



# Report on Research

College of Agricultural, Consumer and Environmental Sciences

## U of I Soybean Researchers Move Ahead on Developing Lines with Rust Resistance

Researchers from the University of Illinois at Urbana-Champaign are moving ahead with efforts to develop soybean lines with resistance to soybean rust through a grant from the United Soybean Board.

Collaborators on this grant include Brian Diers from the U of I; Randall Nelson, David Walker, and Glen Hartman from the U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS) and the U of I; Roger Boerma from the University of Georgia; Perry Cregan from the USDA-ARS at Beltsville, Maryland; and Henry Nguyen, David Sleper, and Grover Shannon from the University of Missouri.

The goal of these efforts is to make rust-resistant soybean varieties available to soybean growers in Illinois and throughout the United States. The first step in developing these varieties is the identification of sources of resistance to soybean rust.

As part of their work, researchers have conducted collaborative tests of accessions from the USDA-ARS germplasm collection. Numerous accessions have been tested for rust resistance in greenhouse and field locations.

From this total, 424 accessions that have shown resistance have been identified, and these will be tested further in field and greenhouse tests during 2007.

"The selection of these accessions was based on extensive testing at six field locations in the southern United States, field data from Vietnam and Paraguay, and greenhouse evaluations at Ft. Detrick, Maryland; Griffin, Georgia; and Urbana, Illinois," Diers said. "The accessions range in maturity from 000 to X and come from 20 different countries."

This past winter was the first time that researchers at the U of I were able to screen for resistance to soybean rust on campus. Because soybean rust was detected in the state during the 2006 growing season, Hartman was able to obtain permits for evaluating rust resistance in a greenhouse.

His program has also screened accessions with rust isolates that were collected in Florida. To ensure that rust does not spread from greenhouses at the U of I to fields in the state, the greenhouse tests had to be complete by March 1, and all rust infected plants destroyed.

Some of the accessions have previously shown resistance in multiple locations and assays. Others have limited available data from past evaluations but appear to merit further testing.

Lists of the most resistant lines have been made available to soybean breeders throughout the United States.



"There are several biological, experimental, and environmental factors that may have influenced their apparent resistance to soybean rust," Diers said. "Even so, we decided that providing this information to the soybean-breeding community would help interested researchers to decide which accession that they would want to work with in their own programs."

Diers and his collaborators are mapping rust-resistance genes so that breeders will be able to develop rust-resistant varieties by selecting for the resistance gene using genetic markers, which will be easier than inoculating plants with the rust pathogen.

During the past year, they have already mapped two rust-resistance genes. One was mapped by Cregan, and the other was mapped by Boerma. They expect that additional genes will be mapped soon.

The researchers expect that the associations between markers and these rust-resistance genes will be used widely by soybean breeders. A number of breeding programs are already using the linked markers to incorporate the two mapped genes into varieties.

"Through our collaborative efforts, we continue to move ahead in developing lines with rust resistance," Diers said. "The goal is eventually to provide growers with high-yielding soybean varieties that can minimize the problems presented by the recent arrival of soybean rust."