Scouting for Sudden Death Syndrome in Soybean

Soybean sudden death syndrome (SDS) has become one of the leading soybean diseases in North America to reduce yield. SDS has two phases—a root rot phase and a leaf scorch phase.

**Disease cycle**

The sudden death syndrome (SDS) fungus (*Fusarium virguliforme*) survives the winter as spores in crop residue and soil. Early in the season, the fungus infects and grows in soybean roots. Infection and colonization are favored by cool, wet soil conditions. The SDS fungus produces toxins in soybean roots that are transported to leaves. As a result, interveinal yellow and brown blotches appear on the leaves, typically after flowering. Foliar symptoms are more severe after frequent or heavy midseason rains.
Symptoms

**Foliar symptoms**
Leaf symptoms include yellow and/or brown lesions between the veins (interveinal chlorosis and necrosis) while leaf veins remain green. As the disease progresses, leaves die and prematurely drop from the plant. Pods and seeds also may abort.

![Interveinal chlorosis and necrosis from SDS and Defoliated plants from SDS with petioles still attached.](image)

**Root and stem symptoms/signs**
The woody tissue in the taproot (cortex) will be brown/gray while the upper portion of the center stem (pith) remains white. Blue masses of spores may be present on the root surface under wet conditions. Root symptoms and signs may be present even if foliar symptoms are not noticeable.

![Taproot discoloration symptoms of SDS and Blue fungal growth on roots.](image)
Others issues that look like SDS

**Brown stem rot**  
(fungus: *Cadophora gregata*)

Stems will have reddish-brown discoloration in the pith, which may only be found at nodes. The stem cortex will remain a normal white/tan coloration. Leaf symptoms include interveinal chlorosis and necrosis of the youngest leaves. Leaf symptoms may not always occur. Root rot is typically not evident.

Pith discoloration in the stem distinguishes brown stem rot from SDS.

**Stem canker**  
(fungus: *Diaporthe* spp.)

A dark, red-brown canker (lesion) forms at a node outside the stem and can extend over several nodes. Lesions often do not entirely surround the stem or extend to the ground. Inside the stem there is discoloration or browning near the lesion. Leaves may have interveinal chlorosis and necrosis, but, unlike SDS, remain attached to the plant. Root rot is typically not evident.

Leaves of plants with stem canker remain attached after wilting, unlike symptoms of SDS.

**Late season potassium deficiency**  
(top dieback)

Uppermost trifoliate leaves appear yellow. Yellowing begins at leaf margins. Roots and stems will appear healthy. Symptoms occur in fields or parts of fields with low potassium.

Potassium deficiency symptoms.
Management

An integrated SDS management strategy is necessary since a single management tactic alone is not likely to provide adequate results. Management strategies include planting soybean varieties with resistance to SDS, using effective fungicide seed treatments, avoiding or reducing soil compaction, improving soil drainage in fields with recurring SDS, and maintaining proper pH and fertility levels.

Planting soybean varieties with resistance to SDS can help manage the disease. This shows the differing varietal responses of more resistant plants (back) compared to those that are more susceptible (front).

Acknowledgments

Authors
Martin Chilvers, Michigan State University; Carl Bradley, University of Kentucky; Anna Freije, Purdue University; Loren Giesler, University of Nebraska-Lincoln; Daren Mueller and Adam Sisson, Iowa State University; Damon Smith, University of Wisconsin; Albert Tenuta, Ontario Ministry of Agriculture, Food and Rural Affairs; Kiersten Wise, Purdue University

Reviewers
Emmanuel Byamukama, South Dakota State University; Anne Dorrance, Ohio State University; Doug Jardine, Kansas State University; Dean Malvick, University of Minnesota; Sam Markell, North Dakota State University; Laura Sweerts, University of Missouri

Photographs
All photos were provided by and are the property of the authors except taproot discoloration and blue fungal growth by Tom Hillyer; brown stem rot split stem by Tristan Mueller; disease cycle illustrated by Renée Tesdall.

Sponsors
The Soybean Disease Management series is a multi-state and international collaboration sponsored by the North Central Soybean Research Program (NCSRP). This project was funded in part by the Grain Farmers of Ontario through Growing Forward 2 (GF2) funding, a federal-provincial territorial initiative. The Agricultural Adaptation Council assists in the delivery of GF2 in Ontario. Contributors to this series come from land-grant universities in the North Central states and Canada.

© 2016 | All Rights Reserved | Crop Protection Network

This information is provided only as a guide, and the authors assume no liability for practices implemented based on this information.

The Crop Protection Network is a multi-state and international collaboration of university/provincial extension specialists and public/private professionals that provide unbiased, research-based information to farmers and agricultural personnel.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual’s income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA’s TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.