

Asian Soybean Rust – Frequently Asked Questions I: Background and General Information

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What is Asian soybean rust (ASR)?

ASR is a disease caused by the fungus *Phakopsora pachyrhizi*. The disease causes numerous lesions to appear on the plant that could lead to premature defoliation and yield loss.

What will ASR mean for Virginia's soybean crop?

If ASR moves into Virginia, it is manageable. Correct fungicide selection and application timing can minimize yield loss. If conditions are favorable for the disease and fungicides are not applied properly, yield losses of 10 percent or greater can occur. The cost of production will increase with fungicide application; therefore, soybean profitability may decrease.

How much yield loss from ASR can farmers expect?

Risk analyses indicate that ASR could cause yield losses of greater than 10 percent in any United States soybean-growing region. In the southeastern coastal states, losses of up to 50 percent are possible because of more favorable environmental conditions and earlier infection due to the closer proximity to overwintering sources of ASR. Actual losses will depend on weather conditions during the growing season, where the pathogen overwinters, and when the pathogen enters Virginia.

What areas of the United States are most at-risk for yield losses from ASR?

All soybean-growing areas of the United States are at risk. In general, southern growing areas are at greater risk than northern areas because of the longer growing season, the presence of other ASR hosts such as kudzu, and their proximity to areas where ASR can overwinter. Therefore, the southeastern states closest to an overwintering source are at greatest risk.

Additionally, a warm, humid climate favors ASR disease development. Based on 30-year averages, very favorable weather conditions for the disease occur in the mid-Atlantic states, the Mississippi Delta region, and the Ohio and Mississippi river basins in the Midwest.

Late-planted soybeans, such as those planted after small grains, are at higher risk, since there is more time for spore movement and inoculum buildup preceding the crop's entry into reproductive stages.

How did ASR reach the United States?

It is thought that ASR was carried to Louisiana and other southeastern states by Hurricane Ivan, which hit the Gulf Coast states in September 2004. Fortunately, researchers at Louisiana State University discovered ASR while monitoring soybean plots in November 2004. Further scouting efforts revealed that ASR was widespread in the Gulf Coast states.

Will ASR overwinter in Virginia?

This is unlikely since ASR cannot survive without a living annual or a perennial host (e.g., kudzu) with green foliage. Virginia experiences low temperatures that would kill most annual hosts and eliminate any green foliage of perennial hosts. Areas that are likely to support year-round occurrence of ASR are the southernmost United States (e.g., Florida, south Texas) and further south (e.g., Caribbean, Mexico, equatorial South America) where freezing temperatures are rare. The presence of green kudzu and several other hosts in those southernmost areas creates a potential for ASR to become established year round.

When will ASR reach Virginia?

No one can say for certain whether ASR will reach Virginia in any given year. However, since ASR will overwinter on kudzu in Florida, the likelihood that it will reach Virginia is increased. Asian soybean rust requires a living host to survive and produce spores. Its host range includes many species of legumes, which increases the potential of overwintering and moving to new locations during the growing season. Additionally, the spores of ASR are produced rapidly in large quantities under favorable environmental conditions (i.e. temperatures between 59 to 82°F and at least six hours of free moisture on the leaves). These spores are readily windborne and can travel long distances on wind currents. This is why weather and wind currents are being used to predict where and when ASR might appear.

Monitoring the northward movement of the pathogen is critical. Therefore, an extensive sentinel plot network was implemented in 2005. This network proved effective in monitoring ASR movement in the United States. Movement into Virginia will likely differ each year since the pathogen will not overwinter in Virginia. Furthermore, dry weather will greatly inhibit rust development.

Can migrating birds carry rust spores to the United States?

No research has examined this question; however, the viability of spores that may travel in this way is unlikely. Temperature, high moisture, ultraviolet light conditions, oil on the birds' feathers, and duration of the trip would negatively impact spore survival.

How far and how fast can the ASR pathogen spread?

ASR dispersal is highly dependent on environmental conditions and weather patterns. Environmental conditions affect ASR spore production. Long-distance dispersal is dependent on wind patterns and weather conditions. Most spores from other rusts travel 20 to 30 miles a day from south to north in the United States. It is expected that ASR could move similarly.

How long will it take for ASR to be transported by wind currents from southern to northern production areas?

Opinion varies on the time required for ASR to reach northern production areas. This could take one to several years. The movement of ASR from south to north in the United States will be different each year and will depend on where ASR is able to survive the winter, the size of the ASR population that overwinters, and weather patterns and conditions. Research shows that wind patterns are more favorable for disease movement from south to north in El Niño years.

Can the spread of ASR be prevented?

Since ASR is carried by wind currents and has numerous hosts there is no way to quarantine and halt the spread of this disease.

Are models being developed to predict the spread of ASR through the U.S.?

Yes. Three models for predicting ASR movement based on weather patterns, environmental conditions, and/or other parameters were developed and tested in 2005. Each have strengths and weaknesses, but performed reasonably well in their first year. Using data collected from sentinel plots, these models continue to be refined. The goal is to link these models together and thereby utilize the strengths of each. At this stage, prediction models are not substitutes for a coordinated monitoring and tracking system.

Are imports of soybean meal, planting seed, or whole soybean likely to bring rust into the U.S.?

