Soybeans

Disease

Symptoms, source of inoculum and management of soybean diseases.

Disease	Symptoms	Source of Inoculum	Management
Aerial Blight (*Rhizoctonia solani*)	The initial infected area typically involves the lower third of one or more of the three leaflets. Necrotic areas may vary in shape from circular to irregular with reddish-brown margins. Leaf blight, leaf spots, and defoliation are symptoms of the disease. Lesions may vary from reddish-brown to brown or tan. Several leaflets may appear to be matted together with a cottony growth (mycelia). Sclerotia may be visible (round survival structures, white to brown, mustard seed to pencil eraser-sized). Petioles, stems, and pods also may be infected.	Weed hosts, field debris, and soil. Rice, grain sorghum, corn and cotton serve as alternative hosts. Risk of disease is increased in rice/soybean rotations.	Fall cultivation of stubble. Use good seedbed preparation and weed control. Research and field observations indicate that some varieties may be tolerant aerial blight. Resistance to strobilurin fungicides has occurred in some areas. SDHI fungicides will be more effective in these situations (Table 1).
Anthracnose (*Colletotrichum* spp.)	Symptoms appear as irregular brown areas most frequently on stems and pods. In advanced stages, affected tissues are covered with black fruiting bodies. The disease may cause serious losses, especially during rainy periods. Seed may fail to form or be wrinkled and moldy.	The pathogens are seed- and debris-borne.	Plant disease-free seed. Some benefit may be derived from seed treatment. Plow under crop residue. Fungicides may be effective (Table 1).
Brown Spot (*Septoria glycines*)	Angular brown to reddish-brown spots appear first on lower leaves, causing yellowing and later defoliation. Symptoms usually are seen first on young plants during cool weather. Sizes of spots vary from a pinpoint to ¼-inch diameter.	The fungus overwinters in crop residue and on infected seed.	Plant disease-free seed. Rotate. Bury crop residue if possible. Resistant varieties may be available. Fungicides are effective and may be economically beneficial in severe cases (Table 1).
Cercospora Leaf Blight (*Cercospora* spp.)	Longitudinal, purplish lesions on petioles appearing at R5 or later. Purpling to bronzing of leaves and/or blighting (brown, necrotic areas on leaflets) beginning in the upper canopy during pod fill. The pathogen may sporulate on leaflets resulting in a grayish hue. Premature defoliation may occur.	The same fungi cause purple seed stain. Pathogens overwinter in crop debris. Some weeds and cotton are alternative hosts. Spores may be airborne. Latent infection occurs with these pathogens; therefore, plants may be infected long before symptoms appear.	Use tolerant varieties based on ratings nearest your location. Fungicides may be effective but are notoriously inconsistent (Table 1).

Disease	Symptoms	Source of Inoculum	Management
Charcoal Rot (*Macrophomina phaseolina*)	Seedling infections result in a discoloration at the soil line. Seedlings may die if hot, dry conditions exist, or they may survive in wet weather with disease symptoms reappearing during hot, dry spells. In older plants, a light brown discoloration of internal tissue occurs. Plants turn yellow and "mature very early." Below the epidermis, at the soil line, small black bodies appear, giving the tissue a grayish-black "charcoal" appearance. Lower stems may be disintegrated.	Overwinters in soil, on seed and in soybean residue.	Avoid excessive seeding rates. Maintaining good fertility will reduce the incidence of this disease. Avoid drought stress, if possible.
Downy Mildew (*Peronospora manshurica*)	Indefinite yellowish-green areas on upper leaf surface, later becoming reddish-brown with age. Grayish tufts of mold growth on lower leaf surface beneath chlorotic spots.	Overwinters in soil, on seed and in soybean residue.	Crop rotation. Use disease-free seed. Seed treatment reduces seedling infection. This disease does not affect yield, and fungicides are ineffective.
Frogeye Leaf Spot (*Cercospora sojina*)	An eyespot type of lesion with a gray or light tan center and a narrow reddish-brown border forms on the leaves. Usually occurs in the upper half of the canopy. May cause premature defoliation. May occur as purplish lesions on petioles, stems, and pods.	Seed and airborne.	Use resistant varieties. Apply foliar fungicides, if necessary, to susceptible varieties (see Table 1).
Minor Nematodes (Spiral, Lance, Ring, Lesion, Stubby-root)	Stunting, stand loss, and reduced yields are associated with high populations of single or mixed populations of these nematodes. Symptoms will vary depending on nematode type and population levels.	Soil.	Rotate with other crops. If populations are high at planting, a nematicide may be used. Use sanitation with equipment that may spread nematode infested soil.
Phytophthora Root Rot (*Phytophthora* spp.)	Destroys roots and tender stems of infected seedlings, resulting in rapid death. Older plants turn yellow and leaves wilt. A brown discoloration develops in the stem. Damage is most severe on heavy clay soils or on poorly drained soils.	The pathogen is soilborne.	Avoid planting susceptible varieties on poorly drained soils. Rotate. Improve drainage.
Pod and Stem Blight (*Diaporthe phaseolorum* var. *sojae* = *Phomopsis sojae*)	Numerous small black fruiting bodies appear on the pods and stems of mature plants. Blight usually occurs in linear rows on the stem. Under favorable environmental conditions for the disease, white mycelial growth may be observed on seed.	Fungus is seedborne and overwinters on diseased plant tissue in the field.	Plant disease-free seed. Some benefit may be derived from the seed treatment. Foliar fungicides may be effective; however, efficacy data is limited (Table 1).
Purple Seed Stain (*Cercospora* spp.)	Pink or light purple to dark purple discoloration of seed. Cracks may occur in discolored areas.	The same fungi cause Cercospora leaf blight. Pathogens overwinter in crop residue and on infected seed. Some weeds and cotton are alternative hosts. Spores may be airborne. Latent infection occurs with these pathogens; therefore, plants may be infected long before symptoms appear.	Plant disease-free seed. Fungicide efficacy is unknown. Varieties vary in susceptibility.

