



UNIVERSITY OF MINNESOTA

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# **Institute of Ag Professionals**

Proceedings of the

## **2015 Crop Pest Management Shortcourse &**

### **Minnesota Crop Production Retailers Association Trade Show**

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**Soybean Cyst Nematode  
Management  
Mineapolis, Minnesota  
December 10, 2015**

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# Soybean Damage Caused by SCN

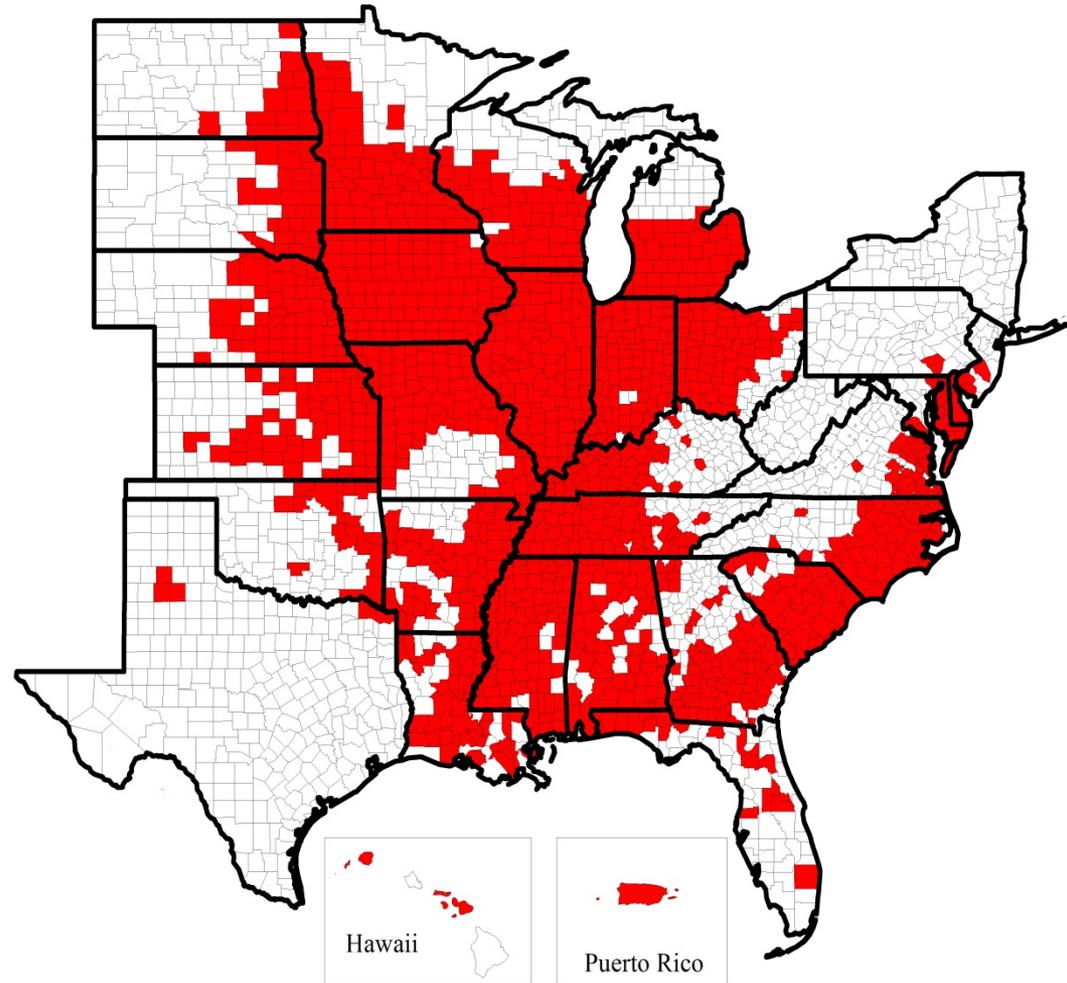


# SCN History and Current Distribution

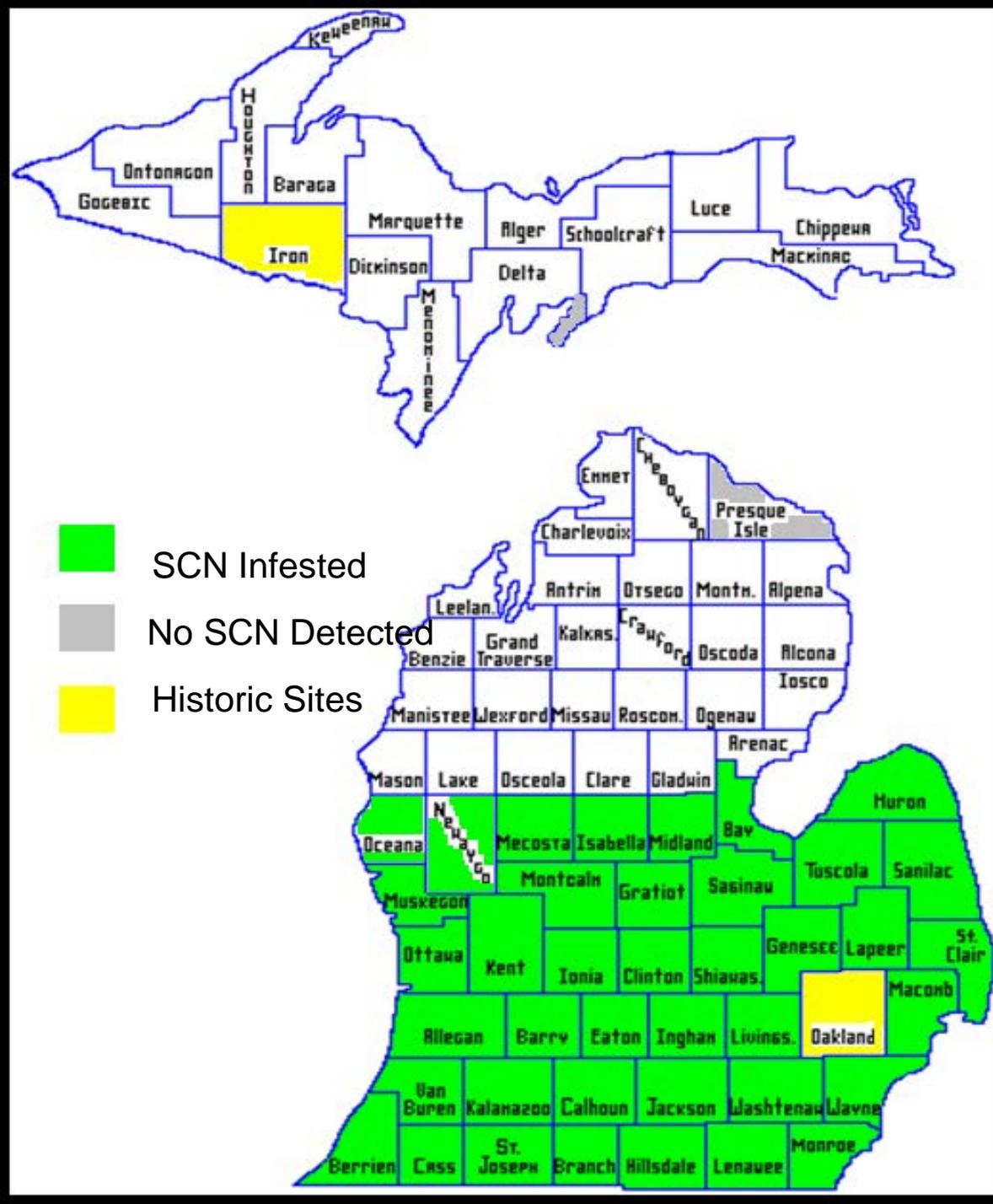
- U.S.A.
- 1954
  - N. Carolina
- 2015
  - # states
  - Yield Loss

