

PRECISION AGRICULTURE INITIATIVE FOR TEXAS HIGH PLAINS  
2002 ANNUAL COMPREHENSIVE REPORT

Texas Agricultural Extension Station and Texas Cooperative Extension

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<b>Cooperators:</b>	Terry Wheeler, Research Plant Pathologist, Texas A&M Research and Extension Center, Lubbock, Greg Cronholm, Extension Agent- IPM, Hale County and John Farris, County Extension Agent-Ag.
<b>Primary Research Location:</b>	Hale and Dawson Counties.
<b>Project Title:</b>	Taking Aerial Infrared Remote Sensing to the Farmer
<b>Project Objectives:</b>	Provide aerial photographs to farmers to make them aware of the field problems that can be detected from the air.

**Reporting Period:** January 1, 2002-December 31, 2002

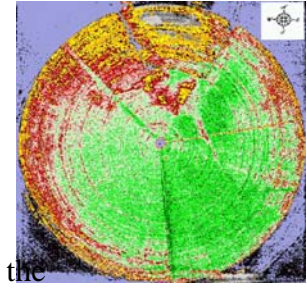
**A. Summary of Progress:** Extension and Research Plant Pathologists at Lubbock teamed up with the Hale County IPM Agent and the County Extension Agent in Dawson County to teach a few of their growers the benefits of aerial infrared field photos. Cooperators in Hale County were Ronnie and R.N. Hopper. Cooperators in Dawson County included Ricky Cude, Mark Boardman, Don Vogler, Glenn Hogg, Brad Boyd, Ronnie Thornton and Mike Huges. Aerial photographs were taken of 16 fields on July 9, 2002 and August 21, 2002. The color infrared photos were provided to the grower along with a computer enhanced unsupervised classification procedure of each photograph. Questions were asked of the growers at the end of the project. Three participants found problems they were not aware of. Three others verified problems they suspected were present. Three of these six are in the process of making changes to correct the problems. All nine participants would like to be in the program again next year. Three would be willing to pay a private company to photograph their fields.

**B. Education/technology transfer:** Nine South Plains farmers were made aware of the benefits of aerial remote sensing. Sixteen fields were photographed on July 9 and again on August 21. Equipment included a 35 mm single lens camera, Kodak Ektachrome Professional Infrared EIR film, and a Cessna 172 airplane with port in the bottom for aerial photography. Most of the fields were quarter section pivots or smaller pivots. The exceptions were the three furrow irrigated fields on the Hopper Farm. The film was processed the day after the flight, mounted as 2x2 slides, scanned with a Hewlett Packard PhotoSmart S20 and exported to ArcView, a digital analysis system. The infrared photo detects differences in the crop foliage that the unaided eye



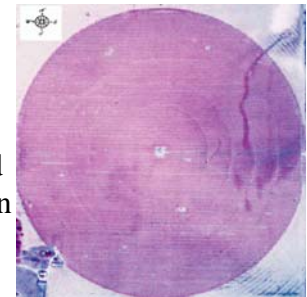
**Figure 1**

can not distinguish. The unsupervised classification program in the image analysis extension of ArcView (ERDAS) more clearly projects differences in the infrared photo. Good heavy foliage is dark red on the infrared photo. Less foliage or lighter green foliage is lighter red, as seen in Figure 1. Some people have difficulty understanding the infrared photo. So we changed the good heavy foliage to dark green and less foliage to lighter shades of green, then to pink, red, dark



**Figure 2**

red and yellow, as in Figure 2. Some fields have a uniform crop canopy with no problems. This was the case on the Cude and Hogg Farms. However, six of the eight farms did have problems illustrated by the photos. The low water volume on the Hughes field could be seen in the light pink areas of the two outside towers in figure 1 and the pink, red, and yellow areas of figure 2. Water problems are difficult to solve with water levels declining in much of the South Plains. The problem on the Thornton Farm could be easily seen with the infrared photo (figure 3). They have a problem with water running from the hill on the southeast side of the pivot, which shows as a light pink area, to dark area to the northeast. Furrow diking on all but the drive rows reduced it somewhat. After seeing this photo, they are more determined to replace the sprinkler heads with bubblers and drag socks.



**Figure 3**

**C. Milestones Achieved or Projects Completed:** The research phase of aerial infrared photography has been completed. A peer-reviewed manuscript on this work has been accepted for publication, and a grower-friendly Extension publication has been made accessible on the web.

**D. Publications:** Wheeler, T. A. and H. W. Kaufman, 2003. Relationships of Aerial Broad Band Reflections to *Meloidogyne incognita* Density in Cotton. Journal of Nematology (In Press).  
Kaufman, H., T. Wheeler, P. Dotray and W. Keeling, Remote Sensing Tools Can Add Precision to Your Farming Operation. Texas A&M University Agriculture Program. Aug. 2002.

**E. Precision agriculture proposals:** Proposals were submitted to the Cotton State Support Committee in Texas which were funded in 2001, 2002 and 2003.

**F. Precision Agriculture meetings attended/papers (posters) presented in 2002:** No PA papers were presented in 2002.