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Red Crown Rot (*Calonectria ilicicola*)	First symptoms appear as an interveinal chlorosis in leaves during R5 to R6 followed by browning and defoliation. On the stems, reddish-orange fruiting structures appear at the soil surface and up to 3 inches above. Stem tissue may appear reddish.	The pathogen is soilborne.	Research and field observations indicate differences in varieties, but ratings are not available. Delayed planting may reduce disease incidence and severity.
Reniform Nematode (*Rotylenchulus reniformis*)	Severely infected plants are stunted and may be chlorotic. Severe yield reductions may occur when nematode populations are relatively high.	The nematode overwinters in the soil.	Planting resistant varieties and rotation with nonhost crops may reduce populations. Nematicides are effective and may be economical if precision application methods are used. Use sanitation with equipment that may spread nematode infested soil.
Root Knot Nematode (*Meloidogyne incognita*)	Aboveground symptoms are poor pod set with wilting and stunting in more-or-less circular patches on lighter soil types. Interveinal chlorosis on foliage is commonly observed. Below ground symptoms appear as knots or galls on the roots. These swellings are a part of the root and are not removeable like bacterial nodules. Southern blight is commonly observed along with root knot nematodes.	The nematode overwinters in the soil as eggs or larvae.	Resistant varieties may be available, and rotation to peanut may reduce populations. Precision-applied nematicides may be economically beneficial. Use sanitation with equipment that may spread nematode infested soil.
Seedling Disease (*Rhizoctonia solani*, *Phytophthora* spp., *Pythium* spp., etc.)	Seed decay and postemergence “damping off.” Roots and basal portion of stem may deteriorate. Brownish-red lesions are often observed on seedling stems at the soil line.	Most of these organisms are soilborne and persist in crop residue.	Fungicide seed treatment or in-furrow spray.
Southern Blight (*Athelia rolfsii*)	Seedlings and vegetative stage plants may be affected in a row. Scattered plants wilt suddenly and die. White mold appears at the base of the plant and girdles the stem. Tan-to-brown sclerotia (resting bodies) about the size of mustard seeds appear in the mold. Southern blight is often seen with southern RKN.	The fungus is soilborne and occurs widely in many soils. It is capable of persisting on almost any type of organic matter.	Resistant varieties may be available. Rotation to less-susceptible crops may reduce incidence and severity. Do not follow soybean with peanut.
Southern Stem Canker (*Diaporthe phaseolorum* var. *meridionalis*)	Small reddish-brown lesions may occur on one or both cotyledons. Later in the season, interveinal chlorosis may be evident on leaflets (similar to foliar symptoms of red crown rot) and plants may die leaving dried attached leaves. Infection usually starts as a small lesion at the base of a main-stem node enlarging rapidly to form a slightly sunken, reddish-brown canker. Plants may be brittle and break at the canker.	The fungus is seedborne and overwinters on infested soybean debris in the field. There may be alternative hosts.	Use resistant varieties. Delayed planting, avoiding stress, and maintaining good fertility may reduce disease incidence and severity.

