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Strike two for soybean rust – 2006 in review

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Introduction
Asian soybean rust is caused by the fungus *Phakopsora pachyrhizi*. This disease was first reported in November 2004 and survived the past two winters on kudzu in the south. Soybean rust can seriously reduce soybean yields and/or significantly increase the cost of soybean production when the disease occurs with high incidence and severity.

Summary of 2006
For the past few years, experts at ISU have pointed to three factors that need to happen for soybean rust to get to Iowa: overwinter, movement of rust spores, and favorable environmental conditions. Environmental conditions in Iowa were not favorable for disease development throughout most of June and July, but improved with the frequent rains late in the summer. However, because the pathogen never made it to Iowa, these environmental conditions were of no consequence.

Overwintering
Rust was found earlier in the year and more widespread this past winter compared to the previous winter (Figure 1). The first infection of soybean rust discovered in 2006 was on kudzu in Alabama and Florida in early January. In 2005, the first report of rust was not until February 24, 2005.

Figure 1. Overwintering sites for soybean rust on kudzu in 2005 and 2006.
Movement of rust.

Movement of rust can be split into a few important steps. First the inoculum (rust spores) need to build up at sites with infected plants. Next these spores need to move to new areas for disease to be established. These two steps need to be repeated several times for rust to move towards Iowa.

During 2006, very dry conditions plagued much of Florida, Georgia, and Alabama (the three states where rust survived on kudzu) so numbers of spores never increased to appreciable levels in these overwintering sites (Figure 2). These dry conditions persisted throughout the growing season.

![Figure 2. Drought stress in S.E. United States in a) April and b) August 2006.](image)

Like 2005, by the middle of August there was still no threat of soybean rust in Iowa and most of the soybean crop was close enough to harvest that management of rust was no longer a concern (Figure 3).

![Figure 3. Distribution of soybean rust in August of 2005 and 2006.](image)

After a hot and dry summer in the south with very little pathogen/disease movement, soybean rust made a late push both up the east coast and into the Ohio River valley. Soybean rust season totals to date are 230 counties in 15 states on soybean and 262 counties total (including kudzu). Last year at this time, there were only 120 counties in seven states positive for soybean rust.
Probably the most important aspect of this late season movement is the information that epidemiologist were able to collect. These finding are valuable as far as modeling for soybean rust and predicting movement in subsequent years. Also, the rapid movement of rust is a good reminder that soybean rust can move very quickly during favorable weather conditions.

X. B. Yang has emphasized the importance of soybean rust becoming established in Texas, Louisiana, and Mississippi. If it overwinters in the Mississippi Delta or moves to this region from Florida or Georgia early in the year, rust could become a much bigger threat to Midwestern soybean growers. The movement of rust during October gives us a good example, thankfully with no consequences, of how quickly rust can move into the Midwest if inoculum builds up in the wrong places.

One important thing to remember is that these late findings of the disease will have no bearing on the chances of rust arriving in Iowa next season. The soybean rust pathogen needs green tissue to survive. Wherever there is a hard freeze there will be a completely clean slate in regards to the chances of soybean rust the next year.

Figure 4. Distribution of soybean rust at the end of 2005 and as of Nov. 10, 2006.

**Fungicide update**

While fungicides were not needed for management of soybean rust in Iowa this year, there were some changes in policy and new products added. In 2005, the Iowa Soybean Rust Team formulated the “I-70 Rule.” The recommendation was that Section 18 fungicides not be sprayed unless Asian soybean rust was found north of I-70 in Missouri. This rule was rescinded after clarification from Environmental Protection Agency (EPA) regarding the interpretation of Section 18 label instructions. Under current Section 18 labeling, a grower or applicator is permitted to apply Section 18 soybean rust fungicides in accordance with all label instructions, when the grower or applicator determines it is necessary for managing Asian soybean rust. Growers or applicators still are encouraged to work with their ISU Extension specialists in determining the best approach for managing soybean rust with fungicides.

The list of fungicides available to Iowa growers for management of soybean rust continues to grow. In April, Section 18 labels for Alto® and Quadris® Xtra were granted for Iowa. From recent conversations with the EPA in early November, it appears that many other fungicides “will be issued in plenty time for the 2007 season.” These fungicides include Caramba™ and
Headline-Caramba CoPack, which have already been approved in South Dakota and Minnesota, and Absolute®, Punch®, Charisma® and Topguard®.

Reports from fungicide trials are still being written, but preliminary reports from the Midwest suggest that many fungicides resulted in a yield increase, more so than in 2005. Fungicide trials specifically targeting soybean rust were completed across the south, and results will be presented as data is collected. Again, this is preliminary, but under high rust pressure in Florida, Topguard®, Domark® and Folicur® outperformed most of the other fungicides.

Lessons Learned in 2006

A comment repeated from several pathologists from the Ohio Valley states was that the late season movement of rust gave their teams an opportunity to identify low levels of rust. One of the challenges for management of rust will be timely applications of fungicides and in order to accomplish this, Iowa growers will need to keep a close eye on the national movement of rust at critical times during the season. Scouting for rust in the field could be a very difficult task. The fact that many of the states south of Iowa have experienced identifying low levels of rust should help with early detection in these states and give Iowa growers more confidence when determining the national movement of rust, especially as it nears Iowa.

For the second year in a row, soybean rust spores were found throughout eastern U.S. in a couple of different spore movement studies. There is no knowledge of the viability of spores found from these spore traps. Soybean rust spores are very sensitive to solar radiation and if these spores have traveled long distances from the source, they probably are not viable. As techniques continue to improve, spore traps may be an additional resource to predict movement of rust, but to date, these tools are not reliable.

If you look at the distribution of soybean rust this season and compare it to last season, there is more evidence that soybean rust movement is not reliant on hurricanes. It is possible that some year in the future, conditions will be favorable to produce a hurricane that will disperse rust spores at a time that favors disease development. But, with the movement of rust late this season, it is evident that hurricanes are not needed for widespread movement of spores and disease development. Despite the historic 2005 hurricane season last year, soybean rust was found the twice as many counties in the U.S. this season.