



NMSP Internship Provides Opportunity for Innovative Nitrogen Management Research

By Lisa Fields

Owning and operating a successful small business requires a strong work ethic and the ability to manage resources wisely. Tyler Pardoe, 2015 Cornell Agricultural Sciences graduate, acquired these qualities during his childhood in central Pennsylvania.

Pardoe described how his interests developed. "For over fifty years my family has owned and operated Pardoe's Perky Peanuts, a snack food company that processes nuts and other products by artisanal methods. Their work ethic was part of our home life, too. My dad had a large garden and most of my free time was spent working alongside him planting and tending vegetables. As a kid that's where I chose to be when the others were playing in the yard. We also grew several acres each of corn and clover as wildlife feed plots. My interest in growing things is one of my few true passions." Pardoe added, "I knew I wanted to pursue a degree in agriculture and be involved in fieldwork, so I was really pleased to get accepted at Cornell."

For his degree program, he chose a concentration in Crop Production and Management with a Soil Science minor. During his junior and senior years, Pardoe found coursework and hands-on learning with the Nutrient Management Spear Program (NMSP) to be especially valuable.

"I was accepted as an NMSP intern for the summer of 2014. I got exposure to the full range of activities involved in field research and traveled all over New York State," Pardoe elaborated. "At first we did a lot of soil sampling in research plots and that made for very long days. The second half of the summer we harvested forages from the plots and I helped process the samples in the lab, so I was involved from pre-planting through the analysis phase."

Professor Quirine Ketterings directs the NMSP. "We love to work with agricultural sciences students in our applied research and extension program, as interns in the summer and as team members during the regular

semesters as well. These students all bring their own unique background, experiences and skills and are eager to learn. Tyler's interest in crop production and soil science was a great fit for all of us and his work ethic was phenomenal," Ketterings commented.



Tyler Pardoe, Agricultural Sciences major at Cornell University, takes soil samples in a farmer field in Western New York as part of the NMSP's GreenSeeker® project.

Pardoe earned two college credits for his own summer-long research project and a fall semester follow-up. He explained, "My project had two elements, to examine the nitrogen (N) fertilizer rate that gives the best economic return in sorghum and to work with an innovative tool that can assess crop yield potential during the growing season. I worked in sorghum planted in two locations, with four repetitions each of five rates of starter N fertilizer. The crop yield assessment tool I evaluated was the hand held GreenSeeker®. It uses a light-emitting diode (LED) to read red and near-infrared light reflected by growing plants and correlates with a Normalized Difference Vegetation Index (NDVI). The NDVI refers to the greenness of the crop canopy and ground coverage, so it's a vigor index scaled from 0 to 1, with 1 having the highest yield potential."

Research is underway to determine which NDVI algorithms best apply to corn grown in New York soils and weather conditions. Pardoe examined if height and position of the sensor impacted NDVI readings. He said, "It was exciting to participate in research that fit my interests and is relevant to farmers' needs. Although my findings weren't highly conclusive I gained a direct understanding of the time and effort needed to get definitive results from field research. Going through the whole process from start to finish taught me things I couldn't have learned any other way. There's no substitute for hands-on experience."

Pardoe also was involved in a study that evaluated the performance of the "Nutrient Boom," a wheeled rig with boom arms covering 120 feet that allows for liquid manure application in standing corn. The NMSP helped Cuff Farm Services and Doug Young of Spruce Haven Farm evaluate its performance on sloping and stony terrain.

Further illustrating technological advances, Pardoe talked about a surprise event when he was in the field for the Nutrient Boom study. "We were applying manure when suddenly a drone came along and hovered about 10 feet over our heads. It was pretty unbelievable. Someone had pulled his car over and sent the drone out to check out what we were doing. That was definitely the most unique experience I had during my internship."

After the field season, Pardoe took Ketterings' agronomy factsheet writing course. He explained, "I chose the topic of in-field NDVI sensors. My factsheet, [Crop Vigor Sensing for Variable-Rate Nitrogen](#) describes the methodology and application of these tools for N management in corn. The course structure involved meeting as a class once a week. We critiqued each other's work and had distinct goals with a timeline. After we created solid drafts, Quirine and specialists from Cornell Cooperative Extension reviewed our work. I think I went through 15 or 16 drafts before the final one. The critiques were all incredibly helpful, and the factsheet is many times better than it would have been without

that input." Pardoe summarized, "Creating the factsheet was my favorite thing from the internship, and highly rewarding. So much of college is theoretical, but this was based on my own real world experience doing actual research with a tool that not a lot is known about. The factsheet can help farmers address the challenge of managing N through precise, in-field applications that can have both environmental and financial benefits."

Deciding to obtain the Certified Crop Advisor (CCA) credential fit Pardoe's goal to work directly with farmers and field crops after graduation. The CCA exam requires thorough knowledge of crop, soil and water, pest and nutrient management. Pardoe's first step to prepare was Ketterings' CCA Exam Prep Course in an independent study format. "There's so much material to go over," he noted. "I'm incredibly glad I took the course. We went through each of the four sections that are part of the test, and made up our own quiz questions. Quirine gave us feedback on how well they fit the material we needed to know. I had a lot more confidence going into the test than if I had prepared on my own. And, I passed!"

In summary, Pardoe said, "I highly recommend the NMSP internship to any student who's willing to work and is intent on learning. I hope to work as a crop consultant after I graduate. There's a lot to learn, and the experience and knowledge I gained through my internship gave me a great foundation."

Stressing the importance of real world experience before setting longer term plans, he commented, "In the back of my mind is the thought to pursue a graduate degree. I need to get out there and get some solid work experience before I can decide on a degree program. One thing I'm sure of is that my career choice must be work I love to do."

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