Common Soybean Diseases in Oklahoma
Part II. Foliar, Pod, and Stem Diseases

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Introduction

Several different diseases commonly attack the leaves, pods, and stems of soybeans grown in Oklahoma. These diseases are caused primarily by fungi and bacteria. Under favorable conditions, foliar, pod, and stem diseases can result in a reduction of seed quality, and occasionally yield losses. Severity of disease development and need for control are influenced by varietal selection and environmental conditions. Correct identification and early detection are critical in the proper management of soybean diseases. This fact sheet is intended to aid soybean producers in recognizing the diseases that commonly attack the foliage, pods, and stems of Oklahoma soybeans. Diseases and nematodes that attack soybean seedlings, lower stems, and roots are described in OSU Extension Facts Sheet F-7660.

Stem and Pod Rot Diseases

Stem and pod diseases are common in Oklahoma soybean fields; however, dry growing conditions that often occur in Oklahoma limit the amount of damage they cause. Normally, yields are not significantly reduced by these diseases. The visible evidence of these diseases is usually not observed until the plants have reached the final stages of maturity.

Pod and Stem Blight (*Diaporthe phaseolorum* var. *sojae*)

Pod and stem blight is a leading cause of seed damage, and is a major factor associated with reduced seed quality. The fungus overwinters on seed or on old soybean crop debris. Infection usually occurs during mid- to late-season and is favored by warm, humid weather. Delayed harvest often increases the severity of this disease.

The most characteristic symptom of this disease is the development of black fruiting structures of the fungus that are arranged in linear rows on the stems (Figure 1), petioles, and pods. Infected seeds crack and shrivel, and are frequently covered with a white mold. The moldy seed often will not germinate or will produce weak seedlings that are infected with the pod and stem blight pathogen.

Pod and stem blight is controlled by planting disease-free seed and applying foliar fungicides. Foliar fungicides can improve seed quality through the control of pod and stem blight in years when warm weather and frequent rains occur during the reproductive phase of soybean development. Research has demonstrated that one application of a fungicide at growth stage R6 can improve seed quality. (Contact your local OSU County Extension Agriculture Educator for a current list of registered fungicides.)

Figure 1. Pod and stem blight.

**Anthracnose** (*Colletotrichum dematium* and/or *Glomerella glycines*)

Anthracnose is another pod and stem disease common in Oklahoma soybean fields. It reduces seed quality and yields. Although seedling infections do occur, anthracnose generally attacks more mature plants during the latter part of the growing season. Warm, wet, and humid weather conditions occurring during bloom and early pod set favor the development of this disease.

Symptoms of anthracnose are easily observed as the plants reach maturity. Reddish or dark brown lesions appear on pods, stems, and leaf petioles. Later, the lesions become covered with black fruiting bodies (acervuli), which under low magnification (10X) resemble tiny pin cushions (Figure 2). Infection of young pods results in empty pods at maturity. Pods infected later contain shriveled and/or moldy seed.

Crop rotation reduces the incidence of anthracnose. Anthracnose can also be controlled by applying foliar fungicides between bloom and early pod fill. This control measure is more likely to be of benefit in protecting seed quality than in producing economical yields increases.
Foliar Diseases

There are several bacterial and fungal diseases that attack the leaves of soybeans grown in Oklahoma. Most of these diseases produce symptoms that are easily observed during the growing season. In general, foliar diseases are not as destructive as seedling diseases or pod and stem diseases. However, because of the pronounced symptoms, soybean producers are often concerned about the effects of these diseases.

Bacterial Blight (Pseudomonas syringae pv. glycinea)

Bacterial blight is the most common foliar bacterial disease of soybeans. This disease is of limited importance in Oklahoma; however, it occasionally causes early season defoliation. It has the potential to cause yield loss in susceptible varieties growing under conditions that favor the development of this disease.

Bacterial blight is favored by cool rainy weather, and is generally more prevalent during the early growing season. Dry and hot weather stops the development of this disease. Initial infections normally occur during seedling emergence, with secondary disease outbreaks often following windy rain storms or crop cultivation while the foliage is wet.

Foliar symptoms begin as small, water-soaked spots that turn yellow and then dark brown to black with a yellow border (Figure 3). The spots often coalesce to form irregular brown patches. Portions of the infected area may fall out, giving the leaves a ragged appearance.

Control is obtained by planting disease-free seed, rotating crops, and avoiding cultivation during times when the soybean foliage is wet.

Bacterial Pustule (Xanthomonas campestris pv. glycines)

Bacterial pustule is another bacterial disease that is frequently present in Oklahoma soybean fields, but moisture is rarely adequate for significant problems to develop. One major difference between bacterial pustule and bacterial blight is that bacterial pustule infections are not reduced by high air temperatures. Consequently, new infections of bacterial pustule can develop throughout the growing season whenever wet conditions occur. Severe infections of this disease can cause some defoliation.

