Looking for wireless? Try a local farm

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A wireless subsystem on a module builder enables harvesters to automatically keep track of where cotton was grown in the field. This would enable a farmer to consider management decisions to optimize profits Credit: Texas AgriLife Research

Wireless. For most, the word conjures images quaint coffee shops or busy airport lobbies – places where people drop in to check on business or check in with other people.

But increasingly "wireless" is showing up on the farm to help produce better crops, net more money for growers and land a superior product in stores for consumers, according to experts.

Wireless agriculture is yielding benefits in rice and cotton studies by Texas AgriLife Research scientists, for example.

"We're working on a system that uses wireless sensing in rice production," said Dr. Lee Tarpley, AgriLife Research plant physiologist in Beaumont. "We'd like to be able to continuously monitor field conditions such as temperature and soil moisture, and using sensors allows us to do that. We can put them in the field and collect the data from them inside on our computer.

"We can't do that using the more typical wired sensing network because the cost of running the cables out to the field would be too expensive," he added.

Because wireless sensing networks are becoming commercially available, Tarpley said, his studies that monitor conditions such as soil moisture will eventually help farmers know how to use such a network to make crop management decisions.

While Tarpley's research focuses on wireless monitoring during the growing season, another system has been developed for use during cotton harvest time, according to Dr. Alex Thomasson, AgriLife Research agricultural engineer.

Thomasson and two graduate students devised a wireless system that can pinpoint the location on the farm where each module of cotton grew. That's important, he said, because a farmer can use the information to figure out why fiber quality differed on various acres.

"Cotton is taken to a gin to be baled. A sample from each bale is sent to a classing office to be measured for fiber quality," Thomasson explained. "The fiber quality results for each bale – along with the module number from which the bale came -- are sent back to the gin and to the farmer for use in marketing the cotton and determining its price.

"We wanted to take that data and map it back to the field the cotton was

grown in," Thomasson said. "That enabled us to look at areas of a given field where cotton of different quality comes from. The ultimate goal was to produce profit maps that show how much money is being made or lost on each portion of a field."

His team's research, published in the journal *Computers and Electronics in Agriculture*, used wireless devices on the harvester, boll buggy and module builder to achieve 100 percent accuracy in tracking cotton to the place in a field where it grew. They call it the Wireless Module Tracking System.

"When a farmer knows the input costs across the field, from things such as fertilizer, then the data from the Wireless Module Tracking System can help determine the profitability of each portion of the field," he said. "It can also be used to determine the reason that a part of the field had poorer fiber quality, which caused them to lose money. Then they may decide to manage that part of the field differently to make more money next year."

The system uses a global positioning system on the harvester to keep track of where the cotton in every module was harvested. As the cotton is transferred from harvester to boll buggy to module building, an identification number is sent wirelessly. That information is eventually compiled with the bale sample data from the classing office which enables a producer to backtrack to where in the field each bale was grown.

"The system can track harvester A and its harvested basket No. 276, for example, all the way to the module and the subsystem on the module building will then send a wireless message with that basket number and the module number back to the harvester's subsystem," Thomasson said. "The overall system also can handle multiple harvesters in a field, even when they dump into a common module builder."

He said the automated system also uses radio frequency identification – similar to the plastic tags on retail items that cause an alarm if not removed before exiting a store. This device automatically identifies which vehicle is dumping cotton so the busy farmer does not have to stop to input data about the harvester.

"Whereas most U.S. cotton used to be sold to domestic textile mills, most of it now is exported to Asian markets where fiber quality presents a bigger issue than ever before and where cotton competes with polyester," Thomasson said. "Polyester fibers are exactly the same because they are factory made. In cotton, there is a lot of variability. So for cotton to compete well with polyester, the fiber has to be good quality. Asian buyers want it all to be uniform."

For consumers, good quality fibers ultimately lead to a better product, he said.

Thomasson said the Wireless Module Tracking System is not yet commercially available but could be adapted by cotton harvest equipment manufacturers either as a built-in option on new models or as an add-on for existing models.

Tarpley and Thomasson agreed that wireless technology could be tapped for these and additional farming activities to help make management decisions that lead to better prices to the grower and better products for consumers.

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