

AG FACTS

Soybean Diseases

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This bulletin provides useful information for diagnosing crop disease problems in the field or plant clinic laboratory. It will assist crop disease consultants, their scouts, state agricultural advisers, agribusiness representatives, pest control dealers and applicators, county agricultural agents, students in plant sciences and growers throughout Michigan.

The descriptions of symptoms, environmental conditions favoring disease, methods of transmission and recommended control are brief, but complete. The calendar indicates the month in which symptoms appear and the plant part showing the symptom. More detailed information, including photos of disease symptoms, is available in the soybean disease compendium

and in Extension bulletins. Contact your county Cooperative Extension Service office or the MSU Bulletin Office to obtain these publications. For information on resistant hybrids and varieties, chemical control and other measures, consult recent literature, competent area specialists, Extension plant pathologists or informed seed suppliers.

SOYBEAN DISEASES

DISEASE	MONTH SYMPTOMS APPEAR					PLANT PART SHOWING SYMPTOMS				
	MAY	JUNE	JULY	AUG.	SEPT.	ROOT	LEAVES	STEM	POD	SEED
Seedling Blight	•	•				•		•		
Phytophthora Root Rot	•	•	•	•	•	•		•	•	•
Pod and Stem Blight				•	•			•	•	•
Stem Canker			•	•	•			•	•	•
Brown Spot		•	•	•	•			•	•	•
Bacteria Blight		•	•	•	•			•	•	•
Bud Blight			•	•	•			•	•	•
Anthraxnose					•			•		
Brown Stem Rot			•	•	•			•		
Downy Mildew			•	•	•			•		
Soybean Mosaic Virus		•	•	•	•			•		•
Black Root Rot	•	•				•				
Charcoal Rot			•	•	•			•		
Purple Seed Stain					•					•
White Mold				•	•			•	•	•
Fusarium Root Rot		•	•	•	•	•				
Rhizoctonia Root Rot			•	•	•	•				

SOYBEAN DISEASES

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS FAVORING DISEASE	METHOD OF TRANSMISSION	RECOMMENDED CONTROL	SPECIAL NOTES
Seedling Blights (<i>Pythium</i> spp. <i>Fusarium</i> spp. <i>Rhizoctonia</i> spp.)	Seed decays before or after emergence; seedlings wilt and die; roots and lower portion of stems rot.	Cold, wet soils in spring.	Fungi survive in soil, on crop residue and attack seedlings when environmental conditions favor infection.	Plant clean, undamaged seed into properly prepared seedbeds; use certified seed or seed with germination tests above 85%.	
Phytophthora Root Rot (<i>Phytophthora megasperma</i> var. <i>sojae</i>)	Germinating seed decays before or after emergence; seedlings wilt and die; older plants yellow, wilt and show dark discoloration on lower stems; roots of older plants rot.	Low, poorly drained areas, as well as higher ground during wet weather; <i>Phytophthora</i> develops most rapidly at temperatures above 75°F.	Fungus survives in the soil and on crop refuse.	Plant varieties with multi-race resistance or high field tolerance. Seed treat tolerant varieties with <i>Apron</i> to help reduce losses.	Over 20 races of this pathogen have been identified.
Pod and Stem Blight (<i>Diaporthe phaseolorum</i> var. <i>sojae</i>)	Numerous small fruiting bodies (called pycnidia) appear on stems, petioles, and pods of mature plants; seedlings may be stunted; infected seeds shrivel and crack, cotyledons of seedlings vary from almost colorless to bright red or brown. Lesions vary from pin point size to areas covering the whole cotyledon.	Wet, warm weather at mid-pod stage or later.	Pathogen survives on pods, and crop residue; seed-borne; spores spread by wind and splashing rain.	Plant disease-free seed; seed treatment may not increase stands. Fungicidal sprays may improve seed quality.	Affects seed quality; may cause a seedling decay. Very little yield loss associated with this disease.
Root Rots (<i>Fusarium</i> spp.)	Outer root tissues decay just below ground. Lesions are red. Plants may be stunted, but rarely die.	Hot, dry weather.	Pathogen survives in soil and infects the root.	None recommended.	Following rain, decay may disappear as new cells develop beneath the decay.
Root Rots (<i>Rhizoctonia solani</i>)	Older plants girdled by lesion at soil line cause wilting and death.	Hot, dry weather.	Pathogen survives in soil and infects roots.	None recommended.	

SOYBEAN DISEASES *Continued*

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS FAVORING DISEASE	METHOD OF TRANSMISSION	RECOMMENDED CONTROL	SPECIAL NOTES
Downy Mildew (<i>Peronospora manshurica</i>)	Light-green spots appear on upper leaf surfaces and later become yellow to brown with yellow-green margins. On lower leaf surfaces in moist weather, lesions become covered with fuzzy tufts of grayish to pale downy mildew fruiting structure.	High humidity and temperatures of (68° to 72°F).	Fungus survives in crop residue and on seed; in wind-blown spores and infected seed; sporulation occurs between 50° and 77°F; no sporulation occurs above 86°F or below 50°F.	Plant disease-free seed; clean plow; rotate crops away from soybeans for 1 year.	
Soybean Mosaic Virus (SMV)	Light and dark green mosaic pattern occurs on leaves, causing a crinkled appearance. Plants are stunted. Dark discoloration of seed occurs.	Cool weather.	Seed-borne and aphid-transmitted.	Use seed from SMV-free fields, plant resistant cultivars; rogue out infected plants when first found.	
Black Root (<i>Thielaviopsis basicola</i>)	Infected seedlings may be killed or stunted. Older plants may wilt under drought stress. Dark brown to black roots and hypocotyl, tap roots often rot away.	Cool soil temperatures (61° to 68°F).	Pathogen survives in soil and infected tissues as chlamydospores for long periods.	Plant resistant varieties; avoid the herbicide chloramben in soils where <i>T. basicola</i> is present. Plant later to avoid cold soils.	
Charcoal Rot (<i>Macrophomina phaseolina</i>)	Leaves yellow, wilt and remain attached; tiny black sclerotia, are present beneath the stem epidermis, which resemble a sprinkling of powdered charcoal.	High temperatures; hot, dry weather favors development on older plants.	Sclerotia in dry soil and residue; infects through roots.	Rotate crops; irrigate to keep soil moisture high; avoid overplanting; fertilize for vigorous growth.	
Purple Seed Stain (<i>Cercospora kikuchii</i>)	Pale to dark purple discoloration of seed coat occurs; seedling emergence is reduced.	Warm, humid weather.	Seed-borne; spores produced on infected cotyledons; rain-splashed or wind-blown onto pods.	Use clean, uninfected seed.	

