

G1545

## Brown Spot of Soybean

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Brown spot disease of soybean may affect crop development in Nebraska, but rarely decreases yields. Learn how to differentiate it from soybean rust and implement cultural practices to manage it.

Brown spot is caused by the fungus *Septoria glycines* and may be called Septoria leaf spot. It was first reported in the United States in 1923 in North Carolina soybeans and is now widely distributed through the north central states, the mid Atlantic states, and the southeastern United States. In addition, it also occurs in many other temperate soybean growing regions of the world.

Brown spot (*Figure 1*) rarely affects soybean yield in Nebraska. In some years it may hasten maturity by causing premature defoliation. Yield loss estimates due to brown spot range from 8 percent to 15 percent nationally and occur when 25-50 percent of the canopy prematurely defo-

liates. Severe brown spot infection usually results in smaller seed size. The disease is most severe when soybean is grown continuously in the same field, particularly in reduced tillage fields, since this is a residue-borne disease.

### Symptoms

This disease is easily confused with soybean rust. Proper diagnosis is critical and should be confirmed by a diagnostic laboratory if there is any doubt. Brown spot lesions are irregularly shaped, light-brown spots found primarily on leaves, but also on stems, petioles and pods. Significant differences between brown spot and soybean rust are that brown spot lesions can be larger than soybean rust lesions and are typically surrounded by a chlorotic halo. Brown spot lesions will not have a pustule (raised center) or spores that are visible (on leaf underside) with a 20X hand lens as is characteristic of soybean rust.

Infection generally begins on the cotyledons and unifoliate leaves (lowest true leaves) when the weather is warm and wet. The disease progresses up the plant and the trifoliate leaves soon develop symptoms with lesions, initially appearing as irregular light brown spots and later turning a blackish-brown color (*Figure 2*). At this stage, lesions are small but vary in size from minute specks to 1/8 inch (4 mm) in diameter. As the infection progresses, leaves become yellow and drop off the plant (*Figure 3*). Often lesions will enlarge and merge to form blotches. Infected leaves turn rusty brown and drop from the plant as the season progresses.

Brown spot also can infect the petioles, seeds, pods and stems of soybean. The pods and stems of infected plants will be marked by irregular brown lesions with indefinite borders. The lesions vary greatly in size. No visible symptoms of infection are observed on seed.



**Figure 1.** Initial symptoms of brown spot on a lower canopy trifoliate leaf.



**Figure 2. Lesions of brown spot on the (A) leaf underside and (B) corresponding upper surface of the leaf.**



**Figure 3. More advanced symptoms of brown spot on yellowing leaves prior to defoliation.**

### **Disease Development**

The primary source of the brown spot fungus in the spring is infected leaf and stem debris from the previous soybean crop. Spores or conidia are carried from the soil surface or debris to the plant by wind or splashing rain. Infection and disease development are favored by warm, moist weather, which promotes spore production in the primary lesions. Secondary spores produced on lesions in the cotyledons are blown to adjacent trifoliate leaves and under favorable conditions will initiate new infections. Temperatures of 59-86°F and high relative humidity are optimal for brown spot disease development. A leaf wetness period of six or more hours is required for the fungus to enter the stomata and infect the plant.

No other plant species has been found to be susceptible to the brown spot fungus under field conditions.

### **Management**

While brown spot does not usually affect soybean yield in Nebraska, it does become progressively more severe when soybean is grown continuously in the same field. Management may require various tactics to reduce disease severity and yield loss. These would include:

**Crop rotation.** If infection becomes progressively severe, rotate out of soybeans for at least one year.

**Tillage.** Soybean debris in fields with high levels of brown spot infection should be incorporated into the soil with tillage to increase the rate of decay of these plant tissues.

**Resistance.** Complete resistance of soybeans to brown spot has not been found; however, varieties will respond differently as tolerance to this disease varies.

**Fungicide.** Fungicides applied to soybeans between bloom and pod fill can reduce brown spot severity and increase yield in fields where this disease is a significant problem.

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