

Asian Soybean Rust in the US: 2006 Experiences and Future Management

by Tom Doerge, Agronomy Research Scientist

Summary

- Asian soybean rust (ASR) (*Phakopsora pachyrhizi*) has now been present in the US for two complete growing seasons.
- Similar to 2005, infected areas were confined to Alabama, Georgia, Florida and the Carolinas early in 2006. Only late in the season were confirmed occurrences of the disease reported further north.
- Experience in 2006 revealed that spray applications at the R1 stage were too early and had no influence on soybean yield if the disease was not also present in nearby sentinel plots at about that same time.
- The rapid northward spread of ASR at the end of 2006 indicates that major soybean-growing regions in the Mid-South and Midwest are at risk if conditions favorable to spore dispersal and infection occur earlier in the season.
- Florida and the Gulf coastal areas remain the primary overwintering sites for ASR in the southern US. In addition, new ASR overwintering sites have been identified in northeastern Mexico in Tamaulipas and San Louis Potosí.
- The US EPA continues to register new, effective fungicides for the control of ASR. Two new products were granted section 18 exemption in 2006 and four additional active ingredients are under consideration for 2007.
- Two years of experience has demonstrated that growers can effectively manage ASR with fungicides. The first fungicide spray should be applied between the early flowering (R1) and seed filling (R5) stages once ASR presence has been confirmed in nearby sentinel plots.

Asian soybean rust (ASR) (*Phakopsora pachyrhizi*) has now been present in the US for two complete growing seasons. In 2005, the infected areas were confined to Alabama, Georgia, Florida and the Carolinas. Disease development followed the same general pattern in 2006 until September, due to mostly dry and sunny conditions throughout the South. Only late in the season were confirmed occurrences of the disease reported in the Mid-South and central Midwest.

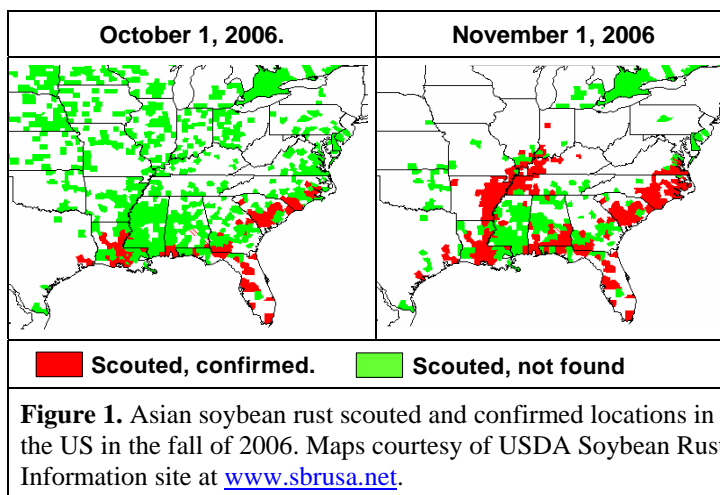
As in previous years, producers, crop scouts, university scientists and input suppliers learned how to more effectively manage this disease. Timely scouting of commercial fields

and early-planted “sentinel plots” combined with appropriate foliar fungicide applications generally kept soybean yield losses to a minimum. This article will discuss 2006 experience with Asian soybean rust in the southern, mid-southern and mid-western regions of the US, and its implications for 2007 management of this disease.

The 2006 Experience with ASR in the US

What was the biggest difference between the spread of ASR in 2006 compared to 2005 ?

For most of 2006, ASR infections were generally confined to the southeastern states plus the Carolinas, similar to 2005. However, at the end of the growing season, the disease showed its explosive potential for northward movement which was reminiscent of historical reports from Brazil. Spore dispersal models suggest that the disease traveled up to 500 miles during a single weather event from Sept. 22-24. This resulted in confirmed ASR infections in AR, TN, MO, KY, IL and IN by November 1 (Figure 1).



How seriously did ASR affect soybean production and the need for fungicide sprays?

ASR infestations tended to occur late in the 2006 soybean growing season. Of the 362 confirmed reports of rust in 15 states, over 95% occurred at the R5 stage (seed-filling) or later (Figure 2). As a result, fewer fields were reported

sprayed with fungicides in 2006. For example, University of Georgia scientist Robert Kemmerait estimates that only 45% of the soybean acres in GA were sprayed in 2006 compared to about 65% in 2005. Because of the late onset of the disease, there was generally little if any yield loss in 2006.

