CROPFOCUS Soybean Vein Necrosis Virus (SVNV)

Disease Facts

- First identified in 2008 in Tennessee.
- Widely established throughout AR, TN, KY, IL, MO, MS, DE, MD, VA, PA, NY and possibly IA.
- Belongs to the genus *Tospovirus*, a group of plant viruses normally transmitted by thrips.
- Because the disease is newly discovered, much is ***not yet known*** or confirmed about the disease.
- Information presented here includes ***assumptions*** based on related tospoviruses, primarily regarding:
  - alternate disease hosts, thrips vector, conditions for disease development and effects of other viruses

Conditions for Disease Development

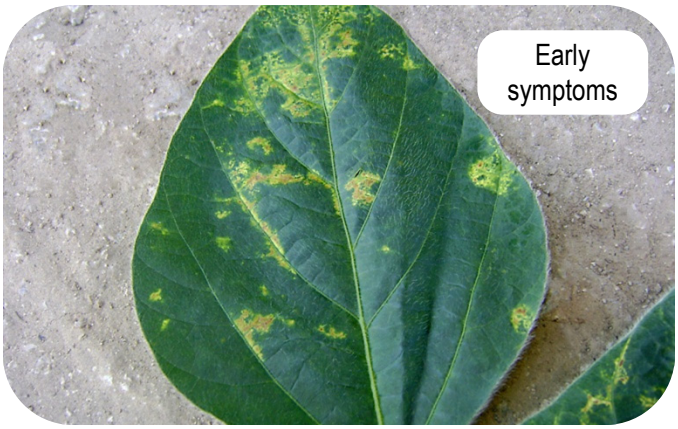
- Virus-infected alternate weed or crop hosts must be present, as well as thrips, the vectoring insect.
  - Thrips are tiny insects only 1/32 to 1/5 inch in length that reproduce quickly and feed primarily on the underside of leaves, especially along the veins. Dry, hot weather increases the threat of damage.
- Thrips must feed on infected weeds, other crop hosts or infected soybeans to acquire the virus and be capable of transmitting it.
- Environmental conditions that favor thrips growth and reproduction most likely favor disease development.

SVNV Disease Cycle

- Infected soybeans, other crop hosts or weeds are fed on by thrips larvae early in the season.
  - Feeding continues throughout the growing season if conditions favor thrips reproduction.
- Thrips acquire the virus, resulting in virus transmission throughout their life.
- Infected thrips feed on soybean plants during plant vegetative and early reproductive stages.
- Virus overwinters in southern areas in thrips and in surviving susceptible plant hosts.

SVNV Symptoms and Impact on Crop

- Early symptoms are light green to yellow (chlorotic) patches near main leaf veins, where thrips fed.
- On susceptible varieties, chlorosis progresses to necrotic (dead) tissue and eventual leaf death and desiccation.
- Lesions are restricted or progress slowly on resistant varieties. Most varieties express moderate symptoms; a few express severe leaf necrosis and canopy loss.
- In severe infections on susceptible varieties, large percentages of the plant canopy may be killed.



- Soybean growth and yield may be severely reduced in susceptible varieties or where infections occur with soybean mosaic virus (SMV), bean pod mottle virus (BPMV) or other soybean viruses or pathogens.
- Growth and yield are most often minimally impacted in resistant or tolerant soybean varieties, or when moderate infections occur later in the plant's maturity.

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Management of SVNV

- Robust disease management strategies are yet to be developed for this newly discovered disease.
- Currently, the best disease control strategy is to manage thrips, the insect vector of the disease, using traps and insecticides (Table 1.)
  - Note that disease symptoms of SVNV have been mild to moderate in most fields, with only a minor impact on plant growth, development and yield.
  - Insecticide application should be considered primarily in fields with a known risk of yield loss.

Moderate SVNV damage in soybean field.

Future Management

- Following better host, virus and vector characterization, control strategies and disease management recommendations will likely include:
  - **Soybean variety selection** – Select varieties determined to be or bred to be SVNV resistant.
    - Soybean varieties and breeding lines are being evaluated in order to map any SVNV resistance genes or quantitative trait loci (QTLs).
  - **Cultural practices** to identify and remove infected soybean and alternate or overwintering weed and crop hosts (of both the virus and thrips vector)
    - Targeted weed control focused on removing alternate weed hosts or overwintering soybeans
    - Crop rotation to eliminate alternate crop hosts

Table 1. Insecticides for control of soybean thrips[1,2].

Brand name	Active ingredient	Pre-Harvest Interval (Days)
Baythroid® XL	cyfluthrin	45
Cobalt®	chlorpyrifos + gamma-cyhalothrin	30
Hero®	zeta-cypermethrin + bifenthrin	21
Leverage® 360	imidacloprid + cyfluthrin	45
Sevin® [3]	carbaryl	21
Warrior® [3]	lambda-cyhalothrin	30
Generics[3]	gamma-cyhalothrin	45

[1] Adapted from: Krupke, C.H., J.L. Overmeyer and L.W. Bledsoe. Field crops: soybean insect control recommendations – 2011. Purdue University Department of Entomology. Available online at: http://extension.entm.purdue.edu/publications/e-77.pdf

[2] Labels may change. Read and follow all label rate, application, and use directions.

[3] Generic products are available.

Acknowledgement / Further Reading

- Special thanks to Dr. Ioannis Tzanetakis, Assistant Professor, Plant Virology, University of Arkansas, for his expert contributions to this article.

- Domier, LL. 2011. Soybean vein necrosis virus: A new pathogen in Illinois soybean fields. Available at: http://agronomyday.cropsci.illinois.edu/tour-soybeannecrosis.html
- Tzanetakis, I., R. We, M. Newman, and R. Hajimorad. 2009. Soybean vein necrosis virus: a new threat to soybean production in Southeastern United States. Phytopathology 99:S131.

Soybean thrips. Purdue University Field Crops IPM. http://extension.entm.purdue.edu/fieldcropsipm/insects/soybean-thrips.php

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