Tailoring topdress nitrogen

Wheat growers are using reference strips to fine-tune fertilizer needs

By Larry Reichenberger

High nitrogen prices have wheat growers looking for ideas to help fine-tune this spring's topdress applications. In Oklahoma, hundreds of farmers are counting on a simple system of nitrogen-rate test strips placed in each of their fields for these topdressing tips.

"Between farmers, agronomists, county agents, and university technicians, nitrogen test strips were placed in roughly 1,500 fields in the state last fall," says Randy Taylor, Extension ag engineer at Oklahoma State University. "Observations and measurements made from these areas this winter and spring will allow growers to determine the appropriate nitrogen rate according to their crop's potential."

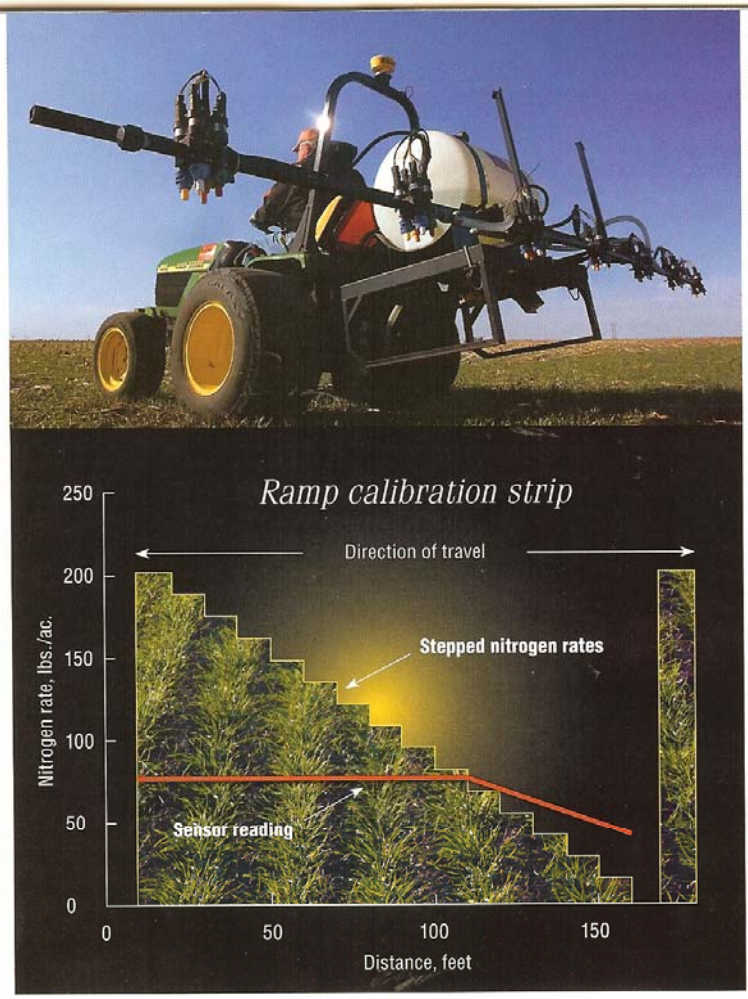
Taylor explains that test strips are put out at either a single "N-Rich" rate or at multiple rates in a "Ramp" stairstep fashion. Growers can use a handheld GreenSeeker optical sensor to measure the difference in the greenness of the N-Rich strip—or the greenest of the Ramp strips—and a representative area of the rest of the field. The resulting sensor readings can either be analyzed in a laptop computer in the field or entered into an OSU interactive Web site (*www.nue.okstate.edu*) that considers planting date and environmental conditions to recommend a topdress nitrogen rate.

Ramping up N. "With the multiple-rate Ramp approach, the grower can also simply walk the area to visually compare the response to nitrogen to select an application rate for his field," says Taylor.

Last season, Miami, Okla., farmer Brent Rendel used this in-the-field approach to nitrogen recommendation and credits it with saving him an average of $14 per acre on nearly 1,700 acres of wheat. "We applied 25 pounds of nitrogen per acre at planting. Then, after the crop had emerged, we put in three small nitrogen rate strips that brought the total N to 50, 100, and 150 pounds per acre. We did this in each of our 39 wheat fields," says Rendel.

Late last winter, Rendel worked with Ottawa County, Okla., ag educator Stan Fimple to read the nitrogen strips both visually and with the optical sensor. The results persuaded him to re-evaluate his standard approach of making a topdress application of 75 pounds of nitrogen per acre.

►**Above:** Oklahoma State University researcher David Zavodny, right, and Extension ag educator Chad Otto put out nitrogen plots last fall.



►**Left:** Nitrogen rate strips, called "Ramps," were placed in 1,500 Oklahoma wheat fields last fall. ►**Lower left:** The Ramps compare 16 nitrogen rates. Growers can compare response visually, or use a handheld GreenSeeker sensor to determine the rate where response tops out.

"We ended up applying anywhere from 10 to 90 pounds per acre on the various fields. Overall, we used a total of 61 tons of urea instead of the 136 tons we typically would have applied. At $325 per ton, this was a savings of more than $24,000," says Rendel.

Fimple says he put out similar plots on 35 fields for 17 other producers in the county last fall. "We'll allow growers to check out our GreenSeeker sensor to take the readings," he says.

Similar results. The $14 per acre savings that Rendel saw are similar to results Oklahoma State University agronomist Bill Raun has found. "In 2005, we worked with 10 farmers to fine-tune their topdress applications. We compared their standard rate to rates based on visual observations and sensor readings of nitrogen-rate strips in their fields. The results indicated a savings of $10 per acre," he says.

Raun says using nitrogen-rate strips to set topdress rates is a way to account for variability in environmental conditions and in the amount of free nitrogen that's supplied. "This free nitrogen comes either from the mineralization of soil organic matter or from rainfall. In some years these can add up to 60 pounds of nitrogen so little topdress N will be needed. In other years they contribute almost nothing so more fertilizer N must be applied."

Raun offers 31 years of data from an N rate study at OSU's Lahoma experiment station as proof. "In 60% of the years, the industry's rule of thumb rate of 2 pounds N per bushel [80 pounds per acre for a 40-bushel yield goal] would have been wrong by more than 10%," he says. Almost half the time the error was at least 35%. And in several years the check plot, with no N, produced the top yield.

Last fall, a team of OSU technicians used a pair of GPS-equipped ATV sprayers to put out hundreds of the nitrogen Ramp strips throughout the state. Seven clusters of four nozzles are attached to the sprayers' 14-foot booms. Solenoid valves on each nozzle allow a broad range of rates which enables these sprayers to put out a plot like the one shown at left in a single pass. A controller is programmed to increase the rate in 13-pound increments on 10-foot intervals to produce a plot with 16 different rates. A high rate at each end of the plot makes the area easy to identify in the field.

Another approach. Danny Peeper, agronomy manager at Wheeler Bros. Grain Company, Watonga, Okla., put together a simpler applicator. "We put a skid-mounted sprayer in the bed of a pickup truck. The sprayer has a 27-foot boom that's divided into three sections, each with a separate pump and nozzle system. This lets us put out three eight-foot wide strips at 30, 60, and 90 pounds of N per acre. The strips are usually 500 feet long, depending on the variability in the field. We did this for our producers in more than 700 fields last fall," says Peeper.

Rendel is using an even simpler approach. "Last season we just used a hand spreader and this year we're putting down nitrogen strips with a lawn spreader," he says.

County ag educator Stan Fimple says such practical approaches can work well. "You can make multiple passes with a fertilizer buggy or sprayer, or you can figure how much to apply on a smaller plot and use lawn or garden equipment. For example, 22 pounds of urea applied to a strip 10 feet wide and 300 feet long is the equivalent of 150 pounds of actual nitrogen per acre," he says. ■