



## Cornell Sociology Student Researches Crop Availability of Soil N

By Lisa Fields

Under the direction of Associate Professor Dr. Quirine Ketterings, the Nutrient Management Spear Program (NMSP) at Cornell University is a hive of constant activity. Multiple integrated research and extension projects in the realm of soil and crop fertility are in various stages of fruition at any given time. Ketterings noted, "Typically we have about ten projects going on at once." The target audiences of farmers, extension staff and agriservice personnel are engaged to help set project objectives and goals and provide collaboration with field research. Once an idea is hatched into a project, the NMSP team gets to work. Ketterings' focus keeps the program on track. She stated, "We strive to address both environmental and farm profitability concerns in our research. Our work must be relevant to the farming community."

How does all this work get done? It takes a diverse and highly dedicated team. Ketterings said, "Each person brings something unique to the team. We learn together how to communicate what we do and why we do it. Having a mix of professionals, students and interns ensures we stay diverse, open-minded, enthusiastic and relevant." Typically, either a staff professional or student is the primary leader of a given project. Ketterings further commented, "NMSP team members all share in the responsibility for each individual's project. Students gain leadership skills by managing their primary project and teamwork skills by helping out with other projects."

There is no cookie-cutter template for the NMSP student workers' background. An example is Kate Orloski, who joined NMSP in 2008 as a Cornell B.A. undergrad. Orloski began her studies at Cornell unsure of her academic direction. In her second semester she was intrigued by a sociology class that focused on race and ethnicity. She commented on her decision to major in Sociology, "I found people's cultural differences and their individual stories highly interesting. I got involved in Social Science as a result."

The science of soil fertility was not one that Orloski anticipated she would be involved in as a Sociology major. However, when she sought her first employment experience, her older brother Joe Orloski, an M.D. and NMSP's first summer intern (2001), suggested she contact Ketterings. Orloski noted, "I was interested in being outdoors for the summer and Joe had a good experience so I thought "why not?" Ketterings added, "Kate asked if I thought she was capable of doing the work given she was not a science major. I told her that a positive attitude and a willingness to learn new things were more important than knowledge and skills already gained, and that she would get training on the job. She joined us in the summer of 2008."



Kate Orloski graduated in January of 2010 with a Cornell B.A. (sociology) and research experience with the NMSP.

Orloski proved her ability to apply herself wholeheartedly to soil fertility research. Her daily work in the laboratory focused on processing and analyzing soil samples with the Illinois Soil Nitrogen Test (ISNT). The ISNT is a field specific test that can be added to routine soil samples to fine-tune N guidelines for corn producers. It estimates the potential amount of readily mineralizable organic soil N the crop

can utilize in current and future years. With this knowledge, fertilizer N application rates can be adjusted to take advantage of the soil N supply.

Orloski explained the process of her work with the ISNT. "I added a sodium hydroxide solution to 1 gram of soil placed in a mason jar and added boric acid solution to a petri dish that sat dispensed in a clamp-type holder within a canning jar. The jars were placed on an electric griddle to be evenly heated for five hours after which the ammonia released from the soil and captured in the boric acid solution was measured by titration with sulfuric acid. "Orloski added with a laugh, "This was all entirely new to me. I had no idea that scientifically sound research could be done with pancake griddles and canning jars!" Orloski received guidance and support in the laboratory from team members Kevin Dietzel, NMSP Technician, and Chie Miyamoto, a Japanese exchange student and intern from SUNY Cobleskill's Plant Science department.

Another new experience for Orloski was the field labor aspect of NMSP's projects under the direction of NMSP Research Support Specialist Greg Godwin. Orloski said, "I learned how plots are set up, and why. I did a lot of measuring and counting of marker flags. I didn't fare too well soil sampling due to the strength it takes, but no-one ever minded that I did the lighter work."

Orloski's summer work experience inspired her to take on a four credit study project in the 2008/2009 academic year. She worked on two projects. The first project involved measuring nitrate levels in corn stalks sampled at the end of the growing season (corn stalk nitrate test or CSNT). This test reflects N availability to the crop, indicating whether N was inadequate, adequate, or excessive for optimal yield that year. Orloski evaluated the importance of sampling time and sample processing methods. Corn stalk samples were gathered over a 9-week period (4 weeks prior to silage harvest up until grain harvest). Her data indicated that field sampling could be done at

either silage or grain harvest without significantly affecting nitrate level. Orloski also found that holding samples for up to 8 days prior to processing did not affect N results as compared to the standard protocol of processing them within 2 days of sampling. The wider sampling and sample processing windows make the CSNT a more practical tool for farmers to implement.

The second segment of Orloski's research was to determine the effect of incorporation of various plant residues and cover crops on soil nitrate and ammonium and the ISNT's prediction of N supply. Residues examined were clover, goldenrod, corn stalks, wheat and soybeans. She found that the C:N ratio of the residue strongly correlated to a reduction in soil nitrate levels one week after incorporation and that clover, at a C:N of 20 was the only material to produce an increase rather than a drop in nitrate levels four weeks after incorporation.

"Both of Kate's projects resulted in practical results that we can use to fine-tune sampling protocols and better understand nitrogen dynamics," Ketterings remarked.

The relationship of this research work to the interests of a sociologist may seem obscure, yet Orloski was inspired by it. During the time of her study project, she delved into Cornell's gender statistics regarding academic staff, and confirmed that as a female full professor and program director Ketterings is indeed one of only a few.

The NMSP experience may have planted a seed toward Orloski's post-graduation plans as well. In January of 2010 she will receive her B.A. and relocate to Houston, Texas with her fiancée. When asked about her employment plans, Orloski said "I am going to pursue a position teaching either or both Social Studies and Science at the middle school level."

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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://nmssp.css.cornell.edu>) or contact Quirine Ketterings at [qmk2@cornell.edu](mailto:qmk2@cornell.edu) or (607) 255-3061.