Speeding Up Data Delivery for Precision Agriculture
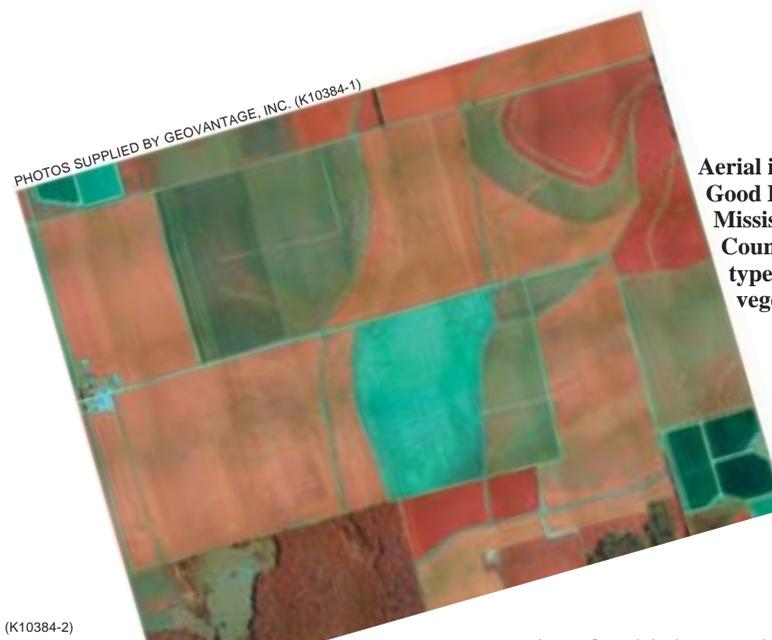
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Aerial image of the Paul Good Farm in Mississippi's Noxubee County showing the type of crop or vegetation in the area.

(K10384-2)

Aerial image of the same farm area pictured above showing the variation in growth stages within the field.

Up in the sky, it's a bird! . . . It's a plane! . . . No, it's the solution to a problem plaguing farmers nationwide who want to adopt precision agriculture techniques!

Using aerial photographs taken from airplanes, those farmers can get detailed overviews of their croplands to see which plants look healthy and which don't. But because of the size of the digital files these photographs are stored in, until recently, the only way farmers have been able to see the results is for the photos to be printed and hand-delivered to them.

Now, what used to take days takes just minutes—another important advancement in precision agriculture technology.

Johnie N. Jenkins is heading a team of Agricultural Research Service scientists at Mississippi State, Mississippi, in developing a high-speed wireless networking system that will allow farmers to download aerial images via the Internet onto their personal computers, laptops, or even better, their PDAs (personal digital assistant, or hand-held PC) in a cost-effective and efficient way. Even though PDA screens are small, farmers could scroll down the screen to see these images.

By using their PDAs, farmers could go out to their fields, download the respective aerial images, and use Global Positioning System (GPS) coordinates to quickly locate problem areas. This would allow them to take care of whatever ails their crops just minutes after the aerial images were taken. The wireless local area network can also be used to download application maps directly to tractors or other machinery, eliminating time-consuming steps and reducing the chance of human error.

For the past 3 years, Jenkins, a geneticist and research leader for the ARS Genetics and Precision Agriculture Research Unit—along with ARS technicians Kimber Gourley and Wendell Ladner—has worked with the Paul Good Farm in Noxubee County, Mississippi, near Macon. In a cooperative agreement, they have been evaluating the utility of this emerging farming tool.

Jenkins' team has tested various Internet connections to see which would make this system work best. Dial-up Internet modem connections are slow, making it impractical to download multimegabyte aerial photography files. Digital subscriber lines, or DSL, are much faster than dial-up modems. But since farmers must live within 18,000 feet of a local central switching system to use DSL, this service is also unusable by most of them.

According to Jenkins, farmers' best option for high-speed downloads of aerial cropland photos would be satellite Internet access through any of several service providers.

"It used to take 2, maybe 3 days before these images were useful to us," says Jenkins of the hand-delivery method. "Now we can have and use these images the same day—usually within minutes of the plane landing."

The technology is not cheap—the receiver box costs about $500, and subscription service is $89.95 per month for small businesses. But the benefits may be worth the costs.

"With these images, we can classify growth patterns, habitats, and insects that cause crop damage," says Jenkins. "It will help decide where to spray and not to spray. There will be tremendous savings on the cost of fertilizers and insecticides—which can harm the environment—and that will help the farmers' bottom line."

James McKinion, an electronics engineer; Sam Turner, a retired computer specialist; Jeff Willers, an entomologist; and John Read, an agronomist, have all taken part in this ongoing study.—By **Alfredo Flores,** ARS.

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