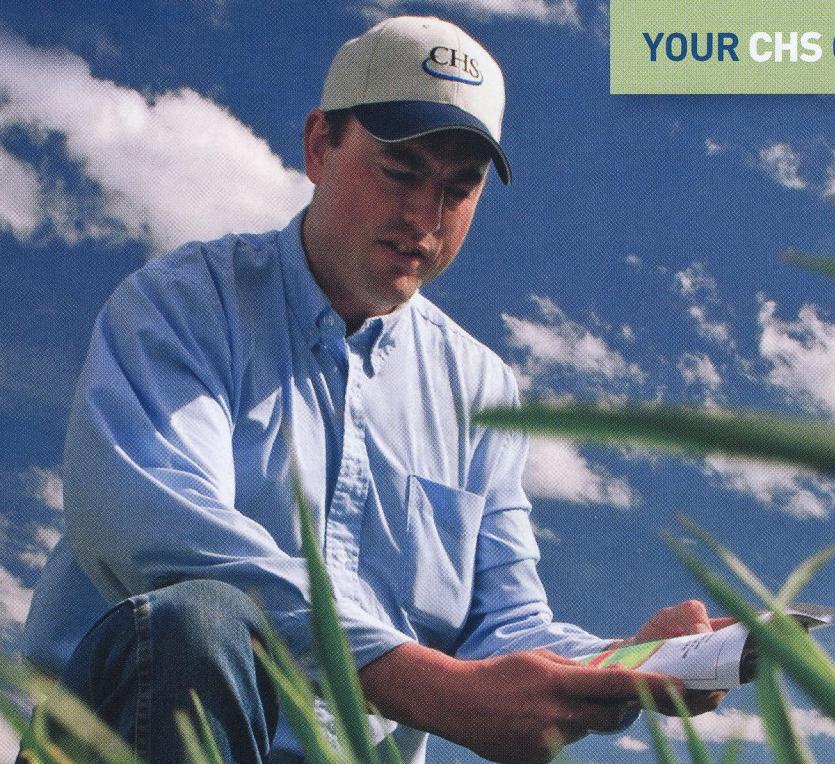


Prime Time for Precision

Rooted in Technology

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Paul Trcka, right, precision ag manager at Grand Meadow, Minn., recaps grid sampling results from fields farmed by Garry Vogt, center. Maps guide variable-rate application for equipment operator Ryan Galing, left.

Input Prices Provide Push

"Producers who had been on the fence about investing in precision ag jumped off this year and started using it," says Paul Trcka, precision agricultural manager for CHS at Grand Meadow, Minn. "More than before, producers became focused on efficient use of inputs and getting the most from their investment."

The idea of being more precise about how and when crop nutrients are applied started to sink in for more producers in 2008, he says. "We did a lot more grid soil sampling last fall, and variable-rate nutrient application increased significantly over the past few years, all while overall crop nutrient demand decreased."

To meet the demand for more precision ag services, the southeastern Minnesota ag retailer had to beef up its staff and invest in more equipment. "We're also looking at where our services may need to expand in the future," he says. "Satellite imagery may be the next logical tool to add to monitor crops throughout the growing season. We've talked to two providers already, but are still evaluating the benefits for our customers."

When the retailer first invested in precision ag equipment over a decade ago, many producers saw the technology as unproven, Trcka notes.

"But within the last four years, we've noticed a shift in grower attitudes about precision ag. Most growers now are more comfortable with the concepts and willing to use the services we offer. Where they used to see the ideas as risky, now they recognize the risk lies in not incorporating precision ag approaches into their operations."

"Satellite imagery may be the next logical tool to add to monitor crops throughout the growing season."

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Probing Yield Potential From Space

Precision agriculture is not just about saving money on inputs, it's also about helping make more money by maximizing yields. "In some places in a field, we may recommend reducing crop nutrient rates, while in others, we increase rates. It all depends on yield potential in the various management zones," explains Bryce Klitzke, precision ag specialist for M&M Cooperative, Yuma, Colo.

Using satellite imagery to estimate a field's organic matter, soil texture and crop density, he and cooperative agronomists produce a map of projected yield for each field. "We can customize application down to 0.2-acre increments, but by grouping like values, we generally break a field into three or five groups of similar productivity levels or management zones."

