Andy Miller at Osterhoudt Farms and NMSP Collaborate on Zone Management

By Ben Lehman

Precision agriculture practices may have a high return on investment when there is a great deal of variability within and among fields on a farm. Osterhoudt Farms, a crop and custom harvest operation in Genoa, New York, uses variable rate seeding and fertilizer applications to maintain or increase yields while using fewer inputs. Andy Miller, the farm's Certified Crop Advisor and on-farm agronomist, notes that "Just because the field is 100 acres, or just because the field is one acre, doesn't mean you should treat the whole field as one unit for management."

Andy Miller of Osterhoudt Farms keeps electronic records for planting, fertilizer/manure rates, and yield monitor data.

Osterhoudt Farms uses variable rate seeding to decrease seeding costs while maintaining or increasing corn yields.

In contrast to whole-field management, where seeding and nutrient applications are based on a field-average rate, Miller manages 30 by 30-foot sections within fields. Each section, or "grid cell", is assigned a zone for management based on historic yield records. The farm's harvester-mounted yield monitors record yield variability that is not always visible from the harvester cab, allowing for small-scale shifts in management that aim to increase yield per unit of input at every location within a field.

Osterhoudt Farms has been collecting silage yield data since 2013. Yield records allow the farm to determine management zones not just based on average yield over time but also based on consistency of yield from year-to-year.

The concept of managing for yield stability was a driving factor in Miller's decision to work with the Nutrient Management Spear Program (NMSP) at Cornell University's College of Agriculture and Life Sciences. The NMSP works with corn growers with three or more years of yield monitor data to create yield stability zones for management and provides resources for more accurate yield data collection and processing. Although no two farms manage zones in the exact same way, yield stability zones make the variability of environmental risk easier for corn growers to see within and among fields.

Yield data quality is critical for farms like Osterhoudt that focus on small field sections for precision management. Especially for silage harvest, where moisture at harvest can be variable within a field, Miller has found that frequent yield monitor calibration by harvester-operators is essential.

"They're pretty religious about it once the season starts up with corn, getting in multiple times that day running moistures and weights… After the first day, and if the operator's really confident, we're gonna kick it back to looking at major changes like varietal changes or if you pick up from one farm and go a few miles away to a different one," Miller explains.

As summarized by NMSP data analyst Dilip Kharel, "Avoiding errors/noise at the source of data collection is easier and more reliable than fixing things later on. In other words, prevention is often better than a cure, and proper calibration prevents excess noise from being recorded into the dataset."

Another important aspect of data quality is "data cleaning", the process of correcting GPS and sensor errors in yield monitor data. Once experienced, data cleaning can be done in under 2 hours per year of data per farm. The NMSP has worked with corn growers interested in data cleaning to develop a step-by-step protocol for semi-automated data cleaning with Yield Editor software. Miller trained with NMSP staff and now cleans Osterhoudt Farms corn yield data himself.

Miller stated: "…if we didn't use Yield Editor, I could confidently take the (uncleaned) field data and be fine with that for as field average, but once we go under field size and I actually want to have any kind of zone, cleaning is a necessity." Operator practices like raising the harvester header at the end of each pass and maintaining a constant speed during harvest can reduce these errors, but yield data cleaning is still recommended for the most accurate yield estimates.

Quirine Ketterings, who leads the NMSP, added "Our earlier research working with farm yield data showed that without cleaning, yield estimates can be off by several tons of silage per acre and up to 15 bushels of grain per acre. Some datasets are cleaner and more reliable than others but all datasets need to be checked for errors before use of those data for management decision".

Not all farms are willing or able to work through the labor and financial barriers associated with zone management. Osterhoudt Farms has been a successful early adapter of this technology due in part to Miller's unique and creative perspective on precision agriculture. Miller taught Agricultural Education at Stockbridge Valley and Southern Cayuga, eventually leaving for an agronomy sales role with Helena Chemical before shifting to his current role at Osterhoudt Farms. These experiences have fostered his drive to learn and experiment with yield data and zone management. Miller describes attending the National FFA Convention in Ames, Iowa, where he was able to tour the Monsanto facility and see one of the first gene guns working to add *Bt* traits to corn. Although the technology was still in its infancy, it was clear to Miller that Monsanto had done the right thing by investing early and dealing with these kinks to develop the best possible products later on. This sparked Miller's belief that "Somebody has to be willing to try the new technology," even if it takes time and effort to work efficiently at scale.

The NMSP team works with farms to make the most of existing technology and software and continues to offer yield data cleaning training sessions to interested growers. These partnerships help to identify areas for additional research and resource development, while simultaneously collecting data for an updated state-wide soil type specific corn yield database. Growers that share their yield monitor data receive a farm-specific yield report including yield per year of data submitted, yield per field, yield per soil type within a field, and yield distribution per soil type on the farm. The team also develops management zones for farms with at least three years of data.

This collaborative approach fits well with Miller's vision for future agricultural technology developments: "I think (the future of precision ag) is going to be a team approach where you chew off pieces at a time and work towards the goals of what the farm is looking for, whether it is the farm and the agronomist and either local extension or researchers… I think it is going to be locally derived, it's going to be multi-faceted, and it's going to be a management system."

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