Managing Frogeye Leaf Spot

KEY POINTS

- Frogeye leaf spot is a foliar disease that occurs in warm and humid regions of the United States.
- The fungus that causes frogeye leaf spot survives in unburied soybean residue and in infected seeds
- Frogeye leaf spot lesions reduce the photosynthetic leaf area, which results in less production of carbohydrates to sustain plant growth and fill the seeds, and consequently, reduce yield potential.
- Management options include product resistance, tillage, crop rotation, and fungicides.

Figure 1. Soybean leaves exhibiting symptoms of frogeye leaf spot.

Disease Characteristics and Symptoms

Frogeye leaf spot (FLS) is caused by the fungus *Cercospora sojina*, which survives in soybean residue left on the soil surface and in infected soybean seeds. FLS has been a common economically important disease in the hot, humid regions of the southeastern United States. Recently, incidences of FLS have become more common in northern regions of the United States where susceptible soybean products are commonly grown.

FLS spore production and infection occur in warm, humid weather. When conditions are conducive, spores will be produced on infected residue and/or on seedlings arising from infected seeds and are spread by wind and splashing rain. Infection can occur at any stage of soybean development, but most often occurs after flowering and is typically in the upper canopy. The disease is only capable of infecting the plant through new leaves as it can not enter through fully expanded leaves. Therefore, when an infection begins at R4 or R5 stage of soybean development the disease will not spread very much since most of the leaves are already developed. Spores will be produced from leaf lesions and secondary infections will continue as long as weather conditions are conducive.

Symptoms initially appear as small, yellow or gray spots on the leaves. As the lesions mature, they expand about 1/4 inch and the centers of the lesions become gray to tan with reddish-brown to purple margins (Figure 1). The lesions may appear to have small, dark hairs on the underside of the leaf which contain the conidia (infecting spores of the fungus). When plants are heavily infected, the lesions may coalesce. When infection covers 30% or greater of the leaf surface, this often triggers premature leaf drop. Lesions may also appear on the stem and pods, although this is less common. Lesions on pods and stems appear reddish brown and darken as they mature, but lack the characteristic gray colored center. Lesions on pods may appear sunken and the seeds inside the pods may turn brown with cracked seed coats. FLS symptoms can be similar to other soybean diseases and disorders. Leaf samples can be sent to plant diagnostic labs for confirmation of the disease.

Managing Frogeye Leaf Spot

Disease Impact on Soybean Yield

FLS is most common during the soybean reproductive growth stages (blooming through maturity) but may develop earlier in continuous soybean fields and/or under optimal environmental conditions. FLS lesions reduce the photosynthetic leaf area, which results in less production of carbohydrates to sustain plant growth and fill seeds, and consequently, reduced yield potential. Infected seeds will have reduced quality and poor germination. Infection can occur at any stage of soybean development. Infections occurring prior to or at flowering can result in substantial amounts of disease and loss in yield potential; however, infections that occur at or after R5 will have limited impact on yield potential. Once an infection starts and conditions remain conducive for further disease development, infections can spread very rapidly throughout the crop. Yield losses can be up to 35% when conditions are favorable and the disease is severe early or just after flowering.

Disease Management

Management is aimed at reducing the amount of inoculum available and protecting plants from infection.

Product resistance is generally the best option for managing a disease. Several races of FLS exist in the U.S. and a resistant soybean product may confer resistance to one or multiple races depending on which resistance gene(s) it contains. Talk to your local agronomist or seed representative about resistant varieties that are available in your area and which races exist in your area (if known).

Plant high-quality, certified disease-free seeds to avoid introducing the fungus into your field.

Crop rotation allows more time for inoculum in the field to degrade before soybean is planted again. Even the small amount of soybean residue remaining after a rotation with corn or another crop may still be enough to provide inoculum to begin an epidemic when soybean is planted again. A two-year rotation away from soybean may be needed to reduce the risk for infection.

Tillage that completely buries soybean residue may be necessary in high disease pressure fields to kill the overwintering fungal structures. Tillage that is performed early, after a soybean harvest, will be more effective at killing the fungus in soybean residue than when tillage is delayed until the next season.

Fungicide applications can protect yield potential and may be warranted on susceptible products when lesions are found prior to the R3 growth stage and conditions remain conducive to further disease development. If a fungicide treatment is needed, treating at the R3 growth stage is generally recommended to effectively control the disease and preserve yield potential. Thresholds at which a fungicide application is justified have not been established for FLS and control recommendations vary by region. In addition, new strobilurin-resistant strains of the FLS fungus have been reported in several states, rendering this type of fungicide ineffective at controlling these strains. Therefore, it is important to check with your local Extension agent for application timing and fungicide recommendations in your region.

Fungicidal seed treatments can also reduce the risk of early-season infection.

Sources

Dorrance, A. and Mills, D. 2011. Frogeye leaf spot of soybean. The Ohio State University Extension publication AC-53-10. http://ohionline.osu.edu.

Westphal, A., Abney, T., and Shaner, G. 2006. Frogeye leaf spot. Purdue University Extension publication BP-131-W. www.extension.purdue.edu.

Bradley, C. et.al. 2016. Frogeye leaf spot. Crop Protection Network Soybean Disease Management publication CPN-1017. http://soybeanresearchinfo.com.

Giesler, L. 2018. Frogeye leaf spot resistance increasing in soybean. University of Nebraska-Lincoln CropWatch. http://cropwatch.unl.edu.

Faske, T. 2016. Soybean disease update and management: Frogeye leaf spot. University of Arkansas. http://www.arkansas-crops.com.

Web sites verified 5/18/18.