

**CCA column for The Farmer  
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**Mapping good decisions**

**Minnesota growers are using precision ag tools to improve management.**

By DeLon Clarksean, CCA

You have a stack of colorful GPS maps sitting on your desk. Now what? How do you translate layers of field data into better farm management decisions?

It can be a daunting challenge. Precision agriculture technologies are among the most demanding farm tools we have. They require time, expertise and a long-term commitment.

But the payoff can be significant. Understanding precisely where and why yield variability exists within your fields can help you boost crop yields, cut the risk of nutrient runoff and save money.

For example, higher fertilizer prices have sparked interest in variable rate phosphorus (P) and potassium (K) applications. Uniform fertilizer application can result in nutrient excesses on lower-yielding soils, or nutrient deficiencies on high-yielding soils. With geo-referenced soil sampling, you can make a detailed map of nutrient needs across the field, and use it to vary fertilizer application.

Variable-rate application can be good for your bottom line. Last year, I worked with growers who cut their fertilizer bills by up to \$70/acre in some parts of fields — without sacrificing yield — by using prescription fertilizer maps.

This practice is good for the environment, too, says Jodi DeJong-Hughes, a University of Minnesota crops and soils specialist, because it helps avoid over-application of nutrients. “It’s really ideal for soils that receive manure applications.”

Minnesota growers are also using GPS mapping to successfully manage iron deficiency chlorosis (IDC), DeJong-Hughes says. “They are changing varieties on the go,” planting IDC-tolerant soybeans in chlorosis-prone zones, she says.

Other Minnesota farmers are using yield maps to vary plant populations, too, DeJong-Hughes says. They boost their seed investment returns by dropping plant populations in less productive parts of the field and pushing up populations in more productive zones.

Yield maps are also very helpful in deciding where it would pay to install tile. The maps let you clearly see areas that should be yielding better than they are and would benefit from drainage.

DeJong-Hughes adds: “A lot of farmers are very visual people.” She says a visual picture of the location and magnitude of yield variations prompts farmers to think about how to fix yield-robbing problems.

Here are some basic tips for using precision ag tools for site-specific management:

- **Collect several layers of data.** You’ll need:
- Soil surveys
- Grain yield monitor data

- GPS-referenced soil nutrient levels
- Weather data
- Scouting records.

It's also helpful to have:

- GPS-referenced planting and application records
- Weed maps
- Drainage maps
- Remote sensing images
- GPS-referenced in-season observations.

•**Invest in soil sampling.** Mapping nutrient variability within the field is one of the first steps in site-specific management. Soil electrical conductivity maps are a good way to establish productivity zones within fields. Growers are using geo-referenced grid points to collect soil samples from the same spot every time.

•**Ensure accurate data collection.** Carefully follow the manufacturer's recommendations for calibrating your grain yield monitor. Calibration must be performed for each crop at the beginning of the harvest season. I also recommend re-calibration later in the season, as average moisture content drops.

•**Collect several years of data.** Before you can make site-specific decisions with confidence, you will need several years of data. Yield maps from just one or two years don't provide enough information to tell if changes "are the result of management practices, or natural variation" caused by weather, insects and other environmental factors, DeJong-Hughes says. I like to see data from two complete crop rotations before making management recommendations.

•**Work with an expert.** Few farms have all the equipment, geographic information systems software, and technical expertise needed for site-specific management. For that reason, it's common for farmers to work with a precision agriculture consultant, who can help make sense of all the information.

*DeLon Clarksean is a precision agriculture specialist for Farmers Coop Association in Canby, MN. Contact him at [dclarksean@fca-net.com](mailto:dclarksean@fca-net.com). Find information and links to Minnesota certified crop advisers on the Minnesota Crop Production Retailers website, <http://www.mcpr-cca.org> – click on the MN CCA website link.*

### **Key points**

- Understanding where and why yield variations exist can help you make better decisions.
- Mapping nutrient variability is one of the first steps in precision farming.
- You need several years of data before you can make site-specific management decisions with confidence.