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**K-State, John Deere team on remote sensing study**

Study could help farmers improve grain protein in crops

MANHATTAN, Kan. – Researchers at Kansas State University and one of the world’s largest manufacturers of agricultural machinery are reporting findings of a project that they say could “fundamentally change” the way farmers manage and market crops.

K-State Research and Extension agronomist Ignacio Ciampitti said the university is working with partners at John Deere to analyze information from remote sensors on and off combines that will ultimately help farmers improve grain protein in crops.

“Our customers tell us that maximizing grain yield and quality is very important,” said Yancy Wright, the business agronomy test lead with John Deere, a Fortune 500 company. “End users – including millers, livestock feeding operations and other processors – need high quality grain crops, and market premiums are beginning to reflect this demand.

“We wanted to validate our current technology development, and discover new approaches to consider as we develop solutions for helping customers maximize their yield and quality, especially grain protein.”

In a paper published in late 2021 in the journal, Remote Sensing, the researchers outline their analysis of 84 studies on the accuracy of models that predict grain content in a field crop based on current technology, such as satellite imagery.

Ciampitti said the team was able to compare areas of farm fields before harvest using hand-held sensors, drones or planes; then after harvest using sensors attached to the combine.

With that information, they compared areas of the field rated as low quality or high quality for grain protein concentration, and determined where there was variation in the quality of crops after harvest.
“This is an emerging area of research,” Ciampitti said. “Field crop quality differentiation is becoming important to understand, and can increase the competitiveness of U.S. crops entering both local and international supply chains and markets.”

Ciampitti said the analysis showed that on-combine sensors are more accurate than remote sensors in predicting grain protein concentration, though off-combine sensors performed better for in-season management and segregated harvest planning; and cost less to implement.

“However,” he adds, “on-combine sensors may quickly become the gold standard for predicting in-season grain protein concentration.”

According to the researcher’s recent journal article, a recent survey of 186 soybean farmers from multiple states indicated that more than 55% of them would invest in technology to assess grain protein concentration if they could earn a $.50 premium per bushel. Because of that, the researchers say, “farmer interest is expected to increase as both the direct and indirect benefits of (grain protein concentration) become more evident.”

“As we introduce on-combine grain protein concentration data collection technologies, we will look to this work to understand how we might carry out some of the proposed uses for this new data layer with internal solutions and via partnerships, which will help us bring maximum value to customers who adopt these technologies,” Wright said.

“This work,” he added, “will direct technology development that will fundamentally change the way growers manage their harvest and grain marketing, as well as how they manage their crop inputs.”

Ciampitti said the university is moving forward with developing a remote sensing “decision tool” to differentiate spatial variation in field crop quality before harvest that will help farmers make decisions prior to harvest and marketing their crop.

“In addition, we are working with crop commodity boards to start collecting field data in order to create one of the largest farmer-centric databases on field crop spatial variation related to the quality of U.S. crops,” Ciampitti said. “This is happening in collaboration with many other states and in close partnership with farmers across the country.”

K-State’s team included Ciampitti as principal investigator; agricultural engineer Ajay Sharda (co-principal investigator); Leonardo Bastos (now at the University of Georgia); and Andre Froes De Borja Reis (now at Louisiana State University).

The researchers’ full study is available to view online.

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FOR PRINT PUBLICATIONS: Links used in this article

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