



Asian Soybean Rust

Description

Soybean rust (*Phakopsora pachyrhizi*) is a fungal disease that attacks the foliage of a soybean plant causing the leaves to drop early, which inhibits pod setting and reduces yield. The amount of damage depends on how early in the growth of the soybean plant the infection occurs. Asian soybean rust causes lesions on cotyledons, stems, petioles, leaves and pods of soybean and other host plants. The main effects on the soybean plant are destruction of photosynthetic tissue, which in turn causes premature defoliation, early maturation, and severe yield reductions through reduction in the number of pods and seeds, and decreased seed weight.

Scouting Rust

Take every opportunity this winter to familiarize yourself with the symptoms of rust. Excellent diagnostic guides are available. Be prepared to monitor soybean fields and adjacent areas for symptoms and signs of rust throughout the coming growing season. Scouting for soybean rust may begin at anytime during the growing season, but detection is typically easiest just prior to or during the flowering stages. When the crop becomes more opportunistic for the rust, you could be scouting your fields up to three times a week.

Figure 1.



Figure 2.



Figure 1. Chlorotic spots - an early stage of rust infection. *Photo © USDA-ARS.* **Figure 2.** A darker brown lesion also caused by the Asian soybean rust fungus. Note pimple-like pustules. *Photo © Glen Hartman, University of Illinois and USDA-ARS.*

Symptoms of Asian Soybean Rust

Infection usually begins on leaves low in the canopy, and chlorotic regions begin to appear along with lesions found mainly on the lower leaf surface, although they can appear anywhere on the plant. Initial symptoms appear on the underside of lower plant leaves as small, grey lesions. As disease progresses, lesions increase in size and color changes to tan or reddish brown. Leaves turn a distinctive brown or yellow as disease progresses. Leaves die prematurely, leaving fewer pods, fewer seeds and lower seed weight. Symptoms may be easily confused with spider mites or other foliar diseases. Symptoms and signs will move to the middle and upper plant canopy as the severity of the infection increases. An early indication of rust is yellow discoloration on the lower leaves of maturing plants at or near flowering. Uredinia may also be found on upper leaf surfaces, though they are typically smaller and less abundant. Lesions are restricted by leaf veins, and may be as large as 2-3 square millimeters.

Staging your Soybeans



R1 Stage: Beginning Bloom

One open flower is visible from any node on the main stem of the soybean plant. Flowering usually begins near node 5 (V4). Stage length varies from 1 to 10 days.

R2 Stage: Full Bloom

There are open flowers at upper most nodes of the main stem of the soybean plant. Stage length is 3 to 15 days.

R3 Stage: Beginning Pod

Short pods (3/16 inch long) are visible at the upper nodes of the main stem with fully developed leaves. Flowering peaks. Stage length is 4 to 22 days.

R4 Stage: Full Pod

Pods are 2 cm (3/4 inch) long at the upper most nodes of the main stem of the soybean plant. Stage length is 6 to 25 days.

R5 Stage: Beginning Seed

Seed within the upper pods are 0.3 cm (1/8 inch) long. Flowering is complete, except for some branches. Stage length is 10-22 days. Spraying for aphids during this stage does not guarantee yield response and is not recommended.

R6 Stage: Full Seed

Pod reaching full length and contain green seeds that fill pod cavity in the upper pods. Full yield potential has been realized. Stage length is 20 to 40 days. Spraying for aphids during this stage does not guarantee yield response and is not recommended.

Related Links

- [Publication 811, Agronomy Guide for Field Crops - Table 413. Reproductive Stages of Soybeans](#)
- [Wisconsin Extension Bulletin - Reproductive Soybean Development Stages and Soybean Aphid Thresholds](#)

Treatment

There are several “**fungicide families**” that are either registered for use on soybeans and labeled for soybean rust, or which have been submitted to the EPA under a Section 18 Emergency Exemption request to help combat the disease. These are the chlorothalonils, sold as Bravo, and Echo, the strobilurins sold as Gem, Headline, and Quadris, and the triazoles sold as Domark, Folicur, Laredo, Tilt as well as numerous generic alternatives. There are several pre-mixes of these products that are significant, such as Pristine, Quilt and Stratego and several other compounds under testing and review that are not likely to be available this coming year. The main point in all of this is that all fungicides are not the same. They differ in site and mode of action, level of translocation as well as in their residual effect.

Some fungicides are curative; others are effective only when used as a preventative. When used correctly, fungicides have been effective in controlling soybean rust. However, in the past two

years there have been significant yield losses in Brazil, even when fungicides were used. These losses can all be attributed to applying the wrong fungicides or to applying the products too late for effective disease control. To control soybean rust, fungicides need to be applied early in the epidemic, soon after flowering.

Preventative fungicides (strobilurins) need to be applied before the disease is present. Once the disease severity reaches 3% to 5% their effectiveness decreases dramatically. The curative compounds (triazoles) can be used after rust is present. However, once the disease reaches as little as 10% severities even these fungicides may not provide full yield protection. The most successful recommendations for control of soybean rust are to apply the first fungicide at or soon after flowering. A second application should be made 14 to 20 days later and a third application may be needed, though only in a severe epidemic.

Both the triazole and strobilurin fungicides, as well as the mixes of the two, were effective in reducing soybean rust severity. The triazole fungicides are sterol inhibitors, interfering with sterol biosynthesis in fungal membranes. As a group, the triazoles have short residual periods and move rapidly through the leaf. Under application schedules longer than 14 days the triazoles may be dissipated from the plant tissue unless high rates are used.

The strobilurin products have a longer residual, moving slower through the leaf tissue, but they are not as effective in controlling infections that are established. If infection levels are too high when the strobilurin fungicides are first applied, they may not protect yields. Strobilurin fungicides limit spore germination and fungal growth, but do not always kill established rust infections. With the single site mode of action from each group of fungicides, it is necessary to limit their use to one application per season for each class.

Much of the preceding information was summarized from *“USDA Fungicide Efficacy Trials to Control Soybean Rust in Paraguay and Zimbabwe”* from 2002-2004, with credit to Monte R. Miles, Wilfrido Morel, and Glen L. Hartman.

Our Mission

We the Farmers Elevator believe we will have to manage the information given to us on a daily basis of where the rust is at and the wind direction or weather in general to determine when we will start spraying. As we know we couldn't cover all our acres in a timely manner if we waited for the rust to arrive. So at R1 or just following flowering of the bean plant, we recommend you spray a portion of your beans with a preventative fungicide.

Last year beans sprayed with a preventative fungicide between R1 and R3 shown a 5 bushel average increase in yield in over 122 trials. Soybeans in our area will normally start blooming the last week of June. At that time we would like to start applying a preventative fungicide on as many acres as we can to get ahead in case the rust does show up. If it doesn't show up that will be GREAT! We will hope for a yield advantage from our early fungicide application. Think of it as an insurance policy. When or if it shows up we will have to start spraying with a curative product on the acres not already treated.

Here Are Several Web Sites You May Want To Refer To For Additional Information On Asian Soybean Rust:

- www.soydiseases.uiuc.edu
- www.nsr1.uiuc.edu www.ncpmc.org
- www.soybeanrustinfo.com
- www.stopsoybeanrust.com
- www.soybeanrust.com
- www.aphids.usda.gov