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Soybean Cyst Nematode (*Heterodera glycines*)	Stunting and various stages of yellowing occur in roughly circular spots. Symptoms vary depending on nematode population, soil type, fertility, and environmental conditions. Symptoms are most pronounced on sandy soils. May occur in conjunction with sudden death syndrome.	Nematodes overwinter in soil, primarily inside resistant cysts. They may be spread to new locations by any means that spread soil.	Practice two-to-four-year rotation with cotton, corn, or sorghum. Use sanitation with equipment that may spread nematode infested soil.
Soybean Rust (*Phakopsora pachyrhizi*)	Rust pustules can be found on the underside of lower leaves. Pustules are tiny, raised, and resemble sand grains requiring at least a 15X hand lens.	This pathogen overwinters on kudzu or volunteer soybean.	Fungicides are very effective on soybean rust (Table 1).
Sudden Death Syndrome (*Fusarium virguliforme*)	Interveinal chlorosis and necrosis similar to red crown rot and stem canker. Will cause premature defoliation. Plants are easily pulled from the ground. White/blue spore masses may be found on roots. Vascular discoloration of stems with pith remaining white. May be exacerbated by soybean cyst nematode.	The fungus is soilborne; however, the disease is rare in Louisiana.	Rotate to a non-host. In-furrow fungicides or seed treatments may be effective. Use sanitation with equipment that may spread infested soil.
Taproot Decline (*Xylaria necrophora*)	Taproot decline may cause plant death at any point during the growing season. On seedlings, cotyledons are characterized by an interveinal mottling. Infection is indicated by a mild interveinal chlorosis on vegetative and early reproductive stage plants. During pod fill, foliar symptoms appear more severe and interveinal necrosis may occur. When affected plants are pulled, they will usually break at the soil line. When excavated, affected tap and lateral roots will have a blackened appearance, and when stems are split at the crown, a white, cottony growth is apparent in the pith. Blackened soybean debris from previous seasons is usually found near affected roots.	The fungus survives within debris from previous seasons.	Rotation to a nonhost and/or tillage may reduce disease incidence and severity. Resistant varieties may be available.

Table 1: Management of Soybean Diseases Using Fungicides

Plant pathologists throughout the United States have developed the following information on foliar fungicide efficacy for control of major foliar soybean diseases. Ratings in this table have been modified by LSU AgCenter Pathologists to reflect observations more accurately in Louisiana. Efficacy ratings for each fungicide listed in the table were determined by field-testing the materials over multiple years and locations. Efficacy ratings are based upon level of disease control achieved by product and are not necessarily reflective of yield preservation. Efficacy depends upon proper application timing, rate, and application method to achieve optimum effectiveness of the fungicide as determined by labeled instructions and overall level of disease in the field at the time of application. **Differences in efficacy among fungicide products were determined by direct comparisons among products in field tests and are based on a single application of the labeled rate as listed in the table, unless otherwise noted.**

The table is not intended to be a list of all labeled products.

Table Legend

Efficacy Rating	Abbreviation
Poor	P
Fair	F
Good	G
Very Good	VG
Excellent	E
Not Labeled	NL
Unkown Efficacy	U

Active ingredient	Product/Trade name	Rate (fl oz/A)	AB[1]	AN	BS[2]	CB[3]	FE[4]	PS	SR	TS	Harvest Restriction
thiophanate-methyl tetraconazole	Acropolis 2.37 SC	20.0-23.0	NL	U	U	U	VG	U	VG-E	U	R5
azoxystrobin tetraconazole	Affiance 1.5 SC	10.0-14.0	U	VG	VG	P-G[6]	VG	U	U	U	R5, 14 days
cyproconazole	Alto 100SL	2.75-5.5	U	U	VG	F	F	U	VG	U	30 days
picoxystrobin	Aproach 2.08 SC	6.0-2.0	VG	G	P-G	P	P	U	G	U	14 days
picoxystrobin cyproconazole	Aproach Prima 2.34 SC	5.0-6.8	VG	U	G	P-G[6]	F-G	U	VG-E	F-G	14 days
prothioconazole triflozystrobin	Delaro 325 SC	8.0-11.0	VG	U	VG	U	G-VG	U	U	NL	21 days
prothioconazole trifloxystrobin fluopyram	Delaro Complete 3.83 SC	8.0-11.0	U	U	VG	U	U	U	U	NL	21 days
tetraconazole	Domark 230 ME	4.0-5.0	NL	VG	VG	P-G[6]	VG	U	VG-E	P	R5
fluoxastrobin	Evito 480 SC Aftershock 480 SC	2.0-5.7	VG	G	P-G	P	P	U	U	U	R5, 30 days
boscalid	Endura 0.7 DF	3.5-11.0	U	NL	VG	U	P	NL	NL	U	21 days
inpyrfluxam	Excalia 2.84 SC	2	E	NL	NL	NL	NL	NL	U	NL	R5
pyraclostrobin	Headline 2.09 EC/SC	6.0-12.0	VG	VG	P-G	P	P	U	VG	P-F	21 days
flutriafol bixafen	Lucento 4.17 SC	3.0-5.5	VG	U	VG	G	VG	U	VG-E	F-G	21 days
pydiflumetofen difenoconazole	Miravis Top 1.67 SC	13.7	G-VG	U	VG	G	VG	G	NL	F-G	14 days

