keen interest in getting involved, Miriam seemed the perfect candidate to work with us on the project," Ketterings said.

Lawrence's project included on-farm trials to validate the ISNT critical value curve that was developed through research by a previous NMSP graduate student Jonathan Klapwyk. Lawrence noticed that first year corn after alfalfa or grass sod did not respond to extra N. The ISNT wasn't accurately predicting the need for additional N for first year corn but that it was very accurate in predicting whether additional N was needed for second or higher year corn.

Miriam spent two semesters with NMSP working on a lab incubation study with alfalfa roots and shoots. She focused her research on addressing the question "How does timing of sampling impact the accuracy of the ISNT in predicting if additional N is needed?"

"For first year corn, we hypothesized that the breakdown of the previous sod crop was affecting the ISNT results but additional research was needed to test the hypothesis that with our sampling at sidedressing time we had missed the ammonium peak and as a result also the ISNT peak that happens upon sod decomposition," said Lawrence. "Research on the ISNT has been going on for many years in New York. It has taken the effort of researchers, students, extension educators, crop consultants, and farmers to answer questions about this test and many were answered. But we had a few extra questions."

"Miriam designed her project together with Joe, Dr. Jerry Cherney, Professor of Forages in the Department of Crop and Soil Sciences, and myself, based on results we had obtained to that point," Ketterings explained.

"For the ISNT to be a valuable tool for crop producers in New York State, it needed to be accurate in predicting N responsiveness in our crop rotations," said Lawrence. "The results of Miriam's project provided key information. Her work explained why ISNT results for soil samples taken at sidedressing time in first year corn after alfalfa or grass do not reflect the large amount of nitrate released from decomposition of the alfalfa or grass biomass. It helped us determine the true value of the ISNT as a predictor of soil N supply, rather than a predictor of crop N needs. And, as such her research made a very valuable contribution to the national ISNT discussion," continued Ketterings.

Dr. Antonio DiTommaso, Goler's academic advisor and the Director of Undergraduate Studies for the new Agricultural Sciences major in the College of Agriculture and Life Sciences, states that one of the goals of the new major is to allow students to develop both their intellectual and academic skills, as well as technical/practical skills in whatever area of agriculture they are most interested in.

"Through internships and independent research or extension projects, students learn to make the link between basic and applied research and how, through research and extension, we can impact people and the environment," said DiTommaso. "Too often, students have a strong academic grounding after completing their B.S. degree, but lack the research/practical skills that are becoming increasingly important in many areas of the agricultural sector."

"Miriam is one of the brightest and most motivated students I have advised to date. She is tremendously resourceful, mature and focused on the task at hand. On her own, she looked for an opportunity to get involved in research and she found that opportunity in Quirine's program." DiTommaso adds. "This project helped her gain research skills and it helped her better understand how findings are used to improve the livelihood of people while at the same time protecting the environment."

Ketterings agrees, "As an undergraduate student I had the chance to do a senior thesis project and it really opened my eyes and resulted in opportunities that I would not have had if I had not gotten involved during my time as an undergraduate student. I love to be able to give other students similar opportunities".

In addition to conducting research, Goler wrote a report on the incubation study she conducted and her work became part of a journal article that she co-authored. The article will appear in the January 2009 issue of the Soil Science Society of America Journal.

"It is really exciting and rewarding to see my research be part of a project that is getting published in a peer-reviewed journal," said Goler.

Goler spent the summer after her sophomore year working on an organic farm in Minnesota. When she returned for her junior year, she switched her major to Agricultural Sciences with a concentration in Sustainable Agriculture. She spent the spring semester of her junior year in Mexico working on an urban agriculture project.

While Goler plans to work in urban agriculture and community food access upon graduation, she noted the skills and confidence she gained through working on her research project has helped her in school and will continue to help her in the future.

"Doing research has given me a much better understanding of the process used in science. In addition, writing up a report on my project has made me much more comfortable with writing papers, lab reports, and research papers for my science classes, and doing this project has greatly improved my ability to read and understand scientific writing," she said.



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The **Nutrient Management Spear Program** (NMSP) is an applied research, teaching and extension program for fieldcrop 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://nmssp.css.cornell.edu>) or contact Quirine Ketterings at qmk2@cornell.edu or (607) 255-3061.