3,368,000 metric tons  
#1 limiting factor

- Global

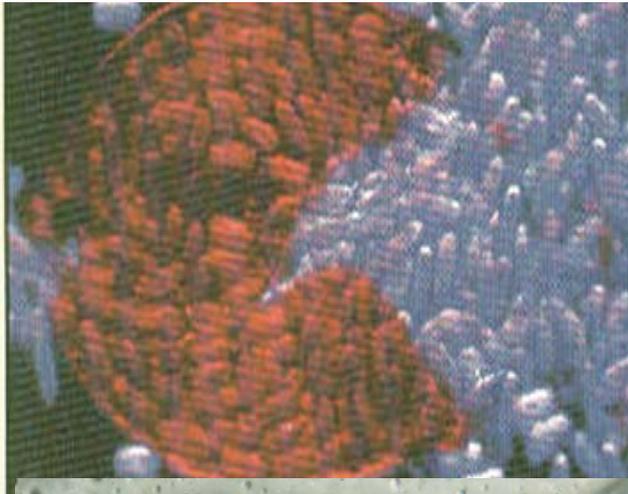


**Michigan  
SCN  
Distribution  
2010-2011  
Survey  
558 Farms  
46 Counties  
53%  
Infestation**



# SCN Biology

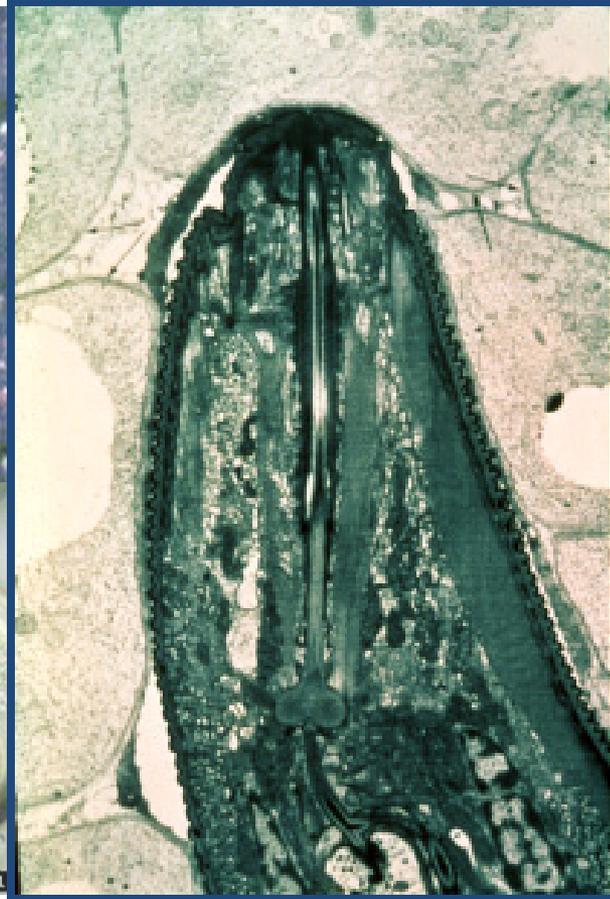
Cyst



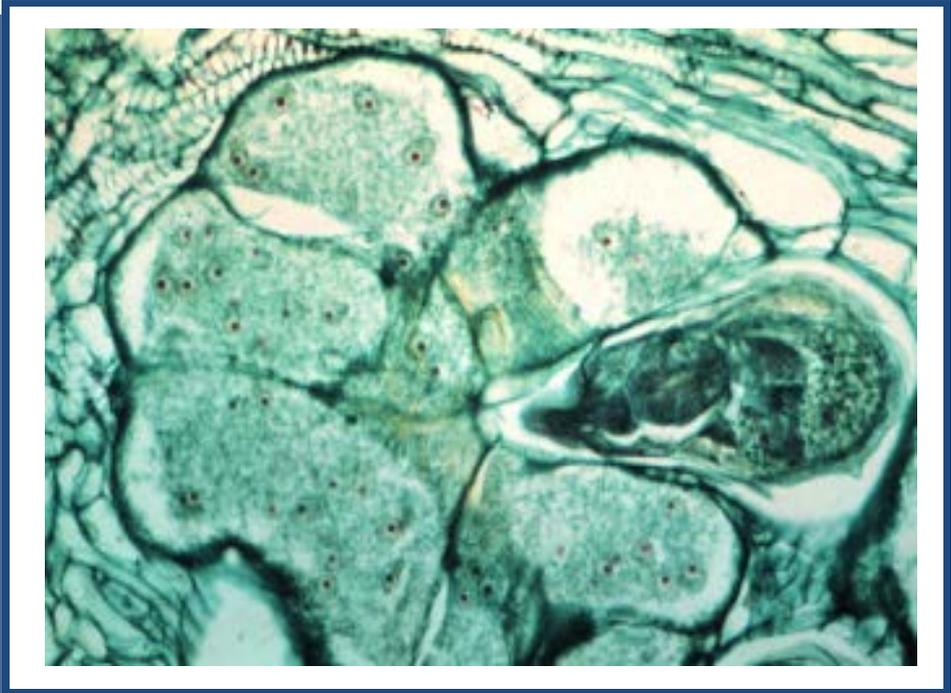
Egg



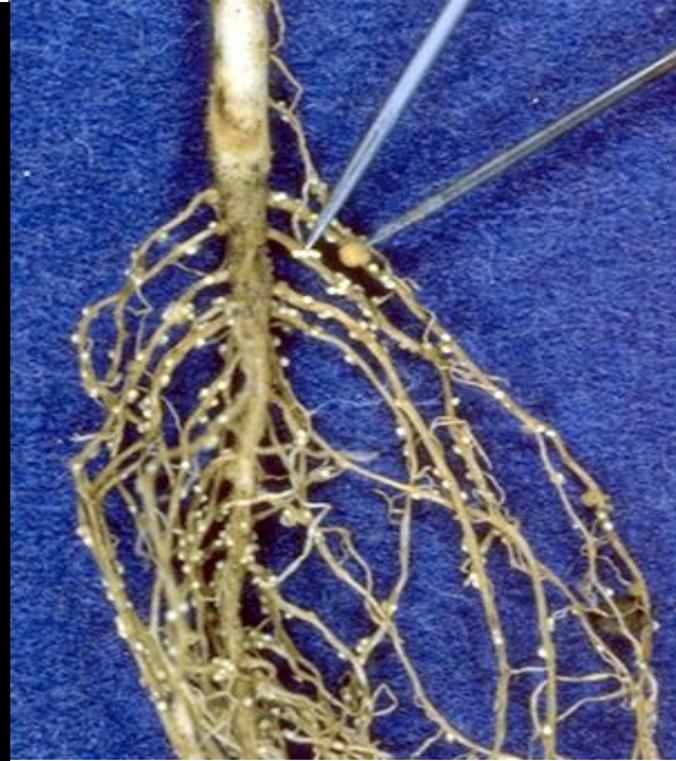
Style



# SCN Feeding Tube and Nurse Cells



# SCN Symptoms and Signs



# Soybean Damage Caused by SCN



# SCN Problem Detection and Diagnosis

- Uneven growth patterns with stunted plants.
- Yellow foliage.
- White SCN females on roots.
- Low number of bean pods.
- Low number of beans per pod.
- Low bean yield (<10 vs > 70 bushels per acre).
- Sometimes no visible above ground symptoms.

