New Visions Program Immerses High School Senior Eli Corning in Relevant Research with NMSP

By Lisa Fields

During his senior year of high school, Eli Corning was part of a unique program linked to Cornell University that engaged his passionate concern about the global food system. Corning, a South Seneca High School student, gained acceptance into the Tompkins-Seneca-Tioga (TST) Board of Cooperative Educational Services (BOCES) New Visions Life Sciences Program in the fall of 2015.

The highly competitive program sponsored by the School of Integrative Plant Science and housed in Guterman Lab at Cornell University provides a full year of challenging studies for 14 seniors. Students in the New Visions program earn 6 college credits from Tompkins-Cortland Community College (TC3) and complete an internship in their chosen area of science.

Michele Kline, New Visions in Life Sciences program teacher, explained, "The program exists because of a long-standing relationship between T-S-T BOCES and the College of Agriculture and Life Sciences. It provides a one-of-a-kind experience aimed at making students 'college and career ready'."

Kline seeks to match student interests with research opportunities for their internships. "As a teacher, it's rewarding to watch high school seniors blossom," she said. "Students generally work three half-days days each week on a project. Many have assumed responsibilities typically given to graduate students, and three students moved into paid lab assistant positions this summer. The research experience in particular helps students to be prepared for university study as well as 'seal the deal' to become Cornell freshmen."

Corning explained, "When Mrs. Kline came to my high school Chemistry class and spoke about the program, I was very excited to apply. I had a profound interest in the life sciences, but didn't know what specific area was the right fit for me. My first assignment after acceptance in New Visions was to write a paper for submission to the World Food Prize Global Youth Institute conference in Des Moines, Iowa. I explored the issues connected to food insecurity in my paper, 'Uganda: Coaxing a Nation Out of Conflict with Global Diplomatic and Humanitarian Initiatives.' To develop my premise, I re-connected with Denis Okema of Global Education Motivators, who had spoken to my class in middle school. At the age of 10 he escaped from life as a child soldier in Northern Uganda. His knowledge brought reality to my research and our discussions deeply affected me."

Kline commented, "Eli wrote an exceptional paper. He went above and beyond what most students do, seeking information about food insecurity from someone who experienced it directly."

"The conference was my first experience with New Visions, and it immersed me in a setting that had a big life impact," Corning remarked. "It was thrilling and immensely humbling to experience so intensely the sense of global connection among people who work to address food insecurity."

Eli Corning completed the New Visions in Life Sciences program with an internship with the Nutrient Management Spear Program at Cornell University.

When it was time to set up Corning's internship, Kline connected Corning with Professor Quirine Ketterings, who leads the

Cornell's Nutrient Management Spear Program. The program gives student interns the opportunity to participate in research that addresses current needs of farms in the realm of soil and nutrient management. Ketterings said, "Our previous work with New Visions was incredibly rewarding for all of us, so when Michele approached me about placement of Eli with our team, I immediately said yes. Eli's background and passion about food security issues convinced us beyond any doubt.

"I was assigned a lot of reading to gain understanding of the principles of soil stability and nutrient management and learn about the scientific research process," Corning noted. "I was given my own research project which resulted in a report, 'Impact of Long Term Manure and Inorganic Nitrogen Management on Soil Aggregate Stability in a Corn-Alfalfa Rotation.' I worked with soil samples from the long-term manure study, in its 15th year and currently led by Dr. Amir Sadeghpour. The goal was to examine the effects of rates of application of manure and fertilizer nutrients and inorganic versus organic nutrient sources on the physical health of soil over time. The treatments were liquid manure, composted /separated dairy solids and inorganic N fertilizer. Nutrient application rates in the study were one based on meeting crop nitrogen (N) needs, and a second, lower rate based on soil phosphorus (P) removal by the crop. The lower rate is used where there is a risk of P build-up in the soil. To evaluate soil health, I assessed wet soil aggregate stability and determined soil particle size as percentage small, medium and large from each treatment and rate of application. I also ran statistical analysis of the raw data, and compiled the results. The conclusions were that shifting to lower application rates based on P removal does not impact soil health. Wet aggregate stability and percentage of large aggregates were greater in the organic treatments than the inorganic treatment, indicating that organic nutrient sources benefit soil health over time. With guidance from Amir and Quirine I developed a poster and presentation for the New Visions seminar. Summarizing the process in that way was a great culmination of what I learned."

Sadeghpour commented, "The long-term corn-alfalfa rotation study is a complex one. Eli worked meticulously and quickly grasped the idea behind the study. He immediately started to work on preparing protocols for both aggregate size distribution and wet aggregate stability tests. I very much enjoyed Eli's passion, curiosity, independence, and critical thinking skills."

Corning remarked, "The way the NMSP team functions I was able to dive in and learn as I took on new tasks. The total immersion was an incredible opportunity, as I was encouraged to figure things out on my own, with total support along the way. Everyone works together too, so if plots need harvesting, or samples need to be prepared for analysis in the lab, whoever is available pitches in."

"The team is truly culturally diverse, and also really welcoming," Corning said. "It's so appropriate to have team members from all over the world researching agricultural practices, as it's a global system. He added, "No matter what area ultimately grabs me into a career, soil health and nutrient management are relevant. It's important to understand the implications of our large scale agriculture on the soil resource as our future as a species really does depend on healthy soil."

Corning spoke of his plans as a fall 2016 Cornell freshman in Environmental and Sustainability Sciences. "My concentration will most likely be in Agricultural Sciences, and I'll seek diverse experiences as my studies get underway. The questions that guide me are, what can I, as one person among billions, do? How can I set myself on a path where I make positive contributions to the issues I care about?"

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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.cals.cornell.edu) or contact Quirine Ketterings at qmk2@cornell.edu or (607) 255-3061.