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NITROGEN FERTILIZER MANAGEMENT: PRECISION TO DECISION

Production agriculture is firmly entrenched in a digital revolution. Critical information that can help guide on-farm decisions is more easily accessible, more rapidly available, and more inexpensive than ever before. The downside of all this information is that advisors and growers are becoming inundated with data to the point that it sometimes inhibits the decision-making process rather than enhancing it. Kansas State University ag economist, Terry Griffin, likes to say “data are useless.” This statement often draws immediate argument from those providing the data, but is clarified when explained that data—in and of themselves—actually do have little value until they are analyzed and applied in an intelligent manner to improve some practice.

One of the sessions at InfoAg 2016 addressed how an already sound, science-based nitrogen (N) fertilizer management strategy can be enhanced by incorporating precision ag technologies. The session consisted of a three-part case study of a Virginia farm that tracked the N fertilizer decision making process from the scientific principles that underlie 4R Nutrient Stewardship, through the analytical processes and data management at the farm advisory level, to the on-farm decisions, evaluation, and adaptive

management strategies employed by the grower.

The first point made was that the basic questions regarding N fertilizer management have been the same for centuries: *What source do I apply? what rate do I apply? What time in the*

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growing season do I apply it? and What placement method do I use? What has changed is our understanding that these questions must be answered simultaneously as source, rate, time, and place are not independent of one another. This fact results in a complex, site-specific recommendation; however, the framework of 4R Nutrient Stewardship allows us to make N fertilizer decisions that adhere to the science-based fundamentals that drive sound agronomic practices while incorporating all the technology and data-driven solutions that producers have access to.

Jim Wallace, owner and chief consultant for Agritek, then discussed how they use multiple layers of on-farm soil and crop data to develop management zones for variable-rate seeding and N fertilizer applications. The grower was already changing N rates based on soil type, but grid sampling and multiple years of yield data identified variation within the soil



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zones that were able to be delineated. The more intensive data analyses also led to plant population changes within zones that affected yield potentials and subsequently N fertilizer recommendations. The result was a corn yield increase of nearly 30% over the two previous corn crops and even though N fertilizer rates increased, the yield boost was great enough to result in a higher N use efficiency.

Virginia farmer, Paul Davis, then completed the session by discussing how a combination of university research and technology have enhanced his operation. In cooperation with researchers from Virginia Tech, Paul has conducted on farm trials to determine the biomass production and N uptake of various cover crops, which led to his incorporation of a vetch cover in front of his corn crop that he estimates saves him 70 to 80 lb N/A (78 to 90 kg/ha) in a good year. He has also made changes in his N timing and placement strategy based on university research and moved to a more intensive starter and in-season approach. He adopted the GreenSeeker™ technology in 2007, again based on

research conducted on his farm, and has seen his N use efficiency increase by approximately 7%. Paul finished his presentation by saying how the precision services provided by Agritek combined with scientific research helped him make better on-farm decision that resulted in higher profitability. The higher income allowed him to purchase the equipment needed to be even more precise in his seeding, fertilization, and irrigation management.

Precision agriculture and 4R Nutrient Stewardship are critical components for meeting sustainability goals and management objectives on the farm. However, technology and data are not silver bullets. Unless precision agriculture is practiced within the context of a science-based decision framework like 4R Nutrient Stewardship, it can create more confusion and frustration than solutions. Likewise, the complexity of the holistic approach to nutrient management in the 4Rs is greatly simplified and enhanced by incorporating the tools, technologies, information management, and documentation strategies of precision agriculture.



The higher income generated from using precision agriculture guidance allows farmers to purchase the equipment needed to be even more precise in their seeding, fertilization, and irrigation management.