Satellite images provide more detailed information than grid soil sampling. "Once we've identified management zones, we take three soil samples within each zone, which does a better

job of eliminating sampling variability throughout the field," Klitzke says. "From there, we develop customized crop nutrient prescriptions for the field."

The initial cost of mapping and soil sampling is \$5.50 per acre for satellite imagery and \$60 per soil sample. "But with the high cost of nutrients and the added bushels that can be produced, many growers see payback fairly quickly."

Between 10 and 15 percent of M&M customers now use this technology, primarily on corn acres and on some sugar beet acres. The entire mapping and zone development process takes about a week. "It is a fairly hands-off process for producers who don't want to collect data themselves," says Klitzke. "We offer the application service or provide them with the field prescription to make the application."

"We haven't had a customer who wasn't able to increase the productivity levels of his fields using this information."

Combining satellite images and applying expert analysis shows where specific nutrients should be applied and at what levels to achieve yield goals for sugar beets and other crops.

Top Precision Ag Trends

According to the 2008 Precision Ag Survey conducted by *CropLife* magazine and Purdue University, these factors are the most influential drivers in the move to precision agriculture.

1. Better data management

Systems to collect and manage field and crop data are easier to use.

2. Autosteering

One in three precision ag subscribers uses an autosteer system.

3. Variable-rate application

Higher input costs have been a major impetus behind precision ag, both for crop nutrients and crop protection products.

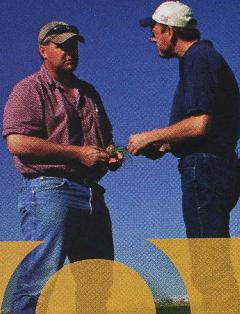
4. Site-specific nutrient management

Over- or under-applying nutrients has become too costly for most growers.

5. Grid soil sampling

Demand has increased significantly in the past two years.





Monitoring Support

"One of the biggest challenges with precision ag is choosing equipment and making it all work together," says Odin Shipstead, precision ag consultant with Precision Crop Management, a division of CHS Cut Bank, Mont.

It's not easy for cooperative staff to keep up on the latest developments in GPS receivers, satellite services, guidance systems and application technology either, so Shipstead and colleague Doug Wiest have made industry expertise part of their business. They consult with producers at their cooperative and work with agronomists and precision ag specialists around the state to help them find the technology they need and to share the latest information.

Having access to expertise and support is essential to implementing any precision ag technology, says Fairfield, Mont., producer Marty Klinker, who works with the Cut Bank cooperative. "Years ago, my first attempt at using the technology failed, not because of the monitor, but because the company that sold it to me didn't provide support to help me make it work."

"That's why I deal with Odin and the folks at CHS," he adds. "They work with me at every step and have made the learning curve easy. I tell them what I want to do and they help me figure out how to do it."

Fairfield, Mont., grain grower Marty Klinker, left, says access to the expertise and support he gets from Odin Shipstead, right, is essential to successfully implementing precision ag technology.

Tracking Crop Progress

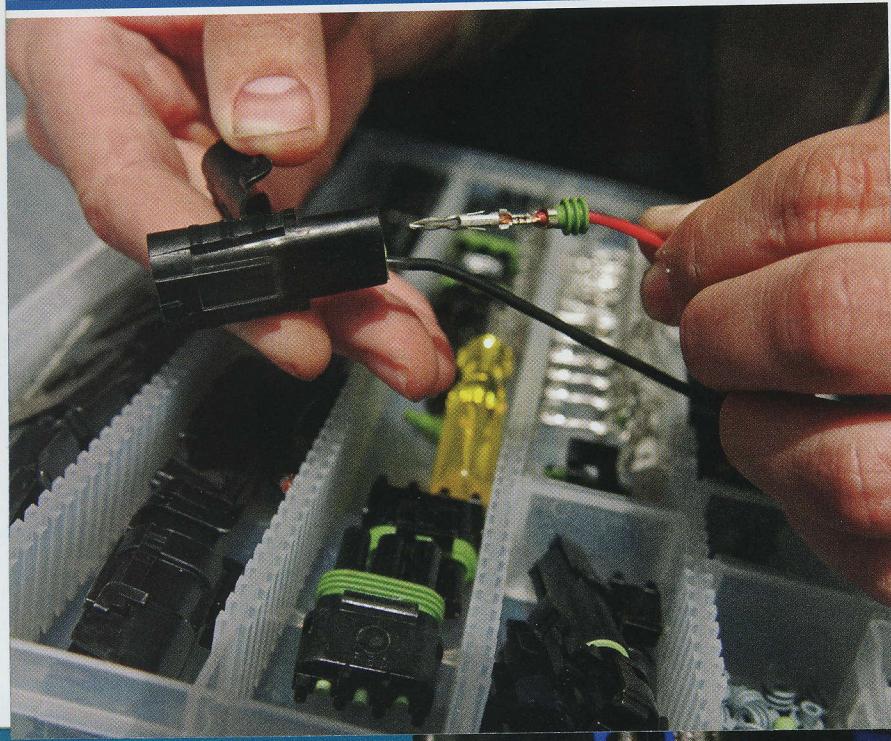
Once a grower has a handle on tracking yield potential and making site-specific crop nutrient applications prior to planting, the next step is to monitor the crop for stressors throughout the growing season and provide additional nutrition or pest control when needed. That's what precision ag consultant Odin Shipstead and colleagues hope to do with customers of CHS Cooperative, Cut Bank, Mont.