SOYBEAN DISEASES *Continued*

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS FAVORING DISEASE	METHOD OF TRANSMISSION	RECOMMENDED CONTROL	SPECIAL NOTES
Bud Blight Tobacco Ring Spot Virus (TRSV)	Before flowering, apical buds and shoots turn brown, curve downward and become dry and brittle; young leaves look rust flecked; plants dwarf and produce no seed. Infection during flowering produces small, undeveloped pods; after flowering, infection causes poorly filled pods with dark blotches.	Wide range of environmental conditions.	Infected seed, and some insect transmission.	Use seed from healthy plants.	
Anthraxnose (<i>Colletotrichum dematium</i> var.)	Small, shallow, elongated, reddish-brown lesions or large dark lesions appear on stems; stems of mature plants become covered with small, black fruiting structures.	Warm, wet weather.	Fungus remains on crop residue in soil; spores are wind-borne.	Plant disease-free seed; treat seed; rotate crops; manage residue; apply foliar fungicide.	Occurs mostly on older plants, especially as plants start to senesce.
Brown Stem Rot (<i>Phialophora gregatum</i>)	Center of stems are brown; external stems may also turn brown, causing wilt and premature leaf drop. Leaves often have a distinct brown color along the veins; in severely infected plants, leaves may appear frost-injured.	Cool weather.	Fungus survives on crop residues in the soil; infection occurs through roots and lower stems.	Plant resistant varieties; rotate crops.	Split lower stems longitudinally to diagnose disease.

SOYBEAN DISEASES *Continued*

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS		RECOMMENDED CONTROL	SPECIAL NOTES
		FAVORING DISEASE	METHOD OF TRANSMISSION		
Stem Canker (<i>Diaporthe phaseolorum</i> var. <i>caulitiora</i>)	Small, superficial, reddish-brown lesions appear on leaf scar; lesions rapidly enlarge to form a sunken, reddish-brown canker that girdles stem and kills plant; invaded tissues are brittle; plants break easily at the canker; older lesions turn brown to chocolate-colored or black.	Warm, humid weather. A mean daily temperature of 70°F is optimal.	Fungus survives in soil, on crop residue, and is seed-borne; spores spread by wind and infected seed.	Plant high quality, disease-free seed. Rotate and plow under crop residue.	
Brown Spot (<i>Septoria glycinis</i>)	Irregular dark brown spots up to 1/4" in diameter appear on leaves. Leaves may turn yellow and drop off.	Cool, moist weather in May, early June and September.	Pathogen survives on infected crop debris. Spores spread by wind and splashing rain.	Rotate crops. Plant disease-free seed.	
Bacterial Blight (<i>Pseudomonas syringae</i> pv. <i>glycinia</i>)	Small, angular, translucent, water-soaked, yellow to light brown spots appear on leaves; centers dry out, turn reddish-brown to black; surrounded by a water-soaked margin bordered by a yellowish-green halo.	Cool, wet weather.	Bacteria survives in crop residues and seed; spread by splashing rain and cultivating equipment.	Rotate crops; plant disease-free seed; avoid cultivating wet foliage.	

SOYBEAN DISEASES *Continued*

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS FAVORING DISEASE	METHOD OF TRANSMISSION	RECOMMENDED CONTROL	SPECIAL NOTES
White Mold (<i>Sclerotinia sclerotiorum</i>)	Upper leaves wilt and eventually die; leaves turn grayish-green but later turn brown and remain attached to stem. Water-soaked lesions appear on the stem and progress up and down from the infection site. Lesions girdle the stem, shutting off water and nutrients to the upper foliage. Pod development and fill are greatly reduced above the lesion. Cottony mycelium on diseased parts is characteristic. Large, black, round to irregularly shaped sclerotia form on and in stems among white mycelium.	Prolonged periods of cool soil temperatures and high soil moisture favor the development of fruiting structures. High humidity is required for infection to occur.	Sclerotia germinate in the field by producing apothecia. Ascospores are ejected from the asci and are wind-borne to blossoms, the only part where initial infections occur.	Avoid rotation with common beans, sunflowers and other susceptible hosts. Plant rows wider than 20 in. Avoid planting tall, viney varieties that lodge and form a canopy that maintains high humidity. Use chemical spray during early bloom to help reduce severity.	Sclerotia survive in the soil for many years; they are highly resistant to many fungicides, prolonged freezing and thawing.

See also Extension bulletins E-1418, *Soybean Diseases I*, E-1419, *Soybean Diseases II* and E-1511, *Phytophthora Root and Stem Rot of Soybeans*.



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