PURDUE UNIVERSITY
PURDUE EXTENSION
SOYBEAN PRODUCTION SYSTEMS

2006 Indiana Soybean Rust Wrap-Up

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- Soybean rust: A late arrival, but still important

During the past couple of weeks, we found Asian soybean rust on soybean leaf samples submitted from six Indiana counties: Knox, Pike, Posey, Tippecanoe, Vanderburgh, and Warrick. The first finding for Indiana was in Knox County, and represented the northernmost detection of this disease in the U.S. A week later, the find in Tippecanoe County bested that record by more than 100 miles.

Our soybean harvest was well underway when rust showed up. Even though rains have delayed harvest, virtually all of the soybeans in the state are now mature, so there was no opportunity for the disease to damage this year's crop in Indiana. The samples on which we found rust were mainly double-crop plantings, or late maturity groups that were far behind in development.

The story of how rust reached Indiana starts in the Mississippi Delta area. The first reports of rust from this region were in late June and early July, on kudzu in Lafayette and Iberia Parishes. It was not until late July that rust was found on soybean in Louisiana, in a sentinel plot in Rapides Parish. On August 1, rust was found on both soybean and kudzu in Jefferson County, Mississippi. From mid August through September, more and more reports of rust came from Louisiana, from sentinel plots and commercial fields. In most cases, incidence of rust (the percentage of leaves with rust) was low. Scouts found moderately severe rust in two commercial fields in late July, one near maturity and another at the R6 stage of growth.

A weather-based spore dispersal and deposition model indicated that from September 22 through 24, spores from the Delta region were carried up the Mississippi Valley into southeastern Illinois and much of Indiana. On Oct 11, Kentucky reported finding rust in three western counties, including Union County, which is just across the river from Posey County in Indiana. We asked County Educators in that area to send any soybean or kudzu leaves that were still green to the Purdue Plant & Pest Diagnostic Lab. The first sample we received was from the Southeast Purdue Ag Center in Jennings County. Some double-crop beans near a security light were still green. We found no rust on these. The first positive sample was from Knox County. Plant pathologists Dan Egel and Sara Hoke collected leaves from a double-crop field on the Southwest Purdue Ag Center. Close examination revealed one pustule on one leaflet. Because

the first finding in each state must be confirmed by USDA-APHIS-PPQ, we sent this sample to the Systematic Botany and Mycology Laboratory in Beltsville, MD for PCR testing, and the positive test results were reported to us on October 18. The next finding was in a sample of 70 leaflets from Posey County. Again, we found rust on only one of the leaflets, but there were 17 pustules on it. In the samples from Warrick, Vanderburgh, Pike, and Tippecanoe Counties there was also only one leaflet with rust. The rusted leaflet from Pike County had 27 pustules in a close group.

Since late September, when the dispersal model predicted spores were being transported north from the Delta area, rust has been found in 26 counties in Arkansas, 17 in Tennessee, 18 in Kentucky, 4 in Missouri, and 8 in Illinois, in addition to the 6 counties in Indiana. The timing of discoveries of rust in the mid South and Midwest indicates that all of these infections arose from a major dispersal event that originated in Louisiana.

Another scenario for spread of rust from the south would be stepwise progression, in which infections would develop perhaps fewer than 100 miles beyond a spore source. As these infections matured to produce pustules and spores, they would become the source for further short-distance northward spread. If rust spread only in that manner, we would not be concerned with the disease until it was in Tennessee or Kentucky.

The events of this fall suggest that viable spores can move long distances in a short period of time. If rains that scrub spores out the air accompany a long-distance dispersion, rust can appear simultaneously over a large area. If the events of late September 2006 were to occur several weeks earlier in a growing season, we could have a major outbreak of rust when the crop is still vulnerable.

We have also learned how difficult it is to detect rust at very low incidence. To make timely fungicide applications we need to detect rust when it first appears. It required as long as 3 hours to examine each sample of leaflets. The entire lower surface of each leaflet was examined through a dissecting microscope. This microscope provides excellent magnification, but at a cost of being able to look at only a small area of leaf in each view. These leaf samples collected late in the season may have been more difficult to examine compared to collections during the summer because there were many brown spot, frogeye leaf spot, and downy mildew lesions, as well as minor wounds. Most leaves were losing chlorophyll. But even earlier in the season, these foliar diseases are present and can make it difficult to find a single, small rust pustule.

This summer and last, weather was dry in much of the South. This may be why rust spread so slowly there until late in the season, until weather became more favorable. If next year or in any future year, the summer is wetter in the South, rust may develop more rapidly there than it has done so far. The events of September and October of 2006 suggest that if that happens, and rust is present in Mississippi, Louisiana, and east Texas, the eastern Corn Belt states could be at risk for soybean rust.

For more information on soybean rust, visit the Purdue Plant and Pest Diagnostic Lab Web site at http://www.ppdl.purdue.edu/PPDL/soybean_rust.html or call the Purdue soybean rust hotline at (866) 458-RUST (7878).