For the rolling topography of northeastern Montana, satellite imagery is a better fit than ground-based crop monitoring systems, he says. The cooperative's precision ag division, Precision Crop Management, works with German-based RapidEye AG to make twice-monthly images accessible online, which allows agronomists and growers to track the crop's percent ground cover and relative nitrogen level in plants by comparing the aerial appearance of the main field to side plots that have received test levels of nitrogen applications.

"We use those plots as a reference to determine when the main field is exhibiting signs of stress, which can limit yield," Shipstead explains. "Then we do follow-up tissue testing in those zones."

"With that data, we can make nutrient adjustments based on crop needs," he says. "In wheat, for example, nitrogen availability needs to be sufficient to boost protein content. With a 25-cent-per-bushel premium for each quarter-percent of protein increase, there is real value in making sure the crop has enough nitrogen."

The technology is getting close to being able to use different light spectrums to help us see weed and other pest problems before they seriously impact yield potential."



Precision Crop Management keeps a supply of compatible parts on hand to service high-tech equipment.

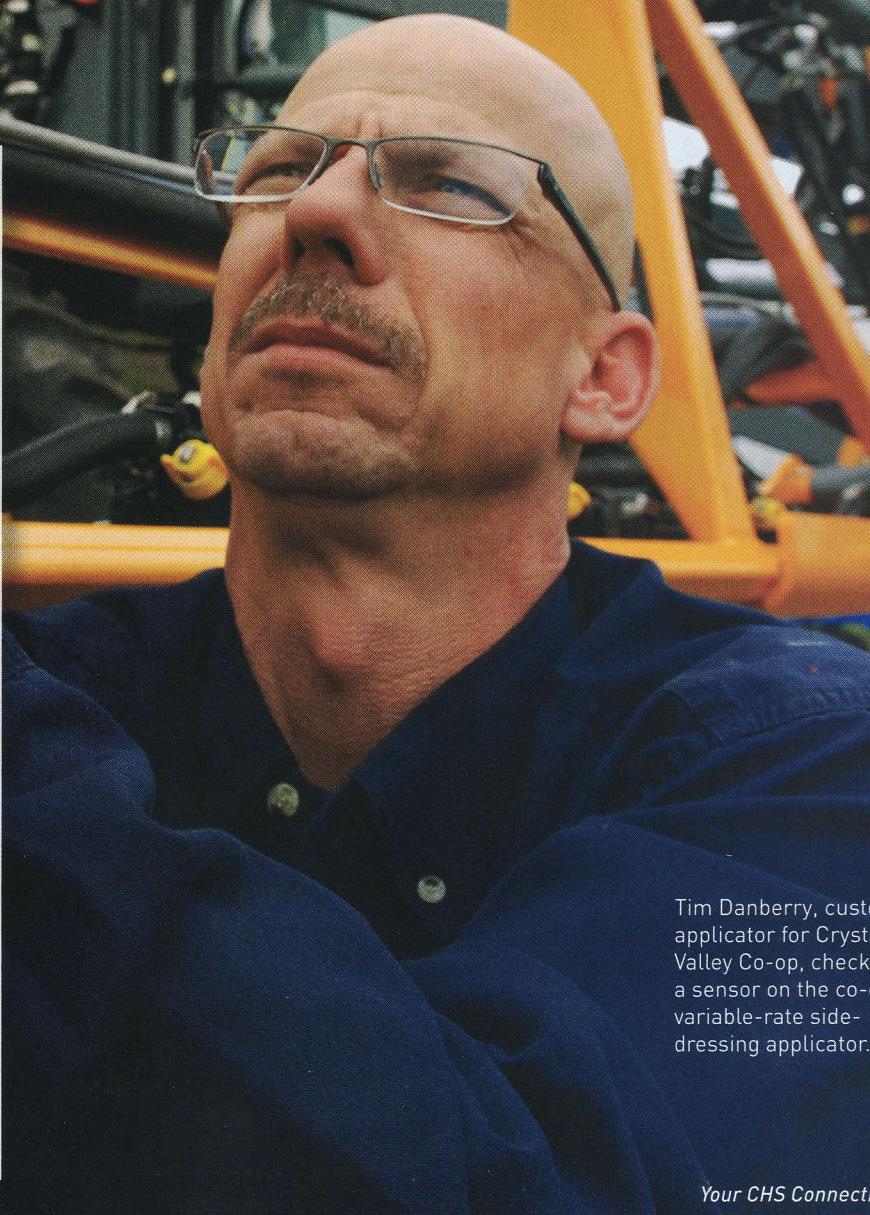
Sensors for Side-dressing

One year of field testing has convinced growers and agronomists with Crystal Valley Co-op, Janesville, Minn., that a sensor-based, variable-rate applicator can pay its way. Last season the southern Minnesota cooperative put a GreenSeeker RT200 through its paces side-dressing nitrogen on 900 acres. The system uses real-time optical sensors to measure the crop's nitrogen status, then instantly prescribes the right application rate.

The results, says agronomy manager Dale Botten, surprised everyone. "There was a significant yield increase over the previous year, which was consistent across all the test fields."

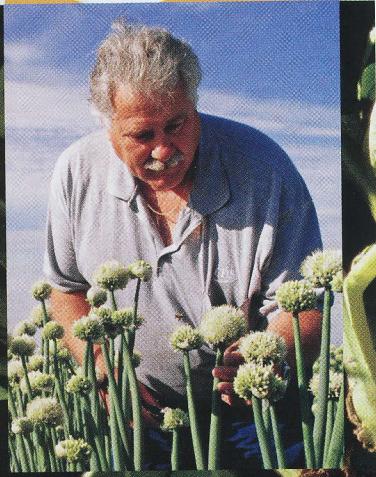
