
Diseases of Soybeans in the Gulf Coast and the Lower Rio Grande Valley of Texas

Although soybeans are susceptible to a multitude of diseases, only a handful of those diseases are ever seen in the production areas in the Gulf Coast and Lower Rio Grande Valley of Texas. Only three of these diseases may affect yield and only if there is rainy weather during the course of the season. The proper diagnosis of the disease is the first, necessary step to managing it. This article will provide information on the diagnosis of the most prevalent soybean diseases, an understanding of how they operate and how they can be managed. The discussion will be limited to diseases caused by living microorganisms, particularly fungi.

By itself, a plant pathogen can not cause disease. It must occur in combination with a susceptible host plant, under environmental conditions that favor infection and subsequent pathogen growth. Furthermore, a plant growing under optimal conditions can sometimes withstand the effects of a pathogen. Good root development and regeneration greatly reduce severity of fungal root rot. An abundance of leaves diminishes the impact of foliar pathogens on yield. Healthy plants often grow to compensate for neighboring plants killed by diseases.

Diseases of soybeans are managed through the use of resistant varieties, fungicides and crop rotation. Crop rotation is most useful for managing foliar diseases caused by fungi, but won't eliminate root-infecting fungi from soil. Fungicides can be applied to seed to manage seedling diseases, but may not work well with extended cool, wet soil that favors damping-off and seedling diseases. If conditions are humid and rainy during the growing season, one application of a foliar fungicide after flowering may be necessary to control rust, purple seed stain, and frog-eye leaf spot, particularly if the field is used for seed production. For the most economical application, a fungicide should be applied to prevent disease, rather than treat it, using the timing and rate on the label. A fungicide should not be used for other purposes (e.g. yield enhancement), as excessive, non-necessary use can result in pathogens becoming resistant to it.

Potentially Damaging Foliar Diseases Occurring With Frequent, Rainy Weather

Disease: Rust (also known as Asian soybean rust)

Cause: a fungus, *Phakopsora pachyrhizi*

The undersides of leaves have raised, brownish, circular to irregularly-shaped areas (Fig. 1).

Fig. 1. Symptoms of rust on the underside of a leaf.



Under some magnification, these raised areas have openings in the center and resemble volcanoes (Fig. 2).

Fig. 2. Magnification of rust.



On the upper surface of the leaf, there may be yellow areas with circular brown spots just above affected areas on the undersides (Fig. 3).

Fig. 3. Rust on upper surface of leaf.



A large amount of leaf rust results in defoliation. The disease is favored by rainy weather, but since the fungus does not survive from season to season in Texas, spores must be blown in from elsewhere to start the disease. Similar symptoms may be caused by drought and nutrient deficiencies related to drought, but a rust diagnosis can be confirmed by microscopic examination or a strip test kit (www.envirologix.com).

Control: Rust can be controlled by a fungicide application, which should only be made between R1 and R5. If a small amount of rust is already detectable on plants, then a triazole or triazole/strobilurin mixture should be used. If there is no rust in the field, a strobilurin fungicide can be used. Currently, the decision to apply a fungicide can utilize a tracking and forecast network (www.sbrusa.org). Texas-specific rust control information can be found at (soybeanrust.tamu.edu or sickcrops.tamu.edu).

Disease: Purple seed stain / *Cercospora* blight

Cause: a fungus, *Cercospora kikuchii*

The upper sides of leaves have a purple coloration (Fig. 4).

Fig. 4. Purple seed stain / *Cercospora* blight on leaf.



Seeds have pink to purple discoloration (Fig. 5).

Fig. 5. Purple seed stain / *Cercospora* blight on seed.



The infection originates from spores from infected seed or residue from a previous soybean crop. Disease development is favored by high temperatures and humidity.

Control: In areas where it is consistently a problem, a fungicide application can be made at R2 to R5, especially if the crop is used for seed. Strobilurin fungicides tend to give

better control than triazole fungicides. Crop rotation and changing varieties are also recommended.

Disease: Frogeye leaf spot.

Cause: a fungus, *Cercospora sojina*

Leaves have circular spots with light brown centers and a darker brown edge (Fig. 6).

Fig. 6. Symptoms of frogeye leaf spot.



The infection originates from spores from infected seed or residue from a previous soybean crop.

Control: Some varieties may be resistant. Residues from previous soybean crops should be deep plowed and two-year rotations used. In areas where it is consistently a problem, a fungicide application can be made at R2 to R5, especially if the crop is used for seed. Strobilurin fungicides tend to give better control than triazole fungicides.

Noticeable Foliar Diseases Which are a Low Risk for Causing Yield Loss

Disease: Downy mildew

Cause: a fungus, *Peronospora manshurica*

Yellow, circular spots with uneven edges on the upper surface of leaves (Fig. 7).

Fig. 7. Downy mildew symptoms on upper leaf.



The portion directly underneath is also yellow, sometimes with a fuzzy, tan growth (Fig. 8).

Fig. 8. Downy mildew symptom on leaf underside.



The disease typically appears before flowering.

Control: Although these spots are noticeable, the disease is not damaging under Texas conditions and no control is recommended.

Disease: Aerial web blight

Cause: a fungus, *Rhizoctonia solani*.

The disease starts as leaf spots, which vary in shape and have reddish-brown margins, but is distinguished by visible growth of the fungus that resembles brown spider webs and is associated with leaves that are wilted and stick together (Fig. 9).

Fig. 9. Aerial web blight.



The disease is favored by high temperature and high humidity. A previous crop of rice can be a risk factor for this disease, since rice is also affected and the fungus can survive in rice residue. Unlike other fungi infecting leaves that can spread from field to field with spores, the aerial blight fungus will not move from fields where it is initially present.

Control: Several fungicides are labeled for aerial web blight, but fungicide control is not necessary in Texas.

Disease: Target spot

Cause: a fungus, *Corynespora cassiicola*

Small, brown spots with yellowing of surrounding leaf. Spots enlarge to ¼ inch diameter, with a darker brown ring around the edge (Fig. 10).

Fig. 10. Target spot.



The fungus survives in crop residue.

Control: The disease has not been a problem in Texas. Crop rotation is advised in fields where the amount of disease increases every year.

Disease: Anthracnose

Cause: a fungus, *Colletotrichum truncatum*

The fungus affects the stem, which is bleached with small, black specks (Fig. 11).

Fig. 11. Anthracnose on soybean stem.



Control: Although fungicides are labeled for this disease, it is not a problem in Texas.

Disease: Mosaic

Cause: Undetermined, possibly a virus

Uneven areas of light and dark green on the leaf Fig. 12).

Fig. 12. Mosaic symptoms on soybean leaves.



Sometimes there is puckering or crinkling on the leaves. Isolated plants in the field are affected.

Although several viruses are known to cause these types of symptoms, repeated testing of samples from south Texas has failed to confirmed any of them.

Control: Only isolated plants have been seen in fields in Texas and the prevalence is not widespread in a particular year. The incidence has never been high enough to cause yield loss.

Soilborne Diseases that Generally Don't Cause Yield Loss

Disease: Seed decay and seedling disease

Cause: Several fungi – *Pythium* spp. and *Rhizoctonia solani*

Seeds fail to emerge. When dug up they may be rotted. Seedlings may emerge, but wilt, shrivel and die shortly thereafter (Fig. 13).

Fig. 13. Seedling disease affecting soybean.



Control: Use seed treated with a fungicide. Plant into warm soils and on raised beds.

Disease: Cotton root rot

Cause: a fungus, *Phymatotrichopsis omnivora*

A few or many plants in an area wilt and die during the late spring and summer (Fig 14.).

Fig. 14. Cotton root rot on soybean.



Roots are rotted, while the lower stem is intact and may still be green. Sometimes there is a fine, brown fungal growth on the lower stem nearest the root.

Control: Crop rotation with corn or sorghum, to prevent an increase of the affected area of the field.

Disease: Charcoal rot

Cause: a fungus, *Macrophomina phaseolina*

Plants wilt and die during the summer. The lower stem and root tissue are rotted and have small, black structures embedded in them (Fig. 15).

Fig. 15. Charcoal rot on soybean stem.



The disease is favored by hot, dry weather and plants under moisture stress are affected.

Control: Crop management to reduce moisture stress.

Disease: Southern blight

Cause: *Sclerotium rolfsii*

Isolated plants wilt and die. An abundant white growth is seen on the lower stem near the soil surface (Fig. 16).

Fig. 16. Southern blight on soybean.



Associated with this growth are small, spherical structures, white to tan in color, that resemble mustard seed (Fig. 17).

Fig. 17. Detail of southern blight survival structures.



These structures will live for several years. The disease is favored by hot weather and moist soil.

Control: Deep plowing will help to remove the survival structures.

Text and photos by Dr. Thomas Isakeit, Professor and Extension Plant Pathologist. March, 2011

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