

**U.S. Wheat and Barley Scab Initiative
 FY02 Final Performance Report (approx. May 02 – April 03)
 July 15, 2003**

Cover Page

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| Year: | FY2002 (approx. May 02– April 03) |
| Grant Number: | 59-0790-1-067 |
| Grant Title: | Fusarium Head Blight Research |
| FY02 ARS Award Amount: | \$ 36,794 |

Project

| Program Area | Project Title | USWBSI Recommended Amount |
|---------------------|--|----------------------------------|
| EDM | Determination of Wetness Duration Using Radar-Derived precipitation Estimates: FY2002. | \$37,714 |
| | Total Amount Recommended | \$37,714 |

Principal Investigator

Date

Project 1: Determination of Wetness Duration Using Radar-Derived precipitation Estimates: FY2002.

1. What major problem or issue is being resolved and how are you resolving it?

Fusarium head blight (FHB) of small grains tends to be associated with particular environmental conditions, especially rain-induced wetness periods occurring near anthesis. Attempts to monitor and predict the risk FHB over large areas have been limited by the measurement of precipitation, which is among the most spatially discontinuous of all environmental variables. In this study, 4 km resolution precipitation estimates from National Weather Service weather radar are employed in a Geographic Information System-based model simulation of wetness duration periods for small grains using a crop canopy energy balance approach. This method of estimating wetness duration over large areas should enhance the ability of researchers to correlate specific weather data with the occurrence of FHB epidemics in specific areas, and ultimately allow producers and processors of small grains to make decisions critical to the management and use of grain during epidemics.

2. What were the most significant accomplishments?

Work continued on two portions of the project began during 2002: Testing and validation of the raw radar precipitation estimates and the development of a GIS-based leaf wetness duration scheme. During 2002 and early 2003, assessment of the accuracy of the precipitation estimates was carried out in Michigan for 2001 and 2002 data. While processing and registration of estimated and observed precipitation data is complete, statistical analysis of the results is still in progress. In an effort to better parameterize the GIS-based wetness duration simulation, a field study was undertaken during the summer of 2002, when greenhouse flats were seeded with a spring wheat cultivar in individual pots. At and following the boot stage, the flats were transferred to a field site equipped with a precision balance and data logger which acted as a lysimeter. Detailed meteorological data were recorded at an automated weather station adjacent to the site. The flats of wheat were watered daily and monitored (for mass) over time, providing estimates of plant evapotranspiration, dewfall, and interception of precipitation. Preliminary results suggest a total nightly dewfall on the headed wheat canopy ranging from 0.0-0.3mm. To study rainfall interception, wheat heads at the flowering stage were cut and collected from extra plants in the flats and mounted on steel wires. The heads and steel 'stems' were in turn mounted on a steel wire frame which held the mounted wheat heads and wire in a fashion similar to that grown in the field. Water on the wire frame after rainfall/irrigation was removed by paper towel and a stream of compressed air. Rainfall interception totals on the order of 0.1mm to 0.3mm were recorded for 11 events. The canopy interception was observed to be associated with the drop diameter of precipitation, with less canopy interception occurring with large droplet diameters and vice versa. Finally, 6 miniature automated weather stations monitoring air and soil temperatures, precipitation, and leaf wetness were placed in commercial wheat fields from early May through early July 2002 just prior to harvest. Data from these stations will be utilized in subsequent validation of the leaf wetness simulation scheme.

Include below a list of the publications, presentations, peer-reviewed articles, and non-peer reviewed articles written about your work that resulted from all of the projects included in the grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

Presentation:

Andresen, J.A., T.M. Aichele, and A.Pollyea, 2002. Determination of wetness duration using radar-derived precipitation estimates. 2002 National Fusarium Head Blight Forum, 7-9 December 2002, Erlanger, KY. US Wheat and Barley Scab Initiative, Michigan State University, East Lansing, MI.

Publication:

Andresen, J.A. T.M. Aichele, and A. Pollyea, 2002. Determination of wetness duration using radar-derived precipitation estimates. Proceedings from 2002 National Fusarium Head Blight Forum, 7-9 December 2002, Erlanger, KY, p. 132. US Wheat and Barley Scab Initiative, Michigan State University, East Lansing, MI.