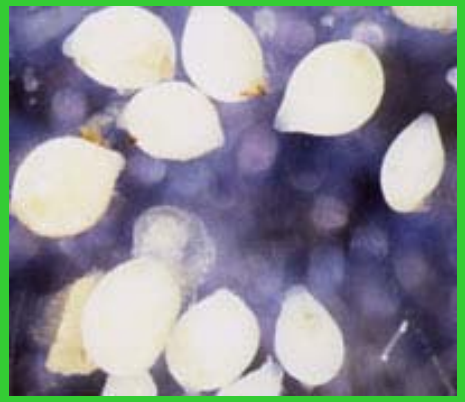
Soybean Cyst Nematode in Wisconsin Fields



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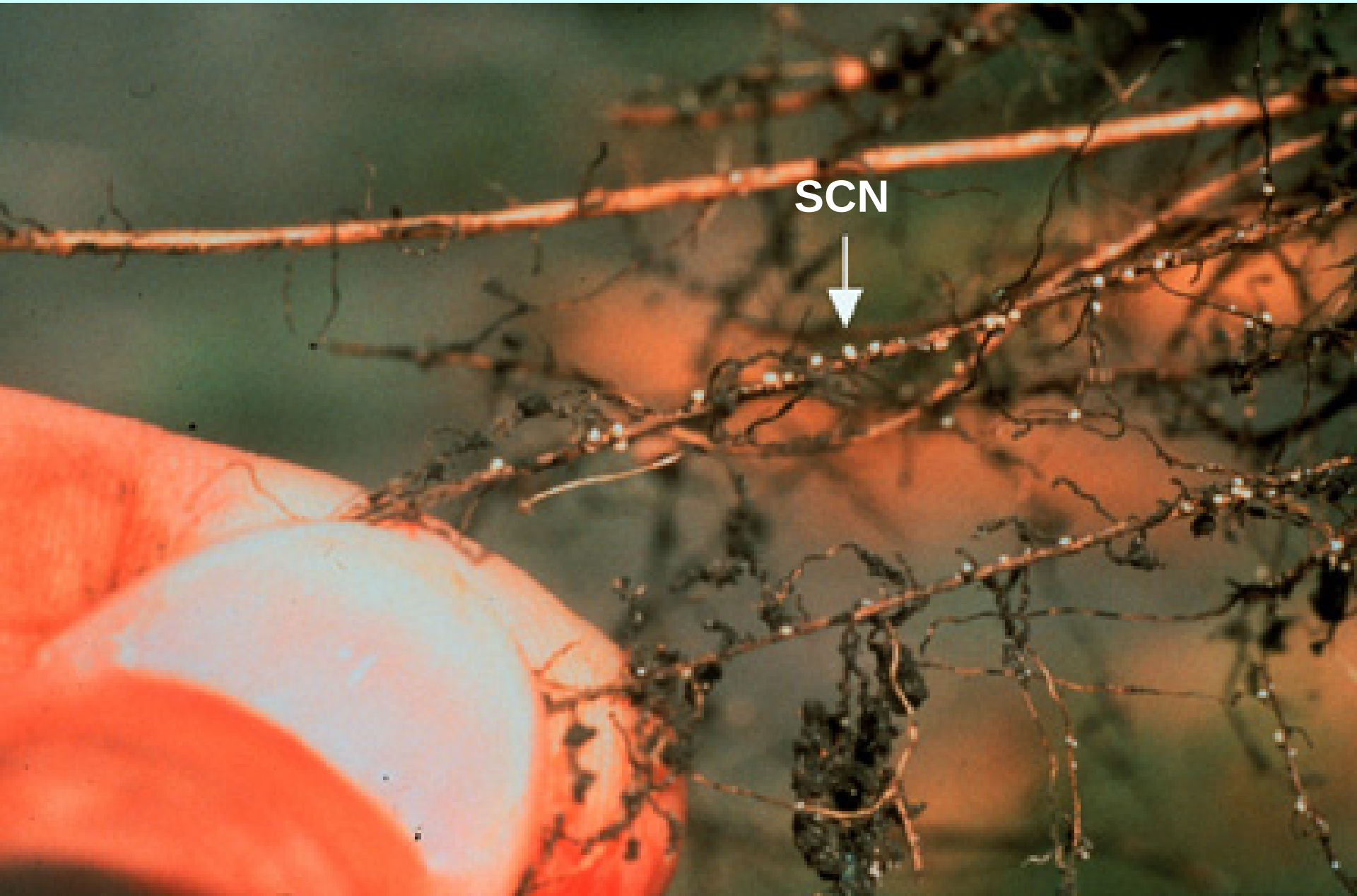
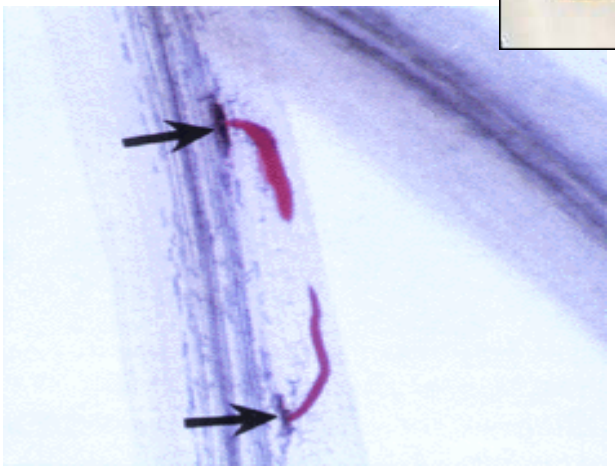
Research reported in this presentation was sponsored by the Wisconsin Soybean Marketing Board

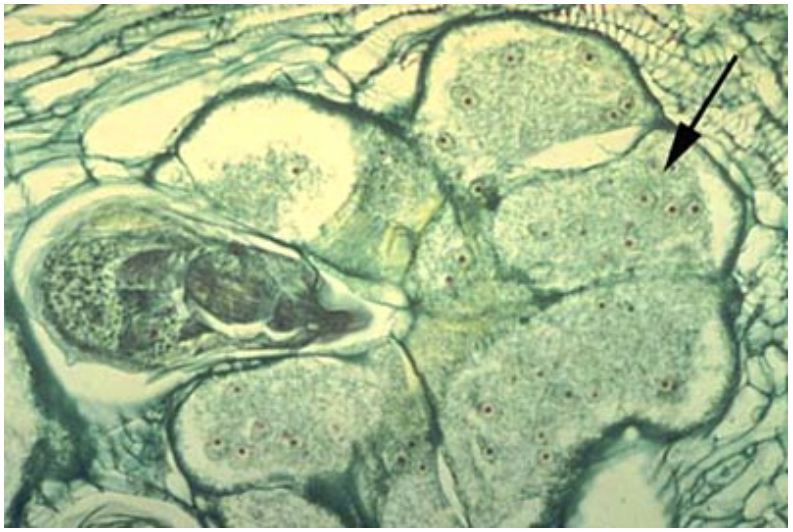
SCN is an animal that infects soybean roots



SCN life cycle

Eggs overwinter in cysts. SCN hatch from eggs and infect roots.