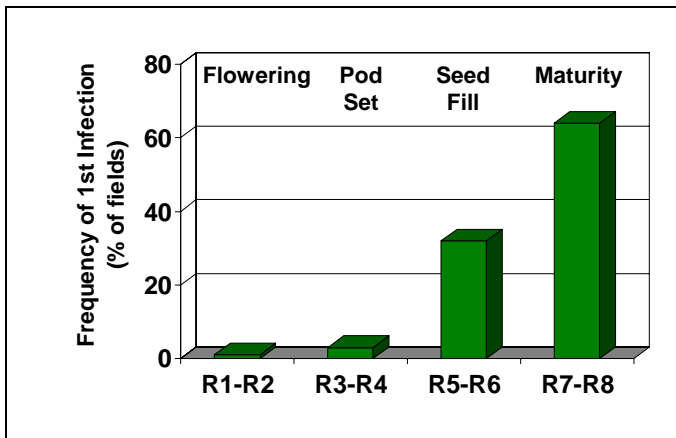


Figure 2. Distribution of the time of first infection by ASR in sentinel soybean plots and commercial fields in 2006. Source: <http://www.plantmanagementnetwork.org/infocenter/topic/soybeanrust/2006/program/>

How much yield protection was provided by a fungicide spray program in the affected areas of the South in 2006?

Seven replicated university field studies measured the yield response of soybean to a variety of fungicide spray programs in Alabama, Georgia and Louisiana. The average yield benefits for the spray programs were 12.3 bu/acre in Alabama (3 trials), 10.2 bu/acre in GA (3) and 9.4 bu/acre in LA (1). At most locations up to three applications of a fungicide were needed to control the disease. Source: Melvin Newman, <http://www.plantmanagementnetwork.org/infocenter/topic/soybeanrust/2006/presentations/Newman.pdf>

What has been learned in 2006 about proper fungicide application timing and technique?

Past experience indicates that the best control of ASR is achieved when a strobilurin (or a fungicide mixture containing a strobilurin) is applied as soon as ASR is detected in nearby sentinel plots with a system that delivers thorough spray coverage in the lower canopy. In 2006, spray applications at the R1 stage were too early and had no influence on soybean yield if the disease was not also present in nearby sentinel plots at approximately that same time. Researchers at Kansas State and Ohio State Universities also concluded that flat fan-type nozzles achieved more uniform coverage lower in the canopy compared to twin nozzles that do not point straight downward. In general, the best coverage was achieved with a minimum pressure of 40 p.s.i., and an

orifice size of 200-300 u. According to the researchers, electrostatic sprayers tended to favor deposition in the upper canopy only.

Did ASR spore trapping results indicate increasing spore density in 2006?

Yes. USDA efforts to monitor rain-borne spore loads in the eastern US revealed a three-fold increase in the number of rain samples testing positive for *P. pachyrhizi* in 2006 (270, 17%) compared to 2005 (84, 5%). In fact, positives were found in every state except North Dakota (Figure 3). Spore detections peaked in May and again in August, similar to 2005.

