



## Project Examines Potassium Dynamics of Alfalfa and Soil

*By Lisa Fields*

Economic pressures in 2008 resulting from historic high potash fertilizer prices along with low milk prices inspired the "Potassium Needs of Alfalfa" on-farm research project that is underway in New York State.

Dr. Quirine Ketterings, Associate Professor and Director of Cornell University's Nutrient Management Spear Program (NMSP) elaborated: "When potash fertilizer prices reached \$800 to \$1,000 per ton of 0-0-60, farmers and their advisors began to seriously question their alfalfa K management. They wanted to cut back but also expressed concerns about the risk of negative impacts on yields and crop survival through the winter if they cut K applications to far."

Ketterings emphasized the potential economic impact of the research. "Crop economics is the strongest incentive for this research although herd nutrition questions are part of K fertilization concerns as well. With prices for K around \$0.40 per pound, with sales of 86 million pounds in New York State,

the K fertilizer sales amount to a \$34 million dollar segment of NY's economy. If K additions can be avoided where not needed the savings can be large. Alternatively, if we are shorting our crops, K addition can give economic returns."

Cornell potassium fertilizer guidelines are derived from soil test results and based on the sufficiency concept. This means that K is not recommended if the soil test indicates a profitable yield response is not expected.

Ketterings explains: "Cornell guidelines for K are soil-specific and reflect the strong K supplying capacity of many of our soils. The sufficiency approach that is used to derive the guidelines can generate advice that is very different from what would be recommended if we use a crop removal concept (reapply what is removed) or the approach that's based on maintaining a particular K saturation ratio in the soil."

In addition to the economic and agronomic questions, the project also created an



The team working on the potassium project at Coyne's in Avon, NY, included Colleen Daly from Agricultural Consulting Services (second from left), Mike Stanyard and James Kingston (fifth and sixth from the left) of the Western New York Field Crops and Dairy Extension Team, and Karl Czymmek (left) and Quirine Ketterings (not pictured) of Cornell University. Animal Science Department.

additional opportunity to address concerns of feed managers and consultants about potassium levels in alfalfa forage. High forage K levels can cause serious metabolic problems in late gestation and early lactation cows. This concern about excessive K levels in forage ties into agronomists' desire to arrive at a level of K input that provides crop needs and does not deplete the soil's K reserves.

The project is evaluating and comparing the different approaches usefulness for making K management decisions for yield and forage quality. To make the information applicable across a wide variety of soils, it was essential to work with a diverse set of farms.

Ketterings explained: "We looked for fields representing various soil types typical of alfalfa production in New York State. For each farm site we chose test plots that represented high, medium and low K fertility status. The fertilizer treatments are sub-plots within the larger plots where we compared the yield after spring application of 350 pounds per acre of 0-0-60 with yield obtained from plots that were not fertilized with K. We measured yield, tissue K levels, forage quality, and soil K levels in 2010 and are continuing to follow most of the fields in the study for a second year in 2011."

One farm site is at the Coyne Family's 1000-cow dairy operation in Avon, NY. Malachy Coyne, one of the farm's seven partners, learned about the project from an article in the Northwest NY Area Extension Team's "Ag Focus" newsletter. Field Crops Specialist James Kingston's article invited farmers to participate, so Coyne contacted him and said "sign me up!"

Coyne explained, "My driving interest in this research project was to find a way to reduce K levels in the alfalfa forage we feed to the cows. I am hoping we can find the level that keeps the crop healthy and productive while having manageable levels of K for the feeding program."

Kingston gave his perspective on the research as an agronomist. "Time and again I have seen alfalfa being fertilized according to a perceived standard without regard for the manure nutrients that were applied. This is an exciting project, because there's potential to save some folks a lot of cash. I was thrilled when Malachy approached me, because on-farm research is the outreach approach most likely to affect people's opinions about fertility management."

The Coyne farm's crop advisor, Colleen Daly, Senior Consultant with Agricultural Consulting Services Inc. (ACS) provided the field data needed to determine where the plots would be set up.

Daly expressed her enthusiasm for the project. "This is a fantastic project, because it's highly relevant. Seeing the research trial on the farm is what engages farmer interest as it is 100% relatable to them." Daly added, "When it was time to harvest, three of us from ACS and the Extension staff got out there and got the work done. The discussions we have about the project as we work together have been a great relationship builder for us."

Coyne agreed, "It's been excellent having the staff here at the farm. They are approachable without taking up my work time. It's very exciting to see the research going on right here in my fields."

Ketterings commented on the results to date. "In 2010 a third of our fields responded to the K fertilizer with a yield increase, while the remaining two thirds did not. This is a great dataset to evaluate our soil and tissue testing tools. We do need the second year of data before drawing conclusions. This year 1<sup>st</sup> cutting was harvested at the end of May and K application took place directly after harvest."

Daly noted the impacts of the research on her work as a crop consultant. "Due to the soil and crop data I've seen from the farm plots and at Cornell's research farms to date, I'm now less aggressive with K fertilizer recommendations."

Ketterings provided a researcher's perspective about the experience: "Being able to work on farms like the Coyne's with extension counterparts and consultant firms like ACS Inc. is great. We can get the work done, get locally relevant results, and farmers and advisors can see for themselves the response in the fields to extra K. We fairly quickly generate a large dataset, and through the interactions we get feedback as well as suggestions for future research."

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To learn about the projects of the Cornell Nutrient Management Spear Program and its collaborators see: <http://nmssp.cals.cornell.edu/projects/>.



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