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Plant Pathology Fact Sheet

The Value of Wheat Residue in Soybean Cyst Nematode Management Programs

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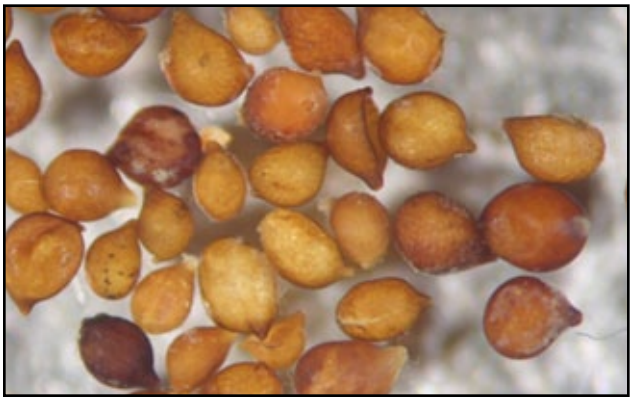
Background

Soybean Cyst Nematode (SCN; *Heterodera glycines*) is the most widespread and significant pest of soybean in Kentucky. Annual yield loss estimates range from 2 to 5 percent (700,000 to 2.5 million bushels, based on 2008 production figures).

SCN is managed primarily by rotating fields to non-host crops (such as corn) and using SCN-resistant varieties. However, for a variety of reasons, producers occasionally desire to plant a SCN-susceptible variety. In fact, based on a 2007 survey, one of the top five soybean varieties grown in Kentucky during 2007 was fully susceptible to SCN.

About 30 percent of the soybeans planted in any given year in Kentucky are planted following wheat harvest (doublecrop soybean). Doublecrop soybeans are almost always planted no-till. Full-season soybeans, which represent 70 percent of the acres planted, are commonly planted no-till, or soil is chisel-plowed and disced once or twice before planting.



SCN CYSTS EXTRACTED FROM SOIL.
(PHOTO: PAUL BACHI, UNIVERSITY OF KENTUCKY)

A multiyear study was initiated in 1990 with the objective of studying the impact of tillage and wheat residue on SCN populations and soybean yield. Earlier work done in neighboring states suggested that SCN populations were lower in no-till systems, compared to tilled production systems. But in almost all studies, results were compromised by the presence of wheat residue (usually killed prematurely to facilitate soybean planting). No data were available for true doublecrop systems. The working hypothesis at the time the study was

SCN cysts on soybean roots (at the fingertip). Notice the nitrogen-fixing *Rhizobium* nodules (at the arrow) for a size comparison.
(Photo: Greg Tylka, Iowa State University)

initiated was that SCN (and resulting soybean yields) would be impacted by tillage, but not wheat residue. The reason for conducting the study was to generate data which would help guide producers in making tillage and cropping systems decisions that would minimize damage caused by SCN.

The findings of the study[1], which were published in 1995, were exactly opposite of what was expected. We found that wheat residue, but not tillage, impacted SCN and associated soybean yields. Specifically, planting SCN-susceptible cultivars into wheat stubble reduced SCN populations at the end of the growing season by as much as 75 percent. A light discing of the wheat residue prior to planting soybeans decreased this "residue effect." SCN was not impacted by tillage regime in the absence of wheat residue.

What the Residue Effect Will Not Do

Yield loss caused by SCN is determined by the level of SCN that is present in the first 4 to 8 weeks following planting. The residue effect is not evident until very late in the season, after the bulk of SCN-related damage has already occurred. Thus, the residue effect will **NOT** protect soybeans from yield losses if SCN populations at the time of planting are above the damage threshold (greater than 500 eggs per ½ pint of soil).

What the Residue Effect Will Do

By significantly reducing end-of-season SCN populations, the residue effect may provide soybean producers with greater production flexibility for fields infested with SCN. For example, in the absence of the residue effect, SCN populations will increase greatly on a susceptible soybean during the course of a single growing season—a two- to five-fold population increase is very common! Generally, the levels are such that SCN susceptible cultivars cannot be grown more frequently than once every 4 to 6 years. This is problematic for producers who prefer to grow SCN-susceptible cultivars as frequently as possible. When SCN populations exceed the damage threshold, non-host crops, such as corn, and/or soybeans resistant to SCN, must be grown in order to avoid significant yield damage. Three years in one or the other of these crops is generally needed to negate the increased SCN populations that occur in a single year of a SCN-susceptible soybean.

Thus, the value of the residue effect is in reducing the period necessary between susceptible crops from 3 years to 2 years. On some farms, it may be possible to grow a susceptible variety every other year. However, under no circumstances should an SCN-susceptible variety be planted in a field infested with SCN in back-to-back years. In addition, always be certain to sample fields to determine SCN egg levels **PRIOR** to planting a susceptible variety. It is essential that a susceptible variety never be planted in a field where SCN is significantly above the damage threshold.

[1]Hershman, D. E., and Bachi, P. R. 1995. Effect of Wheat Residue and Tillage on *Heterodera glycines* and Yield of Double-crop Soybean in Kentucky. Plant Disease 79:631-633.

Additional Resources

Soybean cyst nematode (SCN) disease management advice can be found in the following resources. Publications from the University of Kentucky are available at County Extension Offices, as well as on the Internet.

- Soybean Cyst Nematode Website (University of Kentucky)
http://www.ca.uky.edu/agcollege/plantpathology/extension/scn.html

- Collecting Samples for Soybean Cyst Nematode Analysis (University of Kentucky)
http://www.ca.uky.edu/agcollege/plantpathology/ext_files/SCNsamplingInstructions.pdf

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

- Soybean Cyst Nematode (SCN) Management Recommendations for Kentucky (University of Kentucky)
http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/ppfsags24.pdf

- Soybean Cyst Nematode Management Guide, 5th edition (North Central Soybean Research Program, 2009)
http://www.planthealth.info/pdf_docs/SCNGuide_5thEd.pdf

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