

COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Diaporthe Stem Canker of Soybean

Deloris Veney, Research Associate, Department of Plant Pathology, The Ohio State University

Dana Martin, Research Associate, Department of Plant Pathology, The Ohio State University

Dr. Anne Dorrance, Professor, Department of Plant Pathology, The Ohio State University

Diaporthe stem canker has been a rare disease in Ohio over the past two decades. However, during both 2016 and 2017 several isolated fields in the state reported losses (Figure 1). Stem canker is typically more prevalent in southern regions of the United States with increasing reports of occurrences in the Midwest.

Causal Organism

The pathogens that can cause stem canker are a part of the *Diaporthe* (teleomorph: *Phomopsis*) species complex. These pathogens also cause pod and stem blight and seed decay. There are two pathogens, previously thought to be pathovars of *D. phaseolorum*, that causes northern stem canker, while *D. aspalathi* and *D. caulivora* cause southern stem canker. *Diaporthe aspalathi* has been identified in Ohio, however, management measures for stem canker are the same whichever fungal species is present. The pathogen produces round, black stromata which give rise to perithecia. The perithecial beaks will vary in length and width. These structures will produce asci with 8 ascospores each. The species complex also includes, *D. longicolla* and *D. sojae*, respectively. Correct diagnosis can be accomplished through DNA testing.



Figure 1. Soybean with *Diaporthe* stem canker with patches of dead plants with attached leaves or early maturing plants.



Figure 2. Black zone lines are often associated with *D. longicolla* and will appear in the lower stem to upper taproot.

Symptoms and Signs

The first indication of stem canker damage usually noticed by farmers is the development of patches of premature soybean death scattered throughout a field near the end of the growing season (Figure 1). Upon closer inspection of the infected plants, symptoms will include sunken, reddish-brown to black cankers on the stem. The canker may girdle the stem, restricting water and nutrient transport and causing die-off of the plant above the canker. Early cankers will appear as reddish-brown dots near the bases of branches or leaf petioles (Figure 3). Cankers may begin forming in the late vegetative stages and expand rapidly with severe symptoms appearing in early reproductive stages. Roots and the stem below the canker will retain a healthy appearance, differentiating this disease from Sudden Death Syndrome and *Phytophthora* stem rot. However, *D. longicolla* has been associated with dark zone lines in the lower stem which can extend into the tap root (Figure 2). Interveinal foliar chlorosis, or yellow areas between leaf veins, and brown necrotic regions can develop. Leaves will remain attached to the petioles after plant death.

Disease Cycle

There are several fungi that can cause *Diaporthe* stem canker and they all can survive in plant residue for years. Seed can also harbor fungal fruiting bodies, but infested



Figure 3. Left: Stem cankers begin as reddish-brown dots at the base of a branch or leaf petiole and expand into lesions. Right: *Diaporthe* stem lesion, note the healthy tissue below the canker.

residue is generally the source of infection. Rainfall splashes the fungal spores from the residue on the soil surface onto soybean stems and a lengthy wet weather period allows for infection to take place. Infection can occur over a wide range of temperatures, but the fungus requires extended moist periods to cause disease. While infection occurs during the vegetative stage, cankers do not develop until the reproductive stage. Disease can develop to epidemic levels when rainy weather persists during the early vegetative stages of soybean growth. Secondary spore production on infected plant tissue can occur, but later infection will not have as great an impact on disease development. Additional hosts include: alfalfa, black night shade, curly dock, and morning glory. However, weeds may not show symptoms and are not a good indicator of the presence of inoculum.

Disease Management

Since the occurrence of this disease is rare in Ohio, the first step is to monitor and correctly diagnose late season diseases to determine if it is present. If *Diaporthe* stem canker is present, then you may decide to use one or more of these management strategies in order to decrease yield loss.

Host Resistance: Moderate to highly resistant varieties are available to manage stem canker. Four resistance genes on different loci have been described to protect against this pathogen, making host resistance the primary and most effective method of managing stem canker.

Healthy Seed: Do not use seed from an infected crop. This disease is seedborne and endophytic, so even if seed looks healthy, germination rates will likely be very poor.

Crop Rotation: Rotate the field to a non-host crop, such as corn, wheat, or sorghum, for growing seasons immediately following an outbreak. This will reduce the amount of viable inoculum in your field by eliminating its host for a full growing season. Do not rotate in alfalfa.



Figure 4. *Perithecia* embedded in stem tissue and can overwinter in plant debris left in the field.



Figure 5. Symptoms of Southern stem canker caused by *D. aspalathi*. Cankers are reddish brown and scattered on the main stem on left. Picture on right illustrates the internal discoloration of the pit that occurs.

Tillage: Deep plowing or any form of tillage that will aid in breaking down the *Diaporthe* colonized residue can be effective in reducing inoculum levels.

Useful References

The Crop Protection Network Website
<http://cropprotectionnetwork.org/fulllength-publications/>

APS Crop Protection and Management Collection

Plant Management Network
 Focus on Soybean
<http://www.plantmanagementnetwork.org/infocenter/topic/focusonsoybean>