Partnership Matters

ISU Research and Extension

May 2007

RESEARCH BRIEF—

Soybean rust: A shady character!

What's new. In recent years, Asian soybean rust (ASR) has become a serious concern for many North American soybean producers. And much work has been done to develop and optimize management strategies for the disease. As with any other plant pathogen, making management strategies for soybean rust most efficient and effective requires understanding how environmental factors either promote or limit the disease.

ISU research. Previous studies suggest that germination of spores of the fungus that causes ASR is limited by sunlight. Generally, more rust lesions occur on plants exposed to lower sunlight levels—for example, when it is cloudy—than under bright sunshine.

Natural light inhibits germination of rust spores, but how intense that light must be and for how long it must shine to inhibit infection are unknown. In summer 2006, ISU plant pathologist X. B. Yang and his graduate students Ana Paula Dias and X. Li partnered with Phillip and Carrie Harmon (both with the University of Florida) to conduct field experiments in Florida. In the studies, fresh ASR spores were harvested from rust-infected, greenhouse-grown soybeans and used to inoculate uninfected soybean plants growing in pots. These plants were then placed outside and exposed to four different shade levels ranging from full light to a low of 20 percent transmission (80% shade). The inoculations were made at three different times during the night, 9 p.m., midnight and 2 a.m., and the presence of dew was determined every hour after inoculation until the next morning for all treatments. After 12 days, the soybeans were evaluated for presence of ASR lesions on the leaves. The study was repeated twice during the summer of 2006. The results suggested that:

- The time of night that the leaves were inoculated with the spores did not affect disease infection.
- Relative to shaded treatments, 100 percent transmission of sunlight consistently and significantly reduced the number of plants that were infected with ASR as well as how severe the disease developed.
- Any daytime shading allowed the infection process to be completed and infection to occur. Therefore, sunny days may tend to reduce rust establishment.
- In all these treatments in Florida, the duration of dew was at least 6–7 hours, which the fungus requires for spore germination and penetration of leaves.

—continued

RESEARCH BRIEF—

Weather data to better serve agriculture

What's new. "Everybody talks about the weather, but nobody does anything about it," is a line often attributed to the legendary author Mark Twain. While meant for amusement, Twain has a point as local weather is by far the biggest economically important variable in Iowa corn and soybean production, but there are few things, if any, that can be done to alter the weather. However, agronomy professionals can use weather information to make informed decisions to improve crop management. Many management decisions made by crop producers in Iowa depend on current local environmental conditions and the forecast for short-term weather.

The Iowa Environmental Mesonet (IEM) was established as a clearinghouse for Iowa weather and climate data. "Meso" refers to an intermediate or regional scale of weather and "net" is short for network. Therefore, a mesonet is a network that coordinates data on a regional scale. The IEM coordinates weather and climate information for the Iowa region. There are several groups that gather Iowa weather information for different uses. Collecting these datasets in a usable network both avoids duplication of efforts and allows data to be checked for compatibility. Archived data become more usable in understanding Iowa weather.

Spring thunderstorm. ***(Eric A. Helgeson, National Oceanic and Atmospheric Administration)***

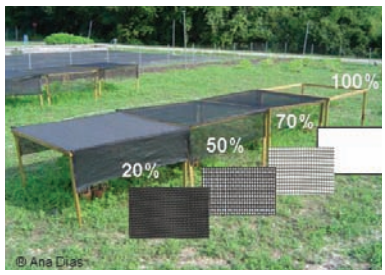
ISU research. ISU coordinates the ongoing development, maintenance and archiving of weather data for public use. The Iowa Environmental Mesonet is housed and maintained within the Department of Agronomy at Iowa State University and is available online at **http://mesonet.agron.iastate.edu**. Cooperating agencies include the following:

- Iowa State University Department of Agronomy
- Iowa Department of Transportation
- National Weather Service
- United States Geologic Survey
- KCCI-TV8 Des Moines, Iowa

—continued

Soybean rust: A shady character, *continued—*

- During part of the second run of the experiment, the weather was notably cloudier, and all the treatments, including those with full light transmission, had more infection than in the other two runs of the experiment, which occurred during sunny weather.



Shade frames used to study effects of light on soybean rust. ***(Ana Paula Dias)***

Light intensity can be reduced by cloudiness, canopy cover and lower angle of the sun as the fall season progresses (like at the very end of the Iowa growing seasons), which is when ASR is more likely to establish. Continuous cloudiness is often observed in soybean-growing regions in Brazil, where severe outbreaks have been consistently observed. In Iowa, summer days tend to be sunny, which should help limit rust development.
This project was funded by Iowa State University.

