

Soybean Bacterial Blight and Brown Spot

Bacterial blight and brown spot are two of the most common soybean diseases in Iowa and the Midwest. Although a bacterium causes bacterial blight and a fungus causes brown spot, the two diseases have many similar features. In Iowa, both are commonly observed starting in June, but are sometimes seen sooner. The two diseases often occur together in the same fields, on the same plants, and even on the same leaves. Bacterial blight and brown spot require similar weather conditions for growth and also can be managed with the same methods. Symptoms of the two diseases are difficult to separate and are easily misidentified.

Bacterial Blight

Bacterial blight can be found in almost every soybean field in any given year. It is caused by *Pseudomonas syringae* pv *glycinea*. Young leaves are most susceptible to the bacterial infection; therefore, the disease is first noticeable on the top of the plants. New lesions are small yellow to brown spots on leaves. The lesions dry out, turn reddish brown to black, and become surrounded by a yellowish green halo (Figures 1 and 2). The halo is a feature that does not appear in specimens with brown spot. The small lesions may enlarge and merge to produce large, irregular, dead areas. The old lesions sometimes drop out or tear away, resulting in the ragged appearance of infected leaves (Figure 2). The bacteria also can infect stems, petioles, and pods.



Figure 1. Leaf symptom of bacterial blight.



Figure 2. Leaf with severe bacterial blight (close view).

If pod infection occurs, bacterial blight can become seedborne. Infected seeds may eventually be covered with a slimy bacterial growth, which is not very noticeable in the field.

The bacteria that cause bacterial blight survive in seeds or infested soybean debris. Infested crop debris in the field is the major source of inoculum. During a growing season, the bacteria are dispersed by rain and wind. They attack soybeans as early as growth stage V1, first true leaf (Figure 1), but can develop at any later growth stage. The time that bacterial blight develops depends on weather conditions. The optimum temperature for infection is 75 to 79° F. The disease is frequently observed in areas with heavier rainfall. Frequent rain in the early season results in early infection, which provides more bacteria for disease development. Yield losses may occur if there is a severe defoliation in the season.

Brown Spot

Brown spot, also known as *Septoria* leaf spot, is a fungal disease caused by *Septoria glycines*. The fungus normally infects aged leaves in the lower portion of plants. Symptoms of the disease include irregular, dark brown spots on both upper and lower leaf surfaces. Adjacent lesions frequently merge to form irregularly shaped blotches. Figure 3 compares a leaf infected with brown spot (left) to a leaf infected with bacterial blight (right). In the early stage of development, bacterial blight lesions have a yellow halo, but brown spot lesions do not. Brown spot lesions are chocolate brown to blackish brown in color.

Like bacterial blight, brown spot occurs in Iowa every year in every field. The brown spot pathogen also survives

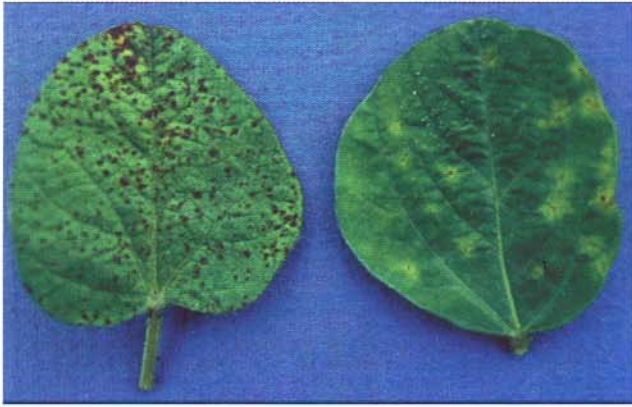


Figure 3. Comparison of brown spot (left) and bacterial blight (right).

in crop residue and can be seedborne. Splashing rain carries the fungus from the soil to soybean plants. Frequent rainfall is the primary condition for the occurrence of an epidemic. In a wet summer, the disease progresses from lower to upper leaves rapidly. Normally brown spot causes no significant yield losses unless premature defoliation occurs (Figure 4). Premature defoliation is caused by extremely heavy rainfall and can result in yield losses up to 15 percent (Figure 5).

Because the brown spot pathogen infects aged leaves, soybeans weakened by other diseases or improper farming practices become susceptible. Relatively high levels of brown spot occur in fields where severe soybean cyst nematode damage has occurred. Soybeans with *Fusarium* root rot also are more affected by brown spot.



Figure 4. Premature defoliation by brown spot.

Scouting

Scouting helps estimate disease damage and aids management decisions for the next soybean crop. Scout early; bacterial blight and brown spot are difficult to identify



Figure 5. Spread of brown spot in field during a rainy season causing premature defoliation.

in mature soybeans. When scouting for the two diseases, the following types of fields may need more attention: (1) continuous soybean fields, (2) no-till soybean fields, and (3) fields planted with seeds from last year's infected soybeans.

To assess yield losses, consider the growth stage of the disease when it is discovered, the severity of the disease, and future weather. If the upper parts of plant are severely defoliated at growth stage R2 to R3, yield losses up to 10 percent for bacteria blight or up to 15 percent for brown spot may occur, according to Illinois studies. If severe infections affect only the lower leaves, and upper leaves are not dropped significantly, a minimum yield reduction may occur. With only light infections on lower leaves and a dry season, no yield reduction is expected.

Management

Management procedures for the two diseases are similar. The following farming practices are recommended:

1. Use disease-tolerant varieties. No resistance is available, but field tolerances have been observed. Avoid using susceptible cultivars.
2. Use disease-free seeds. If you find severe infections and are going to save your seed for planting, check the quality of your seeds.
3. Rotate soybeans with corn or alfalfa.
4. Completely bury soybean residue by clean tillage. This reduces disease risk significantly.

The last two measures, which reduce infested soybean residues, tend to be more effective and economical.

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