Symptoms of bacterial pustule infections consist of small yellow spots with reddish-brown centers (Figure 4). Later, in the center of the spots, a small raised pustule develops, which is most noticeable on the under-side of the leaf. Infections are more common on younger leaves which are more susceptible than older leaves.

Methods of control for bacterial pustule are the same as those suggested for bacterial blight. In addition, resistant varieties do exist and should be planted in areas that have a history of bacterial pustule infections.
Brown Spot (*Septoria glycines*)

Brown spot is a common foliar disease of soybeans that is caused by a fungus that is spread by splashing rain. It frequently occurs following rainy periods early in the growing season, but rarely persists into late season. Hot, dry weather stops the development of this disease. If conditions favorable for disease development continue into the season or reoccur before maturity, the resulting defoliation can cause yield loss.

Cotyledons, primary leaves, and lower trifoliate leaves typically show symptoms of brown spot infections. The brown to red lesions vary in size from pinpoint to 1/4 inch in diameter but may merge and form larger irregular shaped spots (Figure 5). Severely infected leaves turn yellow and fall from the plant. Defoliation begins in the lower canopy and moves upward as the disease progresses.

Incidence of this disease is decreased by plowing under soybean crop residue, rotating crops (1 year out of soybeans), and planting disease-free seed.

Frogeye Leaf Spot (*Cercospora sojina*)

Frogeye leaf spot is a foliar disease of soybeans that has the potential to cause significant yield loss. This disease is most severe during seasons with frequent rainfalls and long periods of high relative humidity.

Young expanding leaves are extremely susceptible to infection, while fully expanded leaves are relatively resistant. However, the symptoms of frogeye leaf spot develop nearly two weeks after initial infection; therefore, lesions are never seen on young expanding leaves. Leaves that expand during periods of weather unfavorable for invasion remain relatively disease free and can result in "layers" of healthy leaves between "layers" of heavily diseased leaves.

Foliar lesions develop on the upper surface of the soybean leaf. The lesions measure up to 1/4 inch in diameter but may coalesce to form larger spots. Young, fully developed lesions have a gray to brown center with a distinct purple to reddish-brown margin (Figure 7). As lesions age, the center becomes tan to nearly white, and the margin darkens.

Crop rotation and plowing under crop residues reduces disease incidence. Fungicides applied at the late flowering (R3) and beginning seed growth (R4) stages will protect against frogeye infections. Some soybean varieties are known to be resistant to this disease.
Cercospora Leaf Blight (Purple Seed Stain) ([Cercospora kikuchii])

Cercospora leaf blight is a late season disease that is often mistaken for early senescence. This disease attacks seeds, pods, stems, and leaves; however, there is no consistent correlation between the development of foliar symptoms and the occurrence of stained seed.

The disease is easily identified through the discoloration of the seed and is commonly called purple seed stain. Seed discoloration varies from pink or pale purple to dark purple (Figure 8). The stained areas range in size from small specks to large irregular blotches, which may cover the entire surface of the seed coat.

Foliar symptoms begin to appear at the beginning of seed set and develop initially as small, reddish-purple, angular to irregular lesions on the upper leaf surface. As the disease progresses, the infected leaves become leathery, and the upper surface of the leaf develops dark purplish-red to bronze discoloration (Figure 9). Heavily infected leaves rapidly turn yellow and drop from the plant, mimicking natural leaf fall. Lower leaves remain green and attached to the plant.

Although some soybean varieties are resistant, control is usually achieved by planting disease-free seed. In fields with a history of purple seed stain problems, the application of foliar fungicides during early pod set should aid in the control of this disease and may improve seed quality.

Use of Foliar Fungicides

The Oklahoma Cooperative Extension Service does not routinely recommend the application of foliar fungicides to control foliar, pod, and stem diseases of soybeans. Research conducted in Oklahoma has shown that although fungicides are capable of reducing the incidence and severity of these diseases, they are not consistently effective in economically increasing soybean yields. However, foliar fungicides have been shown to improve seed quality in years in which warm weather and frequent rains occur during the reproductive stages of soybean development. (Contact your local OSU County Extension Agriculture Educator for a current list of registered fungicides.)

Disease Management Principles

A basic strategy for control of soybean diseases is prevention. The following suggestions are offered in an attempt to provide soybean producers some basic components that will aid in the prevention of soybean diseases.

- Plant high quality, preferably certified seed.
- Apply fungicide seed treatment.
- Use proper seed bed preparation, planting depth, and seeding rates.
- Practice crop rotation with non-legume crops.
- Use deep plowing to bury plant debris.
- Plant disease and nematode resistant varieties.
- Apply foliar fungicides to maintain seed quality.
- Practice good management of fertility, weeds, and insects.

Integrating the above principles, as they apply, into a soybean production program will help prevent diseases from becoming a limiting factor.

References


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