SCN Coalition and Soybean Stem Disease Survey

Sam Markell
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NDSU Extension
## Soybean Disease Diagnostic Series

**Root Diseases**
- Fusarium root rot .................................. PP1867-1
- Phytophthora root and stem rot ........ PP1867-2
- Pythium root rot .................................. PP1867-3
- Rhizoctonia root rot .......................... PP1867-4
- Seed and seedling rot complex .......... PP1867-5
- Soybean cyst nematode ....................... PP1867-6
- Sudden death syndrome ..................... PP1867-7

**Stem Diseases**
- Anthracnose ........................................ PP1867-8
- Brown stem rot ...................................... PP1867-9
- Charcoal rot .......................................... PP1867-10
- Pod and stem blight .............................. PP1867-11
- Stem canker ........................................... PP1867-12
- White mold ............................................ PP1867-13

**Leaf Diseases**
- Bacterial blight ..................................... PP1867-14
- Bacterial pustule .................................. PP1867-15
- Bean pod mottle virus ......................... PP1867-16
- Cercospora leaf blight ........................ PP1867-17
- Downy mildew ...................................... PP1867-18
- Frogeye leaf spot ................................ PP1867-19
- Powdery mildew .................................... PP1867-20
- Septoria brown spot ............................ PP1867-21
- Soybean mosaic virus ........................ PP1867-22

**Additional Diseases** (not known to occur in ND/MN)
- Soybean rust ........................................ PP1867-23

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For more information on this and other topics, see [www.ag.ndsu.edu](http://www.ag.ndsu.edu)
Soybean Stem Disease Survey

- North Dakota Soybean Council supported
- 2017 and 2018
- 400 fields
- Stem diseases only
Anthracnose

Percent of Fields With Disease

- **0%**
- **1-25%**
- **26-50%**
- **51-75%**
- **76-100%**
Northern Stem Canker

Percent of Fields With Disease

- = 0 %
- = 1-25 %
- = 26 – 50 %
- = 51 – 75%
- = 76 – 100 %
Charcoal rot

Percent of Fields
With Disease

- **0%**
- **1-25%**
- **26-50%**
- **51-75%**
- **76-100%**

North Dakota Soybean Council
Our World Is Growing

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

www.ndsoybean.org

NDSU EXTENSION
Charcoal Rot

• Pathogen
  – Fungal, Soil borne, survives as microsclerotia

• Host Range
  – Soybean, Corn, Sunflower, legumes +

• Favorable Conditions
  – Hot temperatures
  – Drought stress
  – SCN present
Charcoal rot
Macrophomina phaseolina (fungus)

Authors: Sam Markell and Dean Malvick

Symptoms
- Symptoms usually not apparent until flowering or later
- Taproot and lower stem may appear gray/silver
- Numerous black fungal specks (microsclerotia) under epidermis give a “charcoal” appearance
- Premature death with wilted leaves attached
- Frequently occurs in patches in fields

Figure 1 - Large patches of soybean with charcoal rot
Figure 2 - Patch of wilting soybeans
Figure 3 - Infected (L and C) and healthy soybean (R)
Figure 4 - External gray lesion peeling away, revealing profuse “charcoal” sclerotia

Factors favoring development
- Hot temperatures
- Drought stress
- May be more severe when soybean cyst nematode is present

Important facts
- Yield loss may occur in hot, dry growing seasons
- Disease typically most severe in drought-prone areas of fields
- Very wide host range, which includes corn, sunflower, other legume crops and weeds
- Commonly confused with anthracnose, Phytophthora stem rot, pod and stem blight, stem canker

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Soybean Cyst Nematode

- Parasitic Worm (Nematode)
- Host range
  - Soybean, dry edible bean, several weeds
- Favorable conditions
  - Average to dry soil, high pH, short rotations, susceptible varieties, more damage in sandy soil
- Very few above ground symptoms
- Spreads with anything that moves soil
Have you sampled for SCN?

Do you have it?