According to custom applicator Tim Danberry, who coordinated the field tests, yield response varied between 6 and 21 bushels per acre. That kind of increase more than pays for the \$3-per-acre GreenSeeker premium the cooperative adds to its \$9.50-per-acre side-dressing fee.

"We had no problem signing up 20,000 acres for our new equipment over the winter," says Botten. "This spring, interest was so strong that we purchased a second unit."



Tim Danberry, custom applicator for Crystal Valley Co-op, checks a sensor on the co-variable-rate side-dressing applicator.

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New Niche: Precision Fumigation

For potato growers, it's less about quantity and more about the quality of the crop they raise. To keep spuds blemish-free, soil fumigants are an important tool for controlling certain nematodes, such as northern root rot species. "If you see just one nematode, you need to treat for them, which is why 100 percent of growers fumigate in the fall," explains Harvey Cameron, precision ag specialist, CHS at Quincy, Wash. (pictured at left, inspecting seed onions for pests).

Application rate can vary from 12.5 to 20 gallons per acre, he explains, based on nematode levels in the soil. "With fumigant running \$10.50 per gallon, a grower can save big money if he's able to use lower rates in some parts of the field."

That's where the cooperative's variable-rate fumigation capabilities come in. "This is the third year we've been offering the service and we think it is an area of precision agriculture with real growth potential," says Cameron.

On fields where growers plan to plant potatoes, the cooperative team tests soil the previous fall to determine nematode levels in one-acre grids in each field, then custom-injects fumigant within the approved application range, he says.

Last year, supplies of the preferred fumigant were limited, due to hurricane damage at the Texas manufacturing plant. "That situation made variable-rate application even more valuable," he adds. "It helped our growers make the best use of available product." **C**



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