This reference guide provides information regarding symptoms, risk factors, and management options in order to help improve diagnoses of above- and below-ground diseases that may affect soybean production during the growing season.

Soybean Cyst Nematode (SCN) 
(*Heterodera glycines*)

**Symptoms:** roots have small, white to tan protrusions (body of the female nematode), which are smaller than nitrogen-fixing nodules; slow to incomplete canopy closure; stunting and chlorosis at high SCN numbers

**Risk factors:** survives in the soil; growth and development are favored by soil temperatures between 75 and 82°F; several legume weed species support SCN reproduction

**Management:** resistant cultivars; crop rotations (2–3 years); weed control

Brown Stem Rot (BSR)
(*Phialophora gregata f.sp. sojae*)

**Symptoms:** foliar symptoms similar to those for soybean Sudden Death Syndrome (SDS); yellow to brown discoloration of the leaves around the veins initially appearing at R4; upward curling of the leaves; chocolate brown discoloration of the vascular and pith tissues

**Risk factors:** overwinters in soybean debris; favored by cool temperatures (60–80°F) and good soil moisture before flowering followed by warm and dry temperatures during pod fill; soil pH ≤ 6.5

**Management:** resistant cultivars; crop rotations (≥ 3 years); tillage
White Mold or Sclerotinia Stem Rot
*(Sclerotinia sclerotiorum)*

**Symptoms:** Stems appear watery then gray to white in color; cottony growth (mycelium) on stem, petioles, and pods; small, black structures (sclerotia) can be found within mycelium or within the stems; wilting; plant death

**Risk factors:** Overwinters as sclerotia; large host range; favored by cooler temperatures (≤ 80°F), rain, fog, high humidity, and dense canopy at flowering

**Management:** Cultivars with partial resistance; decrease seeding rate; reduce tillage; foliar fungicides for susceptible cultivars; crop rotations (≥ 1 year)

Sudden Death Syndrome
*(Fusarium virguliforme)*

**Symptoms:** Foliar symptoms similar to those for BSR; yellow to brown discoloration of the leaves around the veins that begin as small, circular spots; roots can be black and rotted with a slightly blue hue due to growth of the fungus

**Risk factors:** Overwinters in soybean debris and in the soil as chlamydospores (resistant fungal structures); favored by high soil moisture during vegetative growth and cool temperatures around flowering

**Management:** Resistant cultivars; rotations (≥ 3 years); later planting when soil temperatures are warm; tillage to increase soil temperature; increase drainage

Northern Stem Canker
*(Diaporthe phaseolorum var. caulivora)*

**Symptoms:** Reddish brown to black discoloration (lesion) on stems and petioles first appearing at R1; lesion originates at the nodes, appears sunken, and may girdle the stem; yellow and brown discoloration of leaves around the veins; wilting; plant death associated with petiole and leaf retention

**Risk factors:** Overwinters in soybean debris; seedborne; favored by warm temperatures (82–93°F) and prolonged rain before flowering followed by a period of dry weather; host range includes several legume plants

**Management:** Resistant cultivars; tillage; fungicide seed treatments; avoid fields recently cropped to alfalfa
**Pod and Stem Blight**  
(*Diaporthe phaseolorum* var. *sojae*)

**Phomopsis Seed Decay**  
(*Phomopsis longicolla*)

**Symptoms:** visible on mature, wounded, or dead tissues; small, raised, black specks (pycnidia), usually arranged in linear rows; seeds may be white to gray or brown in color, shriveled, and/or have cracks in the seed coat

**Risk factors:** overwinters in soybean debris; favored by prolonged periods of rain, high relative humidity (100%), and temperatures \( \geq 68^\circ F \) during pod development and pod fill

**Management:** harvest mature plants promptly; tillage; fungicide seed treatments; foliar fungicides from mid-flower to beginning maturity

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**Phytophthora Stem and Root Rot**  
(*Phytophthora sojae*)

**Symptoms:** seed rot or seedling death; after V4, plants develop a brown to black lesion that extends above and below the soil surface; root rot; leaves turn yellow and petioles droop; wilting where tip of plant forms a shepherd's hook; plant death associated with petiole and leaf retention

**Risk factors:** overwinters in soil and soybean debris as oospores (highly resistant fungal structures); favored by high soil moisture when soil temperatures are between 60 and 77°F

**Management:** cultivars with partial or race-specific resistance; avoid low-lying areas with poor drainage; systemic fungicide seed treatments

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**Bacterial Blight**  
(*Pseudomonas syringae* pv. *glycinea*)

**Symptoms:** similar to those observed for brown spot; occurs on younger leaves, stems, petioles, and pods; symptoms begin as small, angular, watery, brown to reddish brown spots (lesions) surrounded by a yellow halo; lesions may enlarge and grow together; infected seed may become slimy

**Risk factors:** overwinters in soybean debris; seedborne; favored by stormy weather/rain accompanied by cooler temperatures (75–78°F)

**Management:** resistant cultivars; tillage

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**Brown Spot**  
(*Septoria glycines*)

**Symptoms:** similar to those observed for bacterial blight; occur mainly on older leaves; symptoms begin as irregular, red to brown spots (lesions) varying in size and surrounded by a yellow halo; lesions enlarge and grow together becoming dark brown to black in color; leaves become yellow to orange-brown in color and drop prematurely

**Risk factors:** overwinters in soybean debris; seedborne; favored by rain with prolonged periods of leaf wetness (\( \geq 6 \) hours) and warmer temperatures (77–83°F)

**Management:** crop rotations (\( \geq 1 \) year); foliar fungicides from R1 to R6

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**Asian Soybean Rust**  
(*Phakospora pachyrhizi*)

**Symptoms:** visible on leaves, stems, petioles and pods; symptoms first appear on lower leaves, on the underside, and along veins; symptoms begin as gray to green specks that enlarge, becoming tan, brown, or reddish brown; leaves turn yellow and abscise

**Risk factors:** rust spores (urediniospores) are wind-blown from the southern U.S.; favored by temperatures between 59 and 86°F with extended periods of leaf wetness (\( \geq 8 \) hours) and high relative humidity (75–80%)

**Management:** preventative fungicides before symptom development when risk factors are present (www.sbrusa.net); curative fungicides when \( \geq 10\% \) of plant is expressing symptoms; early planting

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**Frogeye Leaf Spot**  
(*Cercospora sojina*)

**Symptoms:** primarily seen on leaves but can occur on stems, pods, and seeds; brown to reddish brown, irregularly shaped spots (lesions) with a light brown to gray center and a red to purple margin; seeds develop areas of gray to brown discoloration

**Risk factors:** overwinters in soybean debris; seedborne; favored by warm temperatures (77–86°F) and high relative humidity (\( \geq 90\% \)); prolonged periods of rain and wind

**Management:** resistant cultivars; crop rotations (\( \geq 2 \) years); tillage; foliar fungicides applied from flowering through early pod fill
Leaf Spot and Purple Seed Stain  
(Cercospora kikuchii)

**Symptoms:** similar to sunburn; upper leaves develop reddish to purple discoloration during pod fill; seeds are reduced in size and develop a light to dark purple discoloration

**Risk factors:** overwinters in soybean debris; seedborne; favored by extended periods of warm temperatures (75–86°F), high relative humidity (≥ 92%), and prolonged leaf wetness (18–24 hours)

**Management:** resistant cultivars (leaf spot and purple stain controlled by different resistance genes); fungicide seed treatments; foliar fungicides

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Downy Mildew  
(Peronospora manshurica)

**Symptoms:** pale green to yellow specks on the upper surface of leaves with matching areas of gray fluff (mycelium) on the underside; seeds appear whitish to gray in color

**Risk factors:** cool temperatures (68–72°F) with a prolonged period of leaf wetness (6–12 hours)

**Management:** resistant cultivars; tillage; fungicide seed treatment; crop rotations (≥ 1 year)

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Powdery Mildew  
(Microsphaera diffusa)

**Symptoms:** white, powdery areas on the surface of leaves, stems, petioles, and pods

**Risk factors:** overwinters as cleistothecia (resistant fungal structures) on soybean debris; favored by low humidity and cool temperatures between 64 and 75°F; infection can occur from windblown spores

**Management:** resistant cultivars; foliar fungicides