

Mark Jeschke, Ph.D., Agronomy Manager

KEY POINTS:

- Brown stem rot infects roots early in the season, but symptoms of vascular system damage usually appear in mid-summer.
- Development is favored by moderate temperatures (60 to 80 °F) and soil moisture is near field capacity.
- Infection causes vascular and pith tissues to turn brown to reddish-brown.
- Soybean varieties are rated for genetic resistance to brown stem rot.

DISEASE FACTS

- Caused by *Phialophora gregata*, a fungus that survives in soybean residue.
- Widely established throughout the North Central U.S., where soybeans are its only host.
- There are two known strains – strain A is highly aggressive, and strain B is mild.
- Fungus infects roots early in the season, but symptoms of vascular system damage usually appear in mid-summer, during reproductive development.
- Fungus is not carried with seed, and minimal amounts of inoculum are carried with soil adhering to farm equipment.



Figure 1. Mature soybean stem infected by brown stem rot.

CONDITIONS FAVORING DISEASE DEVELOPMENT

- Brown stem rot (BSR) development is greatest between 60 and 80 °F (16-27 °C).
 - Higher temperatures inhibit BSR – little or no disease develops above 90 °F (32 °C).
- Severity and incidence of BSR is greatest when soil moisture is near field capacity, which is also optimal for crop development.

- Symptoms worsen if disease development is followed by drought stress during pod fill.
- Severity increases when soil pH is near 6.0 and is less severe at pH of 7.0 or greater.
- BSR may be more severe in fields where SCN is also a problem.



Figure 2. Susceptible variety on left, resistant variety on right.

Phialophora gregata Disease Cycle:

- Survives in infected soybean residue left on soil surface.
- Pathogen does not produce survival structures – survival is totally dependent on soybean residue.
- Fungus can continue to reproduce throughout the winter, influencing inoculum levels in the spring.
- Conidia (spores) are produced in the spring.
- Infection of new soybean crop occurs through roots (by growth stage V3) and progresses to stems.
- Infected stems become inoculum source for next disease cycle.

IMPACT ON CROP

- BSR infection progresses from roots to vascular system (water and food-conducting system) of soybean plants.
- Infection causes a gradual disruption of the vascular system.
- Premature plant death may occur, especially if heat and drought stress impacts badly diseased plants.
- Degree of yield loss depends on environmental conditions, variety, and fungal strain.
 - BSR strain A causes more damage and may reduce yields up to 40% when severe.



Figure 3. Foliar symptoms of brown stem rot.

STEM SYMPTOMS

- BSR infection causes vascular and pith tissues to turn brown to reddish-brown (pith discoloration is a characteristic/distinguishing symptom).
 - Split stems longitudinally to inspect for BSR.
 - Check at and between nodes near the soil line.
- The height of internal stem discoloration is a measure of BSR severity.
 - When disease is severe, discoloration is continuous from the base of the plant upwards.
 - When disease is less severe, discoloration only occurs at nodes, with healthy, white tissue between nodes.



Figure 4. Split soybean stem showing BSR infection.

MANAGEMENT

- **Select Resistant Varieties:** Soybean varieties have been continually improved for resistance to brown stem rot.
 - Screening potential new varieties in areas of high BSR incidence is key to variety improvement.
 - Corteva Agriscience rates its varieties and makes ratings available to customers.
 - For fields with a history of BSR problems, use a variety with a rating of 6 or higher.
 - Your sales representative can help you select varieties with appropriate BSR resistance and other important traits.
- **Crop Rotation:** Effective in reducing disease inoculum – two years away from soybeans is more effective than one.
- **Tillage:** Some tillage may be necessary to bury infected residue – the rate of inoculum decline is directly related to the rate of soybean residue decomposition.
- **Manage SCN:** Plant varieties resistant to both sudden death syndrome and soybean cyst nematode.
- **Sanitation is not needed:** Minimal amounts of inoculum are carried with soil adhering to farm equipment.



Figure 5. Comparison showing a soybean variety susceptible to BSR (left), and a BSR-resistant variety (right).

The foregoing is provided for informational use only. Please contact your sales professional for information and suggestions specific to your operation. Product performance is variable and depends on many factors such as moisture and heat stress, soil type, management practices and environmental stress as well as disease and pest pressures. Individual results may vary. CF210906