WORKSHOP HELPS FARMERS UTILIZE ONE OF THEIR KEY RESOURCES: INFORMATION

by Bruce Erickson

Farmers are some of the most resourceful managers, utilizing a variety of tools to turn land, sunlight, seed, fertilizer, and various other inputs into food, feed, and fiber. But farmers readily admit that they have yet to capture the full value of an important resource that they generate yearly—information. Since Global Positioning Systems (GPS) became available about ten years ago, many farmers have been collecting a variety of information across their fields. The most common of this information, yield monitor data, has the potential to help farmers manage specific portions of their fields, as well as help them understand the implications of some of their broader management decisions. Yet, even some of the most innovative farmers have struggled to make anything more than a visual assessment of what is contained in this information.

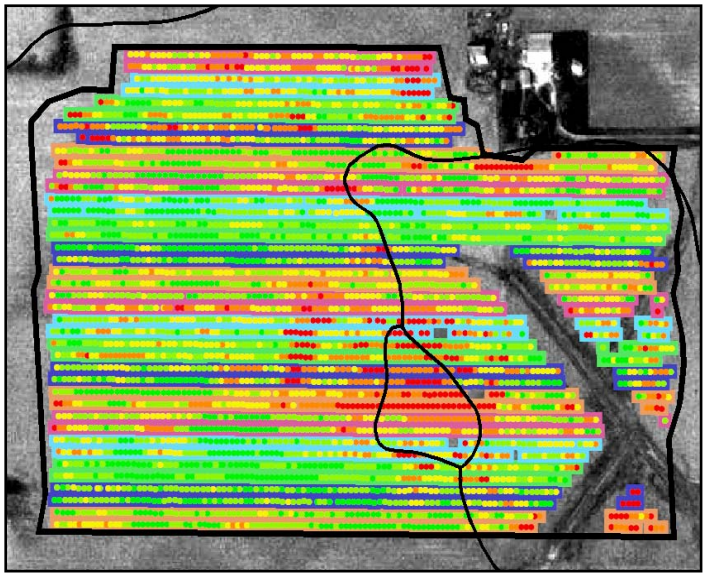
Typical of these farmers is Steve Twynstra, who grows edible beans, seed winter wheat, corn, sweet corn, and IP soybeans on his farms near London, Ontario. Steve is successfully using some of the latest precision tools such as autoguidance and variable rate technology. Yet yield monitor data, much of which is assembled into colorful maps, keeps accumulating, largely unused, in his office. "I have 10 years of detailed information from my fields. It's interesting information and it has helped me to better understand some of my fields and management practices, but I don't feel like I come close to unlocking the full potential," said Twynstra.

A team of specialists with the Site-Specific Management Center at Purdue is assisting farmers in better utilizing some of their yield monitor data as it pertains to on-farm comparisons. Led by Terry Griffin, a workshop held November 14 provided a unique forum for eleven selected farmers from across the Corn Belt to share their challenges with the university research team. In turn, the Purdue specialists related their knowledge of data management and the statistical techniques necessary to correctly analyze and utilize this spatially intense information. A spatial analysis service has been offered to farmers at the summer Top Farmer Crop Workshop for the past two years, but a post-harvest session provides a hands-on opportunity to analyze new information and to potentially make adjustments before the next cropping season.

Workshop participants ponder software designed to fix many of the common errors associated with yield monitor data.

One of the key challenges in working with agricultural information is that crop production is a complex biological system affected by many factors—each of the inputs that a farmer utilizes can have an impact on results, and it

is difficult to sort it all out at the end of the production season. For instance, if a farmer has particularly good results in a certain field, is that because it was planted at the right time, the hybrid was exceptional, the fertilizer program worked well, the soils are exceptional, an interaction of two or more of these, or some other factor?



Crop yield information is overlaid upon treatment strips showing the results of this crop management comparison.

Crop researchers have had good success sorting crop performance factors by exploring variables one at a time—creating a setting as uniform as possible while manipulating a single factor. In traditional small-plot research, spatial variability is negated by keeping plots small and close together, repeating the same treatments (replication) to "average-out" any variability that occurs, and randomizing treatments to minimize bias. But when a grower is collecting information from an entire farm, these classic statistical tools do not work the same.

When field scale yield data is analyzed, spatial variability is impossible to eliminate and needs to be integrated into the analysis. Associated site-specific information from the field is used to quantify this variability, in the form of soil mapping unit information, electrical conductivity readings, differences in land surface elevation and slope aspect, or other landscape factors.

At first, it may appear to some that taking averages of yield monitor data from different treatment blocks would be a valid measure of treatment effects. However, in reality an advanced spatial statistical model is necessary to determine a confidence interval around treatment differences. The simple average of yield data from each treatment does not provide an accurate measure. If the farm management decision maker is to make reliable decisions from on-farm tests, then spatial analysis of the data must be conducted. This can be a difficult concept for both farmers and researchers who may be used to working with more traditional statistical models.

One of the initial problems with the collection of yield monitor data is of the erroneous yield measurements frequently recorded. Crop test weights, moisture, combine speeds, and other factors can affect precision. Calibration and fine-tuning adjustments to the monitoring equipment are necessary at harvest, but there may also be a need to rectify the data gathered, to remove erroneous readings and account for stops and starts, location errors, and the like.

There are numerous examples of businesses that are utilizing information from their enterprises for improved decision-making. Retailers such as grocery stores analyze consumer purchasing patterns to try to better understand their customers. Companies exploring for oil or minerals use spatial analysis tools to improve their ability to find the most promising areas to drill or dig. Use of these same types of tools could be applied to crop production.

At the end of the workshop, neither the farmer participants nor the university researchers had all the answers, however everyone gained in understanding. Breaking new ground rarely comes with any level of certainty. Purdue's spatial analysts will continue to refine their methodology as they work with innovative growers interested in learning more about their farms and building their confidence in management decisions.

For more information:

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Terry Griffin and Dayton Lambert. 2005. Teaching Interpretation of Yield Monitor Data Analysis: Lessons Learned from Purdue's 37th Top Farmer Crop Workshop. Journal of Extension June 2005. Vol 43(3). Available at: http://www.joe.org/joe/2005june/iw5.shtml