



Precision agriculture project in the NMSP helps Steve Robertshaw pursue his career aspirations in teaching

By Agustin Olivo

Steve Robertshaw came to Cornell University to learn more about agricultural education and high school instruction. He graduated summa cum laude with a bachelor's degree in Agricultural Sciences on May 30th. One of his most relevant contributions to the [Nutrient Management Spear Program \(NMSP\)](#) was the development of a high school curriculum about precision agriculture that will have long-lasting impact in the new generations of agricultural students in New York.

Robertshaw is originally from Tannersville, NY, a small town in the southern Catskill Mountains. After graduating from high school, he explored different jobs, including work for a land management firm in New York and at a ranch in western Colorado, before deciding to pursue an undergraduate degree in SUNY Cobleskill. In 2019, he transferred to Cornell as junior in the agricultural science major, with an emphasis in sustainable cropping systems.

Robertshaw joined the Nutrient Management Spear Program (NMSP) shortly after coming to Cornell. "I was interested in exploring applied research related to precision agriculture, so Carrie Richards, the coordinator for the agricultural science major at Cornell, suggested I could get involved with the NMSP; she told me that 'this was a very good program' to learn about these topics", Robertshaw explains.

Dr. Quirine Ketterings, NMSP lead, recalled, "Steve approached me in January of 2019 to say he would transfer into Cornell in the fall of that year and wondered if he could contribute to our NMSP program in any way. I became his academic advisor and he joined our team that fall".

Robertshaw first joined in field data collection and then soon embarked on working with corn silage and grain yield monitor data from farms. From there, he continued with his own project, developing a high school curriculum on precision agriculture.

Robertshaw shares "around April or May of 2020, the idea of working in a high school

curriculum about precision agriculture came up in conversations Dr. Ketterings and I had". This activity aligned closely with Steve's interests in pursuing a career in agricultural education after graduating from Cornell.



Steve Robertshaw from Tannersville, NY, spent his summer internship in Ithaca, developing a high school curriculum on precision agriculture.

During the summer of 2020, Robertshaw received funding from Cornell Cooperative Extension (CCE) through the ["CCE Sumer Internship Program"](#), to develop a curriculum for high school students in precision agriculture as a way to introduce some of the industry leading innovations before students pursue a career or further education in agriculture. For this project, Ketterings and Robertshaw, teamed up with Dr. Jeffrey Perry, Senior Lecturer in the Department of Global Development at Cornell, whose efforts are centered on teaching and education.

Despite COVID19 induced restrictions including working from home, Robertshaw worked on the curriculum with Perry and

Ketterings, with meetings twice a week to discuss multiple aspects of the project. He highlights "This initially started as a smaller project of 20 lessons, that could be part of a longer Ag course; however, after considering all the topics we wanted to include, the curriculum ended up being a semester-long course on precision agriculture".

Kristina Ardalan, another agricultural science student intern with the NMSP during the summer of 2020 joined the efforts and assisted Robertshaw with the creation of activities in the curriculum and reviewing the Agriculture, Food and Natural Resources (AFNR) standards. The final structure of the curriculum contains three main units: foundational knowledge, specific precision agriculture applications, and benefits of precision agriculture. Contained in the three main units are 10 different topics, with 80 lessons (60 lectures and 20 laboratory sessions). Some of the most relevant topics include essential nutrients, GPS and GIS systems, yield data and maps, remote sensing and environmental implications of precision agriculture.

"The tricky part is to funnel the information into a structured lesson or lab activity. This takes organization, creativity and lots of coffee! The topics are complex but must be clear, organized, and understandable for high school students. Moreover, the lessons must have interactive components that will draw the students in and spark interest. The learning curve in this creative mindset is steep but it is a very worthwhile journey. I appreciate the chance to learn how to merge science and creativity for teaching with great mentors", Robertshaw shares in his [2020 CCE summer journal](#).

Robertshaw received feedback from high school teachers to improve the first draft of the curriculum. He points, "It was very useful for me to interact with the teachers that reviewed the curriculum, and one of the things I enjoyed the most in the project; the peer-review process was very useful".

Robertshaw highlights "This project taught me a lot about structure and pacing, how to create lessons breaking content into smaller pieces, and to be creative to keep things entertaining for the students; I also learned about educational psychology and gained an appreciation for the effort teachers put in learning a new topic before teaching it to others".

Ketterings reflects, "The curriculum that Steve put together reflects his dedication, ability to organize complex materials and communicate at the high school level, as well as his creativity. What he developed is now the foundation from which we hope to expand with other modules in future years".

The precision agriculture curriculum that Robertshaw developed during his time as a student at Cornell will be presented in the [2020 Professional Development Conference of the New York Association of Agricultural Educators](#). With an increasing exposure to more agricultural teachers, the curriculum he created will impact the learning experiences of hundreds of students around the state in the coming years. This will help build more interest of younger generations in agricultural careers and contribute to a more sustainable present and future of farming through the diffusion of precision agriculture knowledge.

Robertshaw transitioned into a Master of Arts in Teaching (MAT) Program in Agriculture Education, at Ithaca College, immediately after graduation from Cornell. His work on the high school curriculum contributed to this next step, "This project helped tremendously; to manage to 'make the bridge' with Quirine and Jeff was really 'huge'; lots of experience, knowledge and skills gained, and it definitely helped me affirm that I want to pursue this career".

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Cornell University
Cooperative Extension



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.