



Research Project and New York's Agriculture Provide Exciting Learning Experiences for NMSP Intern from Spain

By Lisa Fields

During his PhD program in soil fertility at Lleida University, Spain, Angel Maresma found an ideal opportunity to deepen his knowledge and gain international experience. He explained, "In the PhD program here we have the chance for a stage (internship) at another university. My advisor, Jaume Lloveras suggested I try to go to Cornell in 2015. At that time, a former student of his, Sebastian Cela, was working as a postdoctoral researcher with the Nutrient Management Spear Program (NMSP) in the Department of Animal Science at Cornell. Sebastian explained the projects that NMSP is involved with to me, and I felt I really should go there."

Professor Quirine Ketterings, NMSP's director, was contacted and she immediately accepted Maresma into the program. "Angel showed a great enthusiasm for what we do and came with a solid background in both farming and agricultural research," she said. "He worked with us for four months between February and the end of May. It's great to be able to bring such capable and motivated people into our program here at Cornell. Agricultural producers and scientists face similar nutrient management challenges around the world, and having a culturally diverse team helps us to learn from each other and be relevant. The variety of backgrounds of our team members at any given time enriches the learning experience for students and staff alike."

Maresma described his background. "I became interested in agriculture at a very early age. I grew up in Selgua, a little village in the Ebro Valley in Northeast Spain. My family lives on the same farm that my grandparents had as a supplement to their jobs. When my parents started farming there, they made investments so the farm could be their livelihood. They consolidated their acreage, and added irrigation and machinery. Irrigation efficiency was improved, changing from flood method via open ditches to buried pipelines and overhead sprinkler systems. The farm specializes in

forage production, especially alfalfa. We crop about 300 acres, with around 180 of that rented to neighbors. Growing up while improvements were made on the farm inspired me to study Agricultural Science."



Angel Maresma, 2015 NMSP intern and PhD student from Lleida University, Spain, harvests triticale in a Double Crop N Rate Study plot on a farm in Canajoharie, New York.

Maresma's NMSP internship included time in the field as well as work on his own NMSP research project. "I thought I would be assigned to assist with projects of the team, but Quirine surprised me by giving me my own project," he said. "Its objective was to evaluate soil sampling protocols. The process was to examine spatial variability as a factor in the accuracy of organic matter and Illinois Soil Nitrogen Test (ISNT) results and quantify the implications for

sampling protocols. I was given a dataset of 600 soil samples taken from two corn fields with the timing split between July and post corn-harvest. They were from a prior project that examined spatial variability impacts of field samples on soil test phosphorus results. The samples had more recently been analyzed for organic matter and nitrogen as well. At the beginning I had to read a lot, because I had never worked in soil precision agriculture. I found I really enjoyed it. The most challenging part was creating a simulation to determine how many samples are needed to assert that their average values were within the mean of the set for the entire field. It took many attempts and some double checking on sample analyses. And, I was amazed to learn that the samples, originally taken 12 years ago, were still available to check the values!"

Ketterings added, "Angel did a super job with the project I gave him. This project is really important to our search for better ways to manage nitrogen in farm fields. Being able to quantify spatial patterns is essential if we want to move forward with more precise nitrogen management. Angel's work is the foundation from which we aim to move forward in the coming years".

"The skills I acquired at Cornell will be valuable as I proceed with my PhD project at home," Maresma commented. "I was able to take a QGIS course and ARCGIS workshops and I got very proficient at Excel." He explained his PhD work. "Our project in Spain has two objectives. One is to develop an index to enable precision application of nitrogen through sprinkler irrigation using multi-spectral aerial images. The other is to determine the optimal nitrogen rate for mono-cropped corn and for double-cropped barley/corn in the Ebro Valley. For the index development, we are using multi-spectral aerial images of corn at the 11-12 leaf stage as an indicator of whether it has adequate N from the soil at that stage, or needs additional fertilizer to reach maturity. The data we're using to determine the best N rate includes 14 years of field trials with the same treatments repeated each year. We are correlating each fertilizer rate

with yield and soil data such as organic matter levels. It's a complex project and really exciting, because of the potential good it can do for our farms. There's a need in our region for farmers to be more conscious of pollution as well as control fertilizer expense."

Maresma discussed NMSP's dynamics. "I greatly enjoyed the opportunity to see from the inside how the NMSP group works. I knew of the research and how good it was before I came, so being part of it was really exciting. Within the group we had many different points of view, so we had truly interesting discussions. Each team member has their own project, but you all discuss your projects together and interact with your teammates during the process of your work. Everyone is specialized in a different subject, and they all offered good advice. The thing I valued most was the teamwork experience. I felt like a sponge during my time at Cornell, trying to absorb and assimilate all the knowledge that I could."

"I always have been eager to go to New York," Maresma added. "I knew the link is there between crops and animals and I really wanted to see how they manage that. It delighted me to see the connection between the NMSP and the farmers; they have the link of the Extension staff to make that happen smoothly. I loved going to Extension meetings and seeing that connection first hand. I traveled around the state and was able to talk with many different people."

Reflecting on his plans, Maresma said, "For my future, I want to continue the improvement of our family farm either by adding animals or using more valuable crops, such as vegetables. I also have an idea to create my own consulting business as a supplement to the farm. My time at Cornell and with the NMSP was a really valuable contribution to achieving my goals!"

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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.