

Plant Pathology Fact Sheet

Stem Canker of Soybean

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IMPORTANCE

Stem canker, a disease that kills plants from midseason to maturity, can be devastating when it occurs at high incidence in a field (FIGURE 1). Fortunately for Kentucky soybean farmers, stem canker typically occurs as scattered plants or in small groupings of diseased plants; field-wide episodes are rare.

SYMPTOMS

Initial foliar symptoms may include a wilting (flagging) of the uppermost expanding leaves and interveinal yellowing and browning of fully expanded leaves (FIGURE 2). Leaf death follows, with affected leaves frequently remaining attached to the plant (FIGURE 3).

An examination of stems of affected plants will reveal tan to dark brown cankers (1 to 3 inches in length) in areas where the leaves are attached to the stems (nodes) and expanding into the base of the leaf petiole. The cankers tend to be most abundant in lower to mid stems, generally at one or more of the first eight nodes.

In the early stages of canker development, cankers are superficial and reddish-brown in



FIGURE 1. SOYBEAN FIELD IN KENTUCKY WITH PLANTS SHOWING SYMPTOMS OF SOUTHERN STEM CANKER.



FIGURE 2. INTERVEINAL YELLOWING AND BROWNING ARE INITIALLY EVIDENT ON PLANTS INFECTED WITH STEM CANKER.

color (FIGURE 4). Northern stem canker tends to have a very distinct purplish border and slightly visible concentric rings (FIGURE 5) that are generally lacking with southern stem canker. The onset of stem cankers typically occurs during the reproductive stages. Green stem tissue will usually be present both above and below individual stem cankers; this is a diagnostic symptom of the disease.



FIGURE 3. LEAVES REMAIN ATTACHED TO DISEASED PLANTS AFTER THE FOLIAGE DIES. **FIGURE 4.** REDDISH-BROWN CANKERS DEVELOP AT THE NODES OF PLANTS INFECTED WITH THE SOUTHERN STEM CANKER PATHOGEN. **FIGURE 5.** NORTHERN STEM CANKER LESIONS HAVE A DISTINCTIVE PURPLISH BORDER AND SLIGHTLY VISIBLE CONCENTRIC RINGS. **FIGURE 6.** ELONGATING CANKERS EVENTUALLY GIRDLER STEMS, RESULTING IN DEATH OF PLANTS.

As the disease progresses, cankers will enlarge longitudinally, turn dark brown to black in color, become slightly sunken, and eventually girdle stems completely (FIGURE 6). At this point, affected plants will die due to disruption of the free flow of nutrients and water in the plant. Plant death is also due to activity of a fungus-generated plant toxin. Invaded stem tissues can become brittle and cause plants to break easily at the canker. It is common to see a mix of healthy and dead branches on affected plants when cankers do not form on the main stem below the origin of branches.

CAUSE

There are two stem canker diseases that occur in Kentucky: northern stem canker, caused by the fungus *Diaporthe phaseolorum* var. *caulivora*, and southern stem canker, caused by *D. phaseolorum* var. *meridionalis*. Historically, southern stem canker has been the more common of the two diseases; however, in recent years, northern stem canker has become more common. This shift of causal species is most likely the result of shifts in soybean genetics, which is favoring northern stem canker.

DISEASE DEVELOPMENT

The fungi that cause stem canker overwinter primarily in soybean stubble from previous crops and in residue of common weeds, such as various species of morning glory. Spread of the causal fungi in seed has been reported, especially for the northern stem canker fungus. However, the importance of seed transmission in the development of either stem canker disease is not clear.

Serious outbreaks of stem canker depend on the widespread infection of plants in the early stages of vegetative plant development (V1 to V7). Infection is favored during extended periods (24 to 96 hours) of moderate temperatures (72° to 86° F) and wet weather. The most critical time is the V3 stage, the stage at which three nodes are present on the main stems of plants. When young plants are infected, some will die rather quickly. The bulk of infected plants, however, will survive the infection and become symptomless. Then, as plants enter the mid pod fill stages of plant development, cankers begin to form and the disease progresses until plants are killed.

DISEASE MANAGEMENT

Management of soybean stem canker involves a number of cultural practices, as well as timely fungicide applications.

- Plant resistant varieties.
- Plant high quality seed.
- Follow a crop rotation plan (i.e., avoid back-to-back soybean crops in a field).
- Disc residue of soybean crops with stem canker to hasten decomposition of infested crop and weed residue, which reduces the potential for stem canker to occur in subsequent soybean crops.
- Fungicide sprays with certain foliar fungicides, made prior to infection occurring at the V3 growth stage, often gives good disease control. Timing of application, however, is extremely critical. Contact your local county Extension agent or fungicide salesperson for more information on which fungicides to use.
- Avoid early planting dates (late April to early May); later planting dates may shift the susceptible V-stages to a time in the season when weather conditions are not favorable for infection.

ADDITIONAL RESOURCE

- Kentucky Integrated Crop Management Manual for Field Crops: Soybeans, IPM-3 (2009)
<http://www.uky.edu/Ag/IPM/manuals/ipm3soy.pdf>

June 2013

Photos by: Chad Lee (Figure 1) and Don Hershman (Figures 2, 3, 4, 6 & 7), University of Kentucky; and Daren Mueller, Iowa State University, Bugwood.org (Figure 5)

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