



BEST MANAGEMENT PRACTICES

Chapter 58: Bacterial Diseases of Soybeans



Connie L. Strunk (Connie.Strunk@sdstate.edu)
Marie. A.C. Langham (Marie.Langham@sdstate.edu)

The two main bacterial diseases found in South Dakota soybeans are bacterial blight and bacterial pustule. These diseases are often spread from plant to plant by wind and rain and through natural openings or wounds caused by high winds, hail, insects, and other causes. Symptoms associated with bacterial diseases include leaf spots, water-soaked lesions, blights, and wilting. Keys for better understanding bacterial problems are provided in Table 58.1. The purpose of this chapter is to discuss the biology and management options associated with bacterial blight and bacterial pustule.

Table 58.1. Keys for an improved understanding of bacterial blight and bacterial pustule.

1. Foliar fungicides do not offer protection against bacterial diseases, because bacterial diseases are caused by a bacterial pathogen, not a fungal pathogen.
2. Plant disease-tolerant cultivars and varieties, use pathogen-free seed, and use appropriate rotations.
3. Bacterial blight is generally found early in the growing season.
 - *Pseudomonas savastanoi* pv. *glycinea* is splashed onto healthy plant tissues by wind and rainfall.
4. Bacterial pustule is commonly confused with Asian soybean rust.
 - *Xanthomonas axonopodis* pv. *glycines* overwinters on crop residues and is spread by wind-blown rain, rain splashing up from the soil, and often during cultivation when the foliage is wet. Bacteria gain entrance to the plant through natural openings and wounds. Bacterial pustules develop in warm (85-90°F), moist conditions.
5. Copper fungicides can be used for bacterial blight and pustule management early in the disease cycle. However, copper fungicides are not as effective on bacterial infection as on fungal problems.

Bacterial Blight

In South Dakota, soybean bacterial blight infection is a widespread occurrence that is often found early in the growing season. Dry hot summer weather provides a natural check (stop) to continued disease development.

Symptoms

Small, angular, translucent, water-soaked, yellow to light brown lesions (spots) are often found on soybean leaves, but may also be found on soybean stems, petioles, and pods. As these lesions begin to age they turn color; starting with yellow, turning to reddish-brown, and then to black, leaving a yellowish-green halo (border) around the edge of the water-soaked tissue (Fig. 58.1). As time continues the centers of the lesions will drop out or tear away and leave a rugged, torn appearance especially after a rainstorm event (Fig. 58.2).



(Left) Figure 58.1. Bacterial blight on soybean. Yellow-green halo is observed surrounding the brown lesions. (Photo courtesy of Clemson University – USDA Cooperative Extension Slide Series)

(Right) Figure 58.2. Aged lesions eventually fall out of the leaf giving the foliage a torn and ragged appearance. (Photo courtesy of Howard F. Schwartz, Colorado State University)

Bacterial blight biology and life cycle

Bacterial blight on soybean is caused by the bacterium *Pseudomonas savastanoi* pv. *glycinea*. This bacteria over-winters in crop residues in the field. Cool, wet weather (70-80°F) favors infection throughout the growing period. Inoculum in crop debris is splashed onto healthy plant tissues by wind and rainfall. Infection typically occurs early in the season as disease development is reduced in hot, dry conditions. Bacterial blight may also be transmitted through infected seeds.

Management

1. Plant disease-tolerant cultivars and varieties. Make sure to use pathogen-free seed.
2. Crop Rotation. Rotate soybeans with a non-legume.
3. Residue management/Tillage. Bury infested soybean residue to reduce risk of disease. Avoid cultivation when foliage is wet.
4. Copper fungicides can be used, but must be applied early in the disease cycle to be an effective control measure. Just a word of caution when using copper fungicides to treat a bacterial infection: they are not as effective when used as a bactericide as they are as a fungicide for disease control. They are not considered a simple curative measure for control of a bacterial infection.

Bacterial Pustule

Bacterial pustule has been found in South Dakota. Due to the pustule formation, this disease is commonly confused with Asian soybean rust (which has not been found in South Dakota). Unlike bacterial blight, it is important to note that bacterial pustule is not checked by warm temperatures and will continue to spread infection.

Symptoms

Early symptoms include small, light green spots with raised centers (Fig. 58.3) which are found on either side of the leaf but are often observed on the lower leaf surface (Fig. 58.4). As disease progression continues, light-colored pustules often develop in the center of the lesion. As lesions grow together, they form large, irregular areas (patches) of dead tissue (Fig. 58.5). Leaves often have a ragged appearance when the dead tissue has been removed from the leaves due to wind or rain.

Bacterial pustule biology and life cycle

Bacterial pustule on soybean is caused by *Xanthomonas axonopodis* pv. *glycines*. This bacteria overwinters on crop residues and is spread by wind-blown rain, rain splashing up from the soil, and often during cultivation when the foliage is wet. Bacteria gain entrance to the plant through natural openings and wounds. Bacterial pustule develops in warm (85-90°F), moist conditions.

Management

1. Plant disease-tolerant cultivars and varieties. Make sure to use pathogen-free seed.
2. Crop Rotation. Rotate soybeans with a non-host crop such as corn.
3. Residue management/Tillage. Bury infested soybean residue to reduce risk of disease. Avoid cultivation when foliage is wet.
4. Copper fungicides can be used, but must be applied early in the disease cycle to be an effective control measure. Just a word of caution when using copper fungicides to treat a bacterial infection: they are not as effective when used as a bactericide as they are as a fungicide for disease control. They are not considered a simple curative measure for control of a bacterial infection.



(Left) Figure 58.3. Early symptoms of bacterial pustule infection include small, light green spots with raised centers. (Photo courtesy of Daren Mueller, Iowa State University)

(Right) Figure 58.4. Bacterial pustule on underside of soybean leaf. Pustules often have a raised center. (Photo courtesy of Martin Draper, USDA-NIFA)



Figure 58.5. Bacterial pustule shown on surface of soybean leaf. Lesions grow together and form large, irregular patches of dead tissue. (Photo courtesy of Adam Sisson, Iowa State University)

References and additional information

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