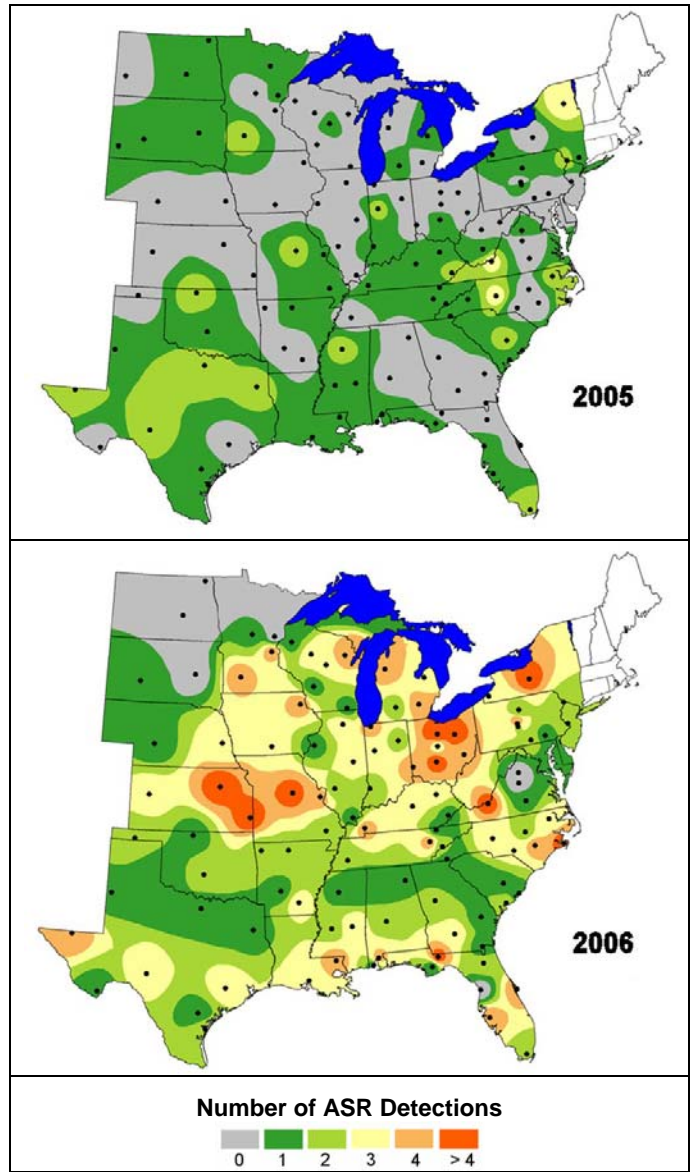


Figure 3. Distribution of cumulative rain trap ASR spore detections in 2005 (top) and 2006 (bottom). Source: C.W. Barnes, USDA-ARS Cereal Disease Laboratory. <http://www.ars.usda.gov/Main/docs.htm?docid=14550>

Expectations for ASR in 2007

Will ASR be even more widespread in 2007?

Most likely, for a number of reasons. First, the dieback of overwintering habitat is expected to be no less extensive than it was last year. In fact, new ASR overwintering sites have now been identified in the northeastern Mexican soybean production areas in Tamaulipas and San Louis Potosí (Figure 4). Second, the spore load in 2006 was greater than in 2005 (Figure 3), indicating an increasing trend. Finally, experience from Brazil suggests that the disease can become more widespread and relatively more aggressive about two to three years after introduction.

Growers throughout the South, Mid-South and Midwest need to be vigilant in tracking the progress of the disease and poised to respond rapidly if fungicide applications are needed.



Figure 4. Newly discovered ASR overwintering sites in northeastern Mexico.

Can I track the location of ASR overwintering areas, primarily areas with actively-growing kudzu?

Yes. The USDA provides regularly updated information on the seasonal freeze line and dieback of kudzu in the southern US (<http://www.sbrusa.net/>). As of Jan. 4, 2007, 100% kudzu dieback had already occurred north of a line beginning in southeastern-most GA and extending westward through Dothan, AL, Panama City, FL, New Orleans, LA and Odessa, TX.

What new fungicides are available to control ASR in 2007?

Section 18 exemptions have been granted by the USEPA for two new active ingredients for the control of soybean rust as

shown in Table 1. Be sure to check with the EPA for a current list of the states where these exemptions have been granted. The USEPA is also considering four new active ingredients to control ASR in soybeans, including Flutriafol, Flusilazole, Famoxadone and Prothioconazole, Source: http://www.epa.gov/oppfead1/cb/csb_page/updates/soybean_rust.htm.

Table 1. New Section 18 exemptions granted by the USEPA for active ingredients for the control of ASR.

Active Ingredient (Brand Names)
Cyproconazole (Alto [®] , Quadris [®] Xtra)
Metconazole (Caramba [™] , Headline [®] Caramba CoPack)

Should producers make major changes in the way they grow soybean based on what was learned about ASR in 2006?

No. In fact, growers should be careful of making any production changes other than sprayer modifications to insure better foliar coverage. Producers should also be sure to make use of early warnings of ASR presence in nearby sentinel plots and time initial fungicide applications accordingly. The USDA and other university and extension websites will also provide useful updates on the spread of ASR throughout the US in 2007.

Conclusion

The rapid northward spread of ASR at the end of the 2006 growing season should serve as a warning about the potential spread of this disease. It indicates that the major soybean-growing regions in Missouri, Illinois, Indiana and perhaps adjacent states are at risk if conditions favorable to spore dispersal and infection occur earlier in the season. Despite this warning, growers must remember they can effectively manage ASR with fungicides. However, the timing of the first spray is critical. Producers need to be ready to make the first fungicide application between the early flowering (R1) and seed filling (R5) stages once ASR presence has been confirmed in nearby sentinel plots.

[®]Alto and Quadris Xtra are registered trademarks of Syngenta.

[®], [™]Caramba and Headline Caramba are trademarks or registered trademarks of BASF Corporation.