No, ASR is not seed-borne, although there is a very slight chance that spores could be associated with debris in seed. For soybean meal there is virtually no chance of contamination since meal is heat-treated, which kills any ASR inoculum. The American Soybean Association has worked closely with the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (USDA-APHIS-PPQ) to reduce the risk of accidental introduction of ASR.

Will crop insurance cover losses due to ASR?

Unavoidable loss of production due to plant disease (e.g. ASR) is a covered peril under the Coarse Grains Crop Provisions, provided the loss is due to natural causes and not agroterrorism. Therefore, soybean losses due to ASR are insurable. However, the producer must follow good farming practices and rust management recommendations of agricultural experts, such as Extension agents and certified crop consultants. Farmers should document advice received and actions taken. If there are no effective control measures available or insufficient amounts of chemicals are available for effective control, the resulting yield loss would be covered. However, damage due to insufficient or improper application of available disease control measures will not be covered. Failure to purchase and apply recommended control measures will result in uninsurable causes of loss being assessed. Producers must be knowledgeable of any pending outbreaks and the control methods recommended by local agricultural experts. For more information and updates on crop insurance, visit the USDA Risk Management Agency's website at <http://www.rma.usda.gov/news/soybeanrust/>.

If ASR is found on my farm, will I be restricted from moving my crops?

U.S. producers will face no restrictions on cropping activities (planting, cultivating, harvesting, baling, pesticide applications, etc.) due to the presence of ASR in their fields.

Concern about restrictions most likely originated from the fact that ASR was on the USDA's select agent list.

Since ASR was determined to have been naturally introduced into the United States, it has been removed from the select agent list (as of March 10, 2005).

Those involved in ASR research are required to have permits for interstate movement of cultures of ASR, but there are no restrictions on crop movement.

Would I be permitted to harvest the soybean vegetation for silage or hay and use it for feed on my farm?

If there are no restrictions related to forage listed on the fungicide labels that have been applied to that crop, the soybean crop may be used for forage. If a fungicide has been applied, refer to the specific product label regarding the required preharvest interval between fungicide application and harvest. In addition, be sure to check the fungicide label for restrictions for the use of the hay for livestock feed or residue as for bedding.

Is there anything I can do now to prepare for soybean rust?

Continue to stay informed. If you suspect ASR is present in your fields this season, contact your local Extension office, a certified crop advisor, or one of Virginia's Primary Diagnostic Centers for identification of ASR or other soybean foliar diseases. If ASR is confirmed and has not previously been found in Virginia, the sample will undergo a second level of testing by APHIS Plant Protection and Quarantine (PPQ) and Center for Plant Health Science and Technology (CPHST).

Check the Virginia Asian Soybean Rust home page, <http://www.ppws.vt.edu/ipm/soybeanrust/index.htm>, and hotline, (757) 657-6450 x130, frequently for updates on soybean rust detections, movement, and up-to-date fungicide recommendations.

How are my soybean checkoff dollars being used to help find solutions to this problem?

The Virginia Soybean Board committed funds to provide for a soybean rust monitoring program during the 2004 growing season. Over 75 fields were monitored through this program throughout most of Virginia's soybean production regions on a bi-weekly basis between June and September. In 2005, the Virginia

Soybean Board funded fungicide efficacy and cultural control research. In addition, the Virginia General Assembly allocated \$50,000 in 2005 for ASR monitoring and research during the 2005 and 2006 growing seasons. These funds were matched by Virginia Tech's College of Agriculture and Life Sciences. ASR was *not* found in Virginia in 2004 or 2005.

The United Soybean Board has funded research on ASR movement, occurrence, soybean resistance to ASR, and screening of commercial soybean cultivars. Soybean checkoff dollars have funded much of the information on ASR available to soybean growers. State and national associations have been at the forefront of preventing accidental introduction of ASR into the United States, promoting federal funding for research, and encouraging the EPA and chemical companies to ensure the availability of fungicides.

In addition, USDA has dedicated over \$1 million to establish sentinel plots throughout the United States.

Other ASR Resources:

Asian Soybean Rust website at Virginia Tech –
<http://www.ppws.vt.edu/ipm/soybeanrust/index.htm>

USDA Soybean Rust Tracking site –
<http://www.sbrusa.net/>

North American Plant Disease Forecast Center –
<http://www.ces.ncsu.edu/depts/pp/soybeanrust/>

The Southern Plant Diagnostic Network –
http://spdn.ifas.ufl.edu/soybean_rust.htm

Related Publications

Asian Soybean Rust – Frequently Asked Questions II: Identification, Biology, and Ecology, Virginia Cooperative Extension publication 450-302

Asian Soybean Rust – Frequently Asked Questions III: Control with Fungicides, Virginia Cooperative Extension publication 450-303

Asian Soybean Rust – Frequently Asked Questions IV: Cropping Systems and Cultural Practices, Virginia Cooperative Extension publication 450-304

Asian Soybean Rust – Frequently Asked Questions V: Monitoring, Tracking, and Scouting, Virginia Cooperative Extension publication 450-305

Asian Soybean Rust – Frequently Asked Questions VI: Sprayer and Nozzle Technology, Virginia Cooperative Extension publication 450-306

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