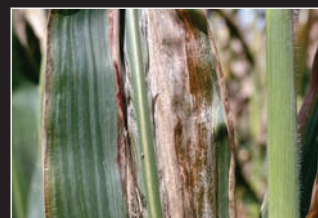


Nebraska

FARMER

The Magazine of Nebraska Agriculture



**Goss's wilt
is not going
away**
Page 28



**Stop stalk
rot before it
drops yields**
Page 42



**Save the herd
by limit feeding
in drylot**
Page 85



READY TO FLY: Aaron Schepers of Cornerstone Mapping in Lincoln has multiple clients for his advanced digital camera systems.

Heat detector

By **DON McCABE**

MONITORING crops from the air isn't new. For irrigation systems, simple visual inspection from an aircraft, aerial color photography or aerial color-infrared images can reveal certain problem spots in a field, including center-pivot and gravity-irrigation malfunctions.

Aaron Schepers of Lincoln says by the time irrigation issues are discovered, it is usually too late in the season for any type of irrigation system fix. Yield has already suffered.

Schepers may hold the next advance in crop monitoring using aerial imaging — a

At a glance

- Aaron Schepers says his thermal camera captures plant heat stress.
- He also uses color photography and color-infrared cameras in his flights.
- Detecting irrigation problems early on is one benefit of aerial imaging.

thermal camera, mounted in the belly of an aircraft, that detects real-time heat stress before plants suffer permanent damage. In other words, the thermal camera measures the temperature of the plants and detects crop stress long before color or

color-infrared aerial photography, he adds.

After gaining his master's degree in geography, specializing in remote sensing and Geographic Information System, or GIS, Schepers started Cornerstone Mapping in 2002 as an aerial mapping, surveying and remote-sensing company. He sees one of the biggest potential agricultural uses for thermal imagery in detecting improper irrigation water distribution.

His undergraduate degree at the University of Nebraska-Lincoln was in agronomy, focusing on integrated crop management. He began flying in 1997, taking aerial photos for his father, Jim Schepers, a retired soil scientist with

USDA's Agricultural Research Service. A friend piloted the aircraft and the younger Schepers snapped the photos hanging out the window of the passenger seat. He got his own pilot's license later that year.

He is now a one-man shop with Cornerstone Mapping, with two aircraft and advanced digital camera systems. His high-tech camera systems are georeferenced to provide high-resolution maps for his clients, including natural resources districts, cities, utilities and even U.S. Department of Defense installations.

■ See Page 20 for more on Cornerstone Mapping's thermal camera system.

Crop Production

Thermal camera: hot, new tool

By DON McCABE

AARON Schepers believes aerial crop monitoring using a thermal camera holds promise in capturing heat and water stress in irrigated corn earlier in the season than color or color infrared images can.

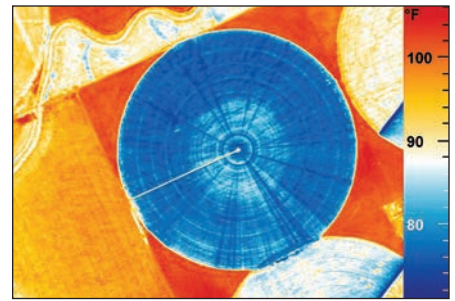
Schepers is a pilot and remote sensing

At a glance

- A Nebraska pilot adds a thermal camera to his aerial arsenal.
- He has two aircraft, and the camera can be mounted in either one.
- His business also includes taking images of UNL research plots.

entrepreneur who owns Cornerstone Mapping in Lincoln (see our cover feature this issue).

“Insufficient soil moisture leads to crop stress and overheating of plants,” he says. “When crops are overheated for long periods, the plant physiology is altered, and grain yield is reduced. Proper irrigation scheduling can mitigate plant heat stress.”



RED ALERT: Aaron Schepers says this is a thermal image of a pivot-irrigated field. Dark blue areas of cooler temperatures represent sufficient water. Warm temperatures are red. The field had two key issues: The inner three tower spans are much warmer than the rest of the field. White areas represent heat stress from lack of water. Also, the dark blue lines radiating from the pivot point are areas of excess water, where the soil and crop are cooler.

While remote sensing using true color or color-infrared aerial photography can detect irregular irrigation patterns late in the season, unrecoverable yield loss has already occurred. “Thermal cameras can detect heat stress before the plant suffers permanent damage,” he says.

Schepers recently purchased a new thermal camera which he integrated into his airborne mapping system. That system “is precisely triggered by a flight navigation system and airborne GPS, which in turn is coupled with an ‘inertial measurement unit’ that logs the camera orientation over the field.”

So far, his primary use has been taking high-quality thermal images of on-farm research fields and plots for seed companies to compare hybrids. He has also taken thermal images of UNL research plots throughout the state.

“For individual farmers, it’s not cost-effective to fly two or three fields,” Schepers says. “But it would be more affordable for farmers who group together for this service. I like to get a dozen fields at a minimum. If we identify a problem in one or two fields, the yield recovered often more than pays for the flight.”

He also envisions working with cooperatives someday in providing their farmer clients with this aerial service.

He began making flights with the thermal camera in 2011, collecting information from “thousands of acres” over several states.