What's next. A second year of experiments will be conducted to improve the understanding of how sunlight affects ASR.

Learn more. Contact X. B. Yang at **xbyang@iastate.edu**, or go to the Iowa Soybean Rust Team webpage, **www.soybeanrust.info**.

BY THE NUMBERS—

Research-based degree days for crop and pest development (all °F)

Crops (cardinal or threshold temperatures)

Corn minimum for growth	50
Corn maximum for growth	86
Soybean minimum for growth	50

Pests (cardinal or minimum threshold temperatures)

Soybean aphid	47
Bean leaf beetle	46
Seedcorn maggot	39
Stalk borer	41
DD41 accumulations to scout movement into fields (from January 1)	1,300–1,400
Black cutworm	50
DD50 scout threshold (start accumulations when an intense moth flight occurs)	300
Western bean cutworm emergence	50
DD50 for 25 percent emergence of adults (begin accumulations May 1)	1,320

Partnership Matters is published electronically once a month for partners of the Corn and Soybean Initiative, with funding from the College of Agriculture and support from Iowa State University Extension. Brian Meyer, College of Agriculture, is executive editor of *Partnership Matters;* Keven Arrowsmith, Extension Communications and Marketing, is managing editor; and Donna Halloum, Information Technology Services, Iowa State University, is production designer.

To learn more about the Corn and Soybean Initiative contact:
Greg Tylka gltylka@iastate.edu (515) 294-3021
Rich Pope ropope@iastate.edu (515) 294-5899

For questions or comments about the newsletter, contact:
Keven Arrowsmith karrows@iastate.edu (515) 294-2405

Weather data to better serve agriculture, *continued—*

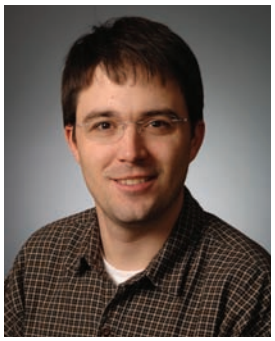
Several valuable climate applications are now available for Iowa producers and agronomists from the IEM. These include daily updated graphic representations of soil temperatures to provide advisories for fall fertilizer nitrogen applications and spring planting readiness, near real-time Iowa environmental conditions associated with soil-loss potential and dynamic maps of wind speed and direction and precipitation. An interactive graphic that allows users to create and display a map of online degree-day accumulations between two dates also is available at **http://mesonet.agron.iastate.edu/GIS/apps/agclimate/gsplot.phtml**.

What's next. IEM staff constantly review the applications and graphics. As new needs arise, the IEM includes new and improved products for use in agricultural decision making in Iowa.

Learn more. The IEM is available online at **http://mesonet.agron.iastate.edu** and is maintained by Daryl Herzmann, an agronomy program assistant. He can be reached at (515) 294-5978 or **akrherz@iastate.edu**. If you have ideas for either new weather-related products, or adjustments to the existing materials that would help you better serve Iowa agriculture, please contact Daryl directly.

ISU PROFILE—

Matt Helmers



Assistant professor and extension agricultural engineer, water resources

Origin
- Sibley, IA (Osceola County)

Training
- Ph.D., Interdepartmental Area of Engineering, Specialization: Agricultural and Biological Systems Engineering University of Nebraska–Lincoln, 2003
- M.S., Civil Engineering, Virginia Polytechnic Institute and State University, 1997
- B.S., Civil Engineering, Iowa State University, 1995

Other experience
- Two years as geotechnical engineering consultant in Los Angeles, Denver and the Black Hills

Notable achievements
- ISU College of Agriculture Early Achievement in Extension Award, 2007
- Newcomer Engineer of the Year, Iowa Section, American Society of Agricultural and Biosystems Engineering, 2006
- USDA National Needs Graduate Fellow, University of Nebraska–Lincoln, 1999–2002

Personal
- Enjoy golfing and chasing 1-year-old twin daughters

Quotable quote
"My interest in agriculture developed while spending time on my grandfather's farm in northwest Iowa. This helped shape my belief that agriculture is important for Iowa but that we need to make sure we protect our natural resources for future generations. My research and extension program is focused on understanding the water resource impacts of agriculture and investigating methods to best protect our water resources."