

Canadian researchers test out the effectiveness of GreenSeeker in small grains

By John Dietz

GreenSeeker technology just became a whole lot more interesting for farmers on the northern Great Plains. Until now, efforts to improve fertilizer management with a variable-rate fertility program using GPS have enjoyed more hope than success. But field research in Canada indicates the GreenSeeker system may offer that success.

Fields trials have been conducted since 2004 in canola, durum, spring and winter wheat by Agriculture and Agri-Food Canada (the equivalent of the USDA's Agriculture Research Service). That research employed the GreenSeeker Model RT200 manufactured by NTech Industries.

The GreenSeeker technology uses diodes mounted on application equipment such as sprayers. These diodes emit red and near-infrared (NIR) light. This light is then reflected from the crop and measured by a sensor on the applicator.

Healthy plants absorb more red light and reflect larger amounts of NIR than those plants that are unhealthy. On that principle, electronics and software can determine the approximate health and yield potential of the crop. The lower the reflectance of red or near-infrared, the healthier the crop and the more yield potential. This measure is called the normalized difference vegetative index (NDVI) of the crop.

How effective the technology is on small grains and canola is still

GreenSeeker up north



Photographs: John Dietz

Two years of field tests in small grains and canola in Canada are confirming that the GreenSeeker system can accurately track crop nitrogen needs.

being investigated. "It's a bit early right now, but once we have two seasons of testing, we'll have a lot more information. So, yes, farmers can be preparing for it for 2007," says Guy Lafond, research scientist with Agriculture and Agri-Food Canada at Indian Head, Saskatchewan.

PREVENTS OVERFERTILIZING

At a minimum, growers using GreenSeeker technology will be able to achieve maximum yields without overfertilizing. "In all the fields that we've analyzed so far, we have shown we could economically reduce the amount of nitrogen applied without affecting grain yield," Lafond says. "It's easy technology to use and to adopt. Once we get the algorithms developed, our growers will just have a spreadsheet and plug in the sensor values. You put that in your machine, and away you go."

Guided by a soil test, a grower

would apply 50% or 60% of the rate recommended for maximum yield either at or before seeding. Each field requires a test strip where nitrogen for the crop is not limited.

At the five-leaf stage in small grains, or the start of midbolting stage in canola, the grower arrives with the GreenSeeker RT200 on a high-clearance sprayer prepared to top-dress at a variable rate. The grower first drives over the nonnitrogen-limiting test strip with the GreenSeeker to find upper end values for possible yield potential. Next, they run across the field to see how the crop is doing with its initial low-rate application.

"If there's very little difference between these two areas, chances are good that you won't need any more nitrogen on the crop," Lafond explains.

Applying half the recommended rate of nitrogen at seeding time is adequate at first, and it may be enough nutrients for an entire season in dry



The GreenSeeker RT200 system used in the Canadian field test employed six optional sensors (white boxes) and a control processor that was mounted on a high-crop sprayer.



Diodes in the white boxes emit infrared and near-infrared light, which is reflected off the crop back to the sensors. The reflection is used to determine crop nitrogen needs.

partners Darrel and Darcy Carlisle were the first Canadian farmers to own a GreenSeeker RT200 system in early 2005. The brothers farm 4,300 acres near Souris, Manitoba, and soil test every field every year. The Carlises also employ tissue testing and foliar feeding.

Last year's fertilizer program for wheat called for approximately 100 pounds of N per acre across the operation. The Carlises banded 60 pounds at planting and were planning to sidedress the remaining 40 pounds when wheat reached the five-leaf stage.

"The calibrations coming back were telling us the field had more than enough N already, so we didn't need to apply the 40 pounds," Darrel recalls. "It ended up that we didn't apply the remaining nitrogen on 3,000 acres of wheat."

ONE-YEAR PAYBACK

The brothers cautiously confirmed the GreenSeeker's results with the developers of the system at Oklahoma State University. In addition, they took tissue tests, confirming the crop had more than enough nitrogen.

And for added measure, they applied the extra 40 pounds of nitrogen to test strips in some fields to see what would happen.

"The good wheat averaged 65 bushels per acre," Darrel says. "The strips that received the extra 40 pounds averaged only 55 bushels. Plus, those strips had higher disease levels."

As a result, Darrel figures that applying the extra 40 pounds of nitrogen would have cost the farm an extra \$14 for fertilizer and \$4 in application costs per acre.

At 40¢ a pound for nitrogen, the brothers saved approximately \$48,000 on fertilizer and \$12,000 for the application. Plus, they gained 10 bushels in yield. Cost of the RT200 system was under \$25,000. ■

►► conditions. That half rate may be adequate in normal conditions, as well, if the field has more available nutrition than expected due to greater-than-expected nitrogen mineralization.

If the crop does need more nitrogen, GreenSeeker senses that need and applies fertilizer as required. Rate controllers that interface with GreenSeeker now have been introduced by Raven, MidTech, and TeeJet. Pattison has introduced variable-rate nozzles that can surface-band UAN solution fertilizer at a rate of up to 20 gallons per acre.

The 2005 Canadian research trials produced average variable-rate treatments costing about \$5 to \$10 per acre less than a full-rate treatment. "We were able to maintain grain yields with less nitrogen. Therefore, the efficiency of the fertilizer was increased with the variable-rate applications," Lafond says. "GreenSeeker has tremendous potential for commercial application. Our results to date show that in most cases, even if you don't increase your yields, the fertilizer savings will pay for the application."

Southwestern Manitoba farming



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