• ND Soybean Council Sampling Program
  – Pick up sample bags at County Extension Office (Mid-August or later)
  – Send in soil sample
  – Data mailed to you

• Reported in eggs/100cc

Are you managing it?
EFFECT OF SCN ON GROWTH OF DRY BEAN
(Courtesy Berlin Nelson)
SCN Survey 2013-2019

Eggs/100cc

- 0-49
- 50-200
- 201-2000
What’s your number?
Take the test. Beat the pest.
The **SCN Coalition**
Funded by the soybean checkoff

The New SCN Coalition

*Figure 1: Map of the known distribution of the soybean cyst nematode, Heterodera glycines, in the United States and Canada from 1954 to 2017. Known infested counties are indicated in red. Map © C. C. Werkhe and G. L. Tyka, Iowa State University, 2017.*
How do we manage SCN?

Keep your egg levels low
SCN management recommendations

What’s your number?
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Funded by the soybean checkoff

Photo: Tylka, Iowa State
SCN management recommendations

Rotate resistant varieties.
Rotate Resistant Varieties?

• Source of resistance
  – PI88788
  – Peking

• Varieties with PI88788
  – Multiple genes
SCN management options

Rotate to non-host crops.
SCN management options

Consider using a seed treatment nematicide.
A new generation of soybean cyst nematode is born every 24 days during summer. Many overpower resistant soybeans. All will cut yield potential.
WHY YOU NEED TO TEST YOUR FIELDS TO KNOW YOUR NUMBERS

THE SOYBEAN CYST NEMATODE

life cycle.

EACH CYST (dead female) contains 200 or more eggs.

~ 24 days per generation
3-6 generations per year
> 200 eggs per female

A female can lay up to 300 eggs per day.

THE FEMALE GETS SO LARGE that she
ruptures out of the root and onto the soil surface and
sends out a chemical signal to attract males. There’s no such thing
as nematode monogamy. Females mate with many males, and males mate with many females. There’s a lot of genetic mixing.

WHY YOU NEED TO TEST YOUR FIELDS to know your numbers.

Examine the cysts in the field. Each cyst contains 200 or more eggs.

NEW SCN MANAGEMENT recommendations.

Work with your advisors and develop a plan to manage SCN:

- Test your fields to know your numbers.
- Rotate resistant varieties.*
- Rotate to non-host crops.
- Consider using a nematode-protective seed treatment.

* SCN populations can adapt to individual resistant varieties as well as to sources of resistance. So, rotating to a different resistant variety — even if it’s still PI 88788 — may help slow the SCN problem.

HOW THE SCN PROBLEM EVOLVED

TOO MUCH of a good thing.

For more than 20 years, greater than 95 percent of all SCN-resistant soybean varieties have included resistance to the PI 88788 breeding line.

Nematodes are becoming “resistant to the resistance.”

A resistant variety should allow less than 10 percent reproduction. In other words, a resistant variety should stop 90 percent of the SCN in a field from reproducing. Across the region, varieties with PI 88788 resistance aren’t hitting the mark. On some farms, one out of every two nematodes can reproduce.

AS SCN REPRODUCTION INCREASES, yields decrease by as much as 14 bushels per acre.

SCOUTING AND SOIL TESTING FOR SOYBEAN CYST NEMATODE.

TWO WAYS to scout for SCN.

1. Dig roots and look for females. (Dig, don't pull.)
2. Collect soil samples for testing.

THREE APPROACHES to collecting soil samples.

1. Collect soil zones using a zigzag pattern.
2. Collect soil cores from logical areas or management zones in the field.
3. Collect soil cores from high-risk areas in the field where SCN might first be discovered.

WHY SCN SOIL TEST results are variable.

It all depends on where you put the probe. A 1-inch difference can mean the difference between zero and 1,500 eggs. (Each cyst can hold 200 to 250 eggs.)

WHEN to sample.

- Fall in a non-host crop.
- Fall in soybean stubble.
- Spring before a soybean crop.
- During the season in the soybean crop root zone.

soil probe tip

7 SCN cysts
egg count = 1,500

0 SCN cysts
egg count = 0

Visit TheSCNcoalition.com for more information.
Thank You

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