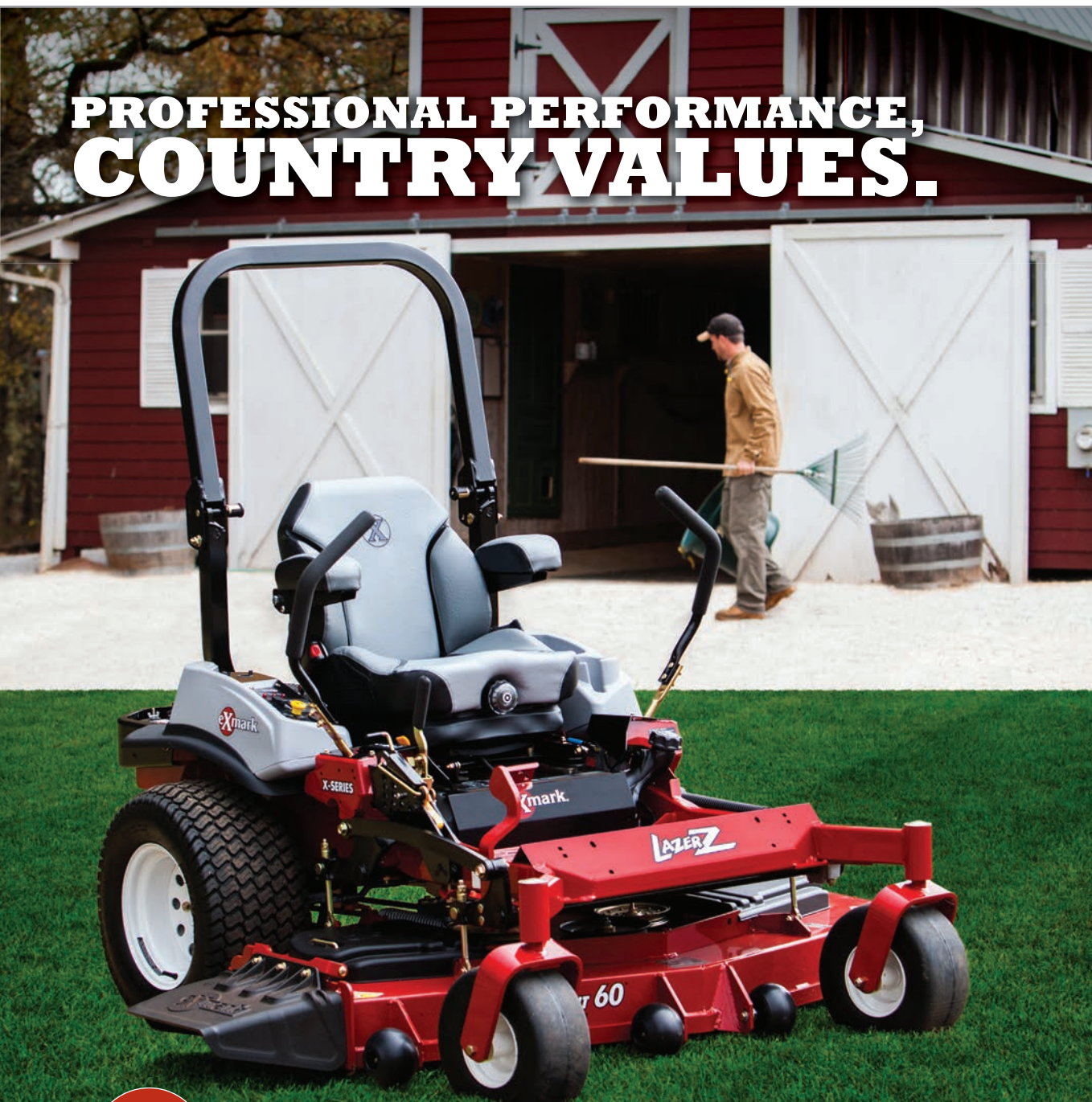
Heat-stress maps revealed problems caused by clogged nozzles, pressure regulators not working correctly, or an entire system with the wrong nozzle package. Maps also showed leaks in some systems.

Schepers flies two aircraft, a Cessna Turbo 206 and a Piper Turbo Saratoga, for his aerial photography. His new thermal camera can be installed in either aircraft.

Two cameras are co-mounted in the aircraft — the thermal camera and a camera with four heads, one each for blue, green, red and near-infrared. Each camera captures images at the same time. When he returns from a flight, he pulls out the hard drive and plugs it into his office data viewer and processes the images. “I am able to deliver color images, color-infrared images and the thermal image,” he says.

For agriculture purposes, Schepers says that thermal images are the best choice for irrigation assessment. Color and color-infrared images are good for nutrient and farm management.

PROFESSIONAL PERFORMANCE, COUNTRY VALUES.



eXmark

Life in the country is a conscious choice. And, with that choice, comes hard work, attention to detail, and investing in the right tools to keep your home or farm at its best. Known for their durability, precision cut and time-saving performance, Exmark mowers are the preferred brand of mowing equipment for the landscape professional. So, why choose anything but the very best zero-turns money can buy? Rely on Exmark—the right choice!

0% RETAIL FINANCING GOING ON NOW



Purchase any Exmark rider* through May 31st, 2013 and receive a \$200 Carhartt gift card. Visit Exmark.com/giftcard for complete details.

*Excludes Quest riders

www.exmark.com