# SCN Problem Detection and Diagnosis

- Uneven growth patterns with stunted plants.
- Yellow foliage.
- White SCN females on roots.
- Low number of bean pods.
- Low number of beans per pod.
- Low bean yield (<10 vs > 70 bushels per acre).
- SCN laboratory analysis of soil and root tissue.
- SCN Type analysis

# SCN Problem Confirmation

- SCN Laboratory Soil Analysis.
  - Number of cysts recovered per unit of soil.
  - Number of SCN eggs recovered per unit of soil.
  - Number of SCN eggs per cyst.
  - Local Damage Threshold Information.
  - Management Recommendation.
- SCN Type Analysis.
  - Aggressive population classification.

# SCN Management

- SCN Exclusion (common sense)
- SCN Containment (more common sense)
- SCN Control
  - Crop Rotation
  - Chemical
  - **Host-Plant Resistance**
  - **Seed Treatment**
- Do Nothing

# What are SCN Resistant Varieties?

High yielding varieties derived from:

PI 548402 (a.k.a. Peking)

PI 88788

PI 437654 (a.k.a. Hartwig, CystX<sup>®</sup>)

# How Does This Work?

Resistance Source	Mechanism
Susceptible	None
<b>PI 548402</b> First commercial source	Vertical (single major gene)
<b>PI 88788</b> Second commercial source	Horizontal (multiple minor genes)
<b>PI 437654</b> Fourth commercial source	Horizontal and Vertical (both)

# Can these varieties fail? Yes!

<b>Resistance Source</b>	<b>Mechanism</b>	<b>SCN Types</b>
<b>PI 548402 1<sup>st</sup> source</b>	Vertical	<b>SCN Type 1</b> (aggressive)
<b>PI 88788 2<sup>nd</sup> source</b>	Horizontal	<b>SCN Type 2</b> (aggressive)
<b>PI 437654 4<sup>th</sup> source</b>	Horizontal and Vertical	<b>SCN Type 4</b> (aggressive)

# SCN Seed Treatments

- **Chemical**
  - Avicta
- **Biological**
  - VOTiVO (*Bacillus firmus*)
  - Clariva (*Pasteuria nishizawae*)
- **Plant Health Regulator**
  - N-Hibit



**Resistant Varieties Only!**

# 2015 SCN Research Results

Variety/Treatment	Bean Yield (bu/A)	SCN (eggs/100 cc soil)
Susceptible	57.4	29,840
PI 88788 Variety	64.4	536
PI 548402 Variety	66.2	1105
PI 88788 + Future Seed Treatment	71.3	336

# Why am I confused?

SCN Type	Races
0	3
1	13
2	1
4	None available
1.2	11
1.4	None available
2.4	None available
1.2.4	None available

# Managing SCN with Resistant Varieties

Resistance Source	Mechanism	SCN Type 0	SCN Type 1	SCN Type 2	SCN Type 4
Susceptible	None	Red	Red	Red	Red
PI 548402	Vertical	Green	Red	Green	Green
PI 88788	Horizontal	Green	Green	Red	Green
PI 437654	Horizontal and Vertical	Light Green	Green	Green	Red

# Managing SCN with Resistant Varieties

Resistance Source	Mechanism	SCN Type 0	SCN Type 1	SCN Type 2	SCN Type 4
Susceptible	None	DO NOT PLANT			
PI 548402	Vertical	OK TO PLANT			
PI 88788	Horizontal	OK TO PLANT			
PI 437654	Horizontal and Vertical	OK TO PLANT			

# Managing SCN with Resistant Varieties

Resistance Source	Mechanism	SCN Type 0	SCN Type 1	SCN Type 2	SCN Type 4
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# Summary

- SCN Biology
- SCN Problem Detection – Identification
- SCN Laboratory SCN Problem Confirmation
- SCN Type Assessment
- Management
  - Crop Rotation (Avoidance)
  - Resistant Varieties
  - Seed Treatments
  - Healthy Soil



**Thanks for  
Listening**

*Professor Bird (George)*

