IPNI Plant Nutrition TODAY
Better Crops, Better Environment...through Science

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ON-THE-GO MANAGEMENT OF COTTON INPUTS

On-the-go, optical sensing technologies have some advantages over aerial images. Both tools allow growers to identify variability in their fields, but with the sensor-based systems there is no need to acquire an image from an outside provider and the sensors are not weather dependent. There is also no time lag between in-field analysis using the sensors and variable-rate application of PGRs, fertilizers, or harvest aids.

Cotton growers in the MidSouth and Southeast have used GreenSeeker sensors to make variable-rate PGR applications. GreenSeeker sensors measure reflected light at wavelengths that correspond to crop vigor. An on-board computer calculates the PGR requirement based on the sensor measurements and changes the applied rate as the applicator moves through the field. University research has demonstrated savings of 40 and 33% on PGRs and harvest aids, respectively, using GreenSeeker variable-rate application. However, for sensor-based systems like GreenSeeker to be even more economical for cotton farmers, variable-rate N needs to be part of the package.

Variable-rate N applications in cotton have not been developed as rapidly as in other crops like wheat and corn. However, beginning in 2008, Cotton Incorporated named sensor technology as its precision agriculture research focus. In addition to the internal work being conducted in their core program, Cotton Inc. is coordinating university research in 13 states across cotton producing regions of the USA. As part of this program, various methods to determine cotton N requirement using optical sensors are being evaluated.

Nitrogen rates can be determined based on estimated yield potential. This approach has been used successfully in wheat and corn in several states. States evaluating this method for cotton include Louisiana, Oklahoma, South Carolina, and Texas. This method requires in-field, high-N reference areas for calibration. The South Carolina work has shown that different calibration values need to be established for different soil types.

Other work has identified a link between sensor measurements and leaf N. Researchers at Mississippi State University have established strong relationships between leaf N and sensor measurements across a range of cotton growth stages. The ability to use sensors to indirectly determine leaf N can result in accurate N rate recommendations without having to collect and analyze leaf tissue samples.

Another approach being evaluated in Tennessee uses known field history and current sensor measurements. For example, a field with historically high yield potential resulting in high sensor readings would be considered typical and N fertilizer would be applied normally based on expected yield. The same would be true for low sensor readings in a known low-yielding field. Using this approach, changes in fertilizer management will be needed only if the sensor measurements and field history don't match. For example, a typically low-yielding field giving high sensor readings could indicate rank growth and N rates might need to be reduced.

Variable-rate N management in cotton using ground-based sensors still needs to be refined, but the potential for success is evident. Several states have not advanced past small-plot research work, but those that have taken the technology to grower fields are encouraged by the results. To learn more about on-the-go cotton sensing and other topics in precision agriculture, make plans now to attend InfoAg 2009 scheduled for July 14-16 in Springfield, Illinois. Visit the website at: **<www.infoag.org>**

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Abbreviations: PGR = plant growth regulator; N = nitrogen.