FACT SHEET
"CURRENT APPLICATIONS"
PUBLIC OUTREACH SERIES

Funding for this project has been provided through the **University of Nebraska-Lincoln Interdisciplinary Grants Program and imagery from CALMIT. Note:** *This Fact Sheet series provides educational information on current examples of common remote sensing applications from AV Members; however, no endorsement of or association with* ***AmericaView***^{SM} *by any funding*

Wheat Curl Mite and Wheat Streak Mosaic Virus Spread from Volunteer Wheat

Principal Investigators**,** Gary L. Hein, University of Nebraska, Panhandle Research Station (*ghein@unlnotes.unl.edu*), Albert J. Peters, Center for Advanced Land Management Information Technologies (CALMIT) (*apeters@calmit.unl.edu*)

Background: Wheat streak mosaic (WSM) is the most severe disease of winter wheat in the Great Plains. Estimates indicate WSM causes an average loss to winter wheat of ca. 2% ($6 million, Nebraska; $18 million, Kansas). This mite-vectored virus is a problem in the year following pre-harvest hail damage because resulting volunteer wheat is the primary source of the mite/virus. Understanding mite movement (i.e. virus spread) is critical to predicting the epidemiology of WSM and developing efficient pest management programs. Remote sensing capabilities have the potential to greatly improve our approach to managing this complex problem.

- Remote characterization of pre-harvest hail damage in wheat will enable forecasts for high risk areas within and near hail streaks.
- Remote sensing offers capability to study mite movement and virus spread. This will enable predictions of disease risk for growers.
- Remote detection of virus severity will benefit hail adjustors in delineating and evaluating the spatial severity of WSM across varying agricultural landscapes.
- The understanding and prediction of mite-vectored disease epidemiology could serve as a model to evaluate potential spread and impact of plant-targeted bioterrorism.

Project Goal: The ultimate goal of this work is to establish WSM risk prediction tools based on pre-harvest hail damage and on virus spread via movement of wheat curl mites.

Objectives:

- To use a medium-scale remote sensor, such as MODIS, to monitor hail streaks at the field scale
- To establish WSM sensing capabilities in various field situations (hyperspectral field radiometer with fraction of cover and chlorophyll density).
- To map and model the spatial pattern of virus spread in surrounding wheat with an airborne imager.

Applications:

- Provide the capability to spatially quantify mite movement and predict virus spread and risk
- Provide a useful tool for crop insurance adjustors in determining the spatial spread and impact of WSM

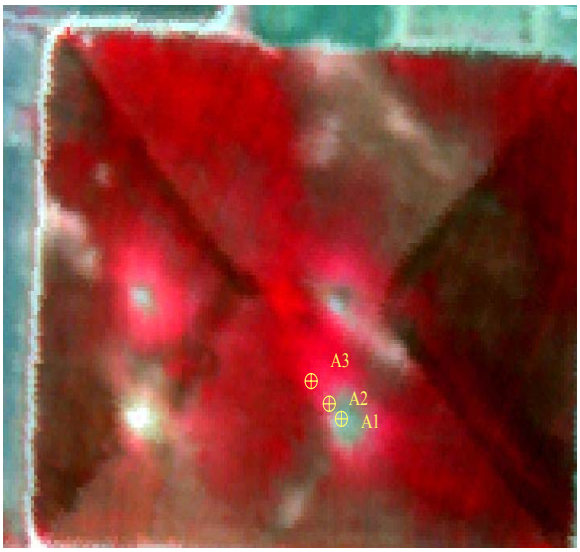

Figure 1. False color composite image at a scale of 1 meter showing Wheat Streak Mosaic infestation in test plots of winter wheat. The light colored holes are centers of the infestation and the red colors grade outward to less densely infected areas. The dark red areas are not yet infected.

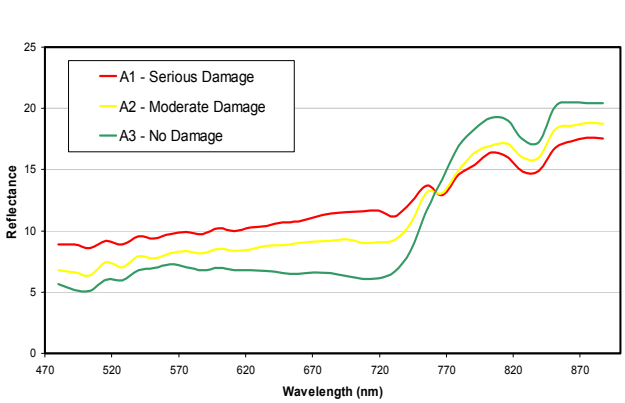

Figure 2. Spectral profiles at three points identified in Figure 1. Location A1 has the most serious damage and exhibits the profile of bare soil at the center of infestation. Location A3 has minimal damage and exhibits the profile of healthy vegetation with strong absorption in the visible and strong reflectance in the near infrared wavebands. Location A2 is between these two extremes.