



Brown Stem Rot of Soybeans

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



Conditions Favoring Disease Development

- Brown stem rot (BSR) development is greatest between 60 and 80°F
 - Higher temperatures inhibit BSR – little or no disease develops above 90°F
- 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

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



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

Management

- **Select Resistant Varieties:** Pioneer® brand 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
 - DuPont Pioneer 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 Pioneer 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 SDS and SCN (soybean cyst nematode)
- **Sanitation is not needed:** Minimal amounts of inoculum are carried with soil adhering to farm equipment



Split soybean stem showing BSR infection



Left: Variety susceptible to BSR
Right: BSR-resistant variety