Active ingredient	Product/Trade name	Rate (fl oz/A)	AB[1]	AN	BS[2]	CB[3]	FE[4]	PS	SR	TS	Harvest Restriction
flutriafol fluoxastrobin	Preemptor SC Fortix SC	4.0-6.0	U	U	G-VG	P-G[6]	G-VG	U	VG	P	R5
pyraclostrobin fluxapyroxad	Priaxor 4.17 SC	4.0-8.0	E	VG	G-VG	P-G[6]	P-F	G	VG	F-G	21 days
prothioconazole	Proline 480 SC	2.5-5.0	NL	NL	NL	NL	G-VG	NL	VG	U	21 days
fluopyram prothioconazole	Propulse 3.34 SC	6.0-10.2	NL	NL	U	NL	U	U	U	NL	21 days
azoxystrobin	Quadris 2.08 SC Multiple Generics[5]	6.0-15.5	VG	VG	P-G	P	P	U	G-VG	P-F	14 days
azoxystrobin difenoconazole	Quadris Top 2.72 SC Quadris Top SBX 3.76 SC	8.0-14.0 7.0-7.5	VG	U	G-VG	P-G[6]	VG	F-G	VG	F-G	14 days
azoxystrobin propiconazole	Quilt 1.66 SC Multiple Generics[5] Quilt Xcel 2.2 SE	14.0-20.5	VG-E	VG	G	P	F	U	VG	P	21 days R6
mefentrifluconazole pyraclostrobin fluxapyroxad	Revytek	8.0-15.0	VG	U	VG	G	VG	U	VG-E	F-VG	21 days
trifloxystrobin prothioconazole	Stratego YLD 4.18 SC	4.0-4.65	VG	VG	G	P-F	F-G	U	VG	P	21 days
propiconazole	Tilt 3.6 EC Multiple Generics[5]	4.0-6.0	P	VG	G	NL	F	NL	VG	U	R5
flutriafol	Topguard 1.04 SC	7.0-14.0	U	VG	VG	P-G[6]	G-VG	U	VG-E	P	21 days
azoxystrobin flutriafol	Topguard EQ	5.0-7.0	VG	U	VG	P-G[6]	G-VG	U	E	P	21 days
thiophanate-methyl	Topsin-M Multiple Generics[5]	10.0-20.0	U	U	U	P	VG	U	G	U	21 days
benzovindiflupyr azoxystrobin propiconazole	Trivapro	13.7-20.7	E	U	G-VG	P-G[6]	F-G	G	VG-E	U	14 days R6
mefentrifluconazole pyraclostrobin	Veltyma	7.0-10.0	U	U	U	U	U	U	U	U	21 days
tetraconazole fluoxastrobin	Zolera FX 3.34 SC	4.4-6.8	U	U	U	U	F-G	U	U	U	R5 30 days

[1] In areas where strobilurin resistance has been found, efficacy of products containing strobilurins may be reduced.

[2] Strobilurin resistance has been discovered in nearby states in this pathogen population and may exist in Louisiana. Reduced efficacy of strobilurins may be observed.

[3] Fungicides with a solo or mixed QoI or MBC mode of action may not be effective in areas where QoI or MBC resistance exists in the fungal population that causes Cercospora leaf blight.

[4] Fungicides with a solo or mixed QoI mode of action may not be effective in areas where QoI-resistance exists in the fungal population that causes frogeye leaf spot.

[5] Generics containing the same active ingredient may be available.

[6] Efficacy of this product on CLB has been inconsistent across locations and years.

The soybean section was revised September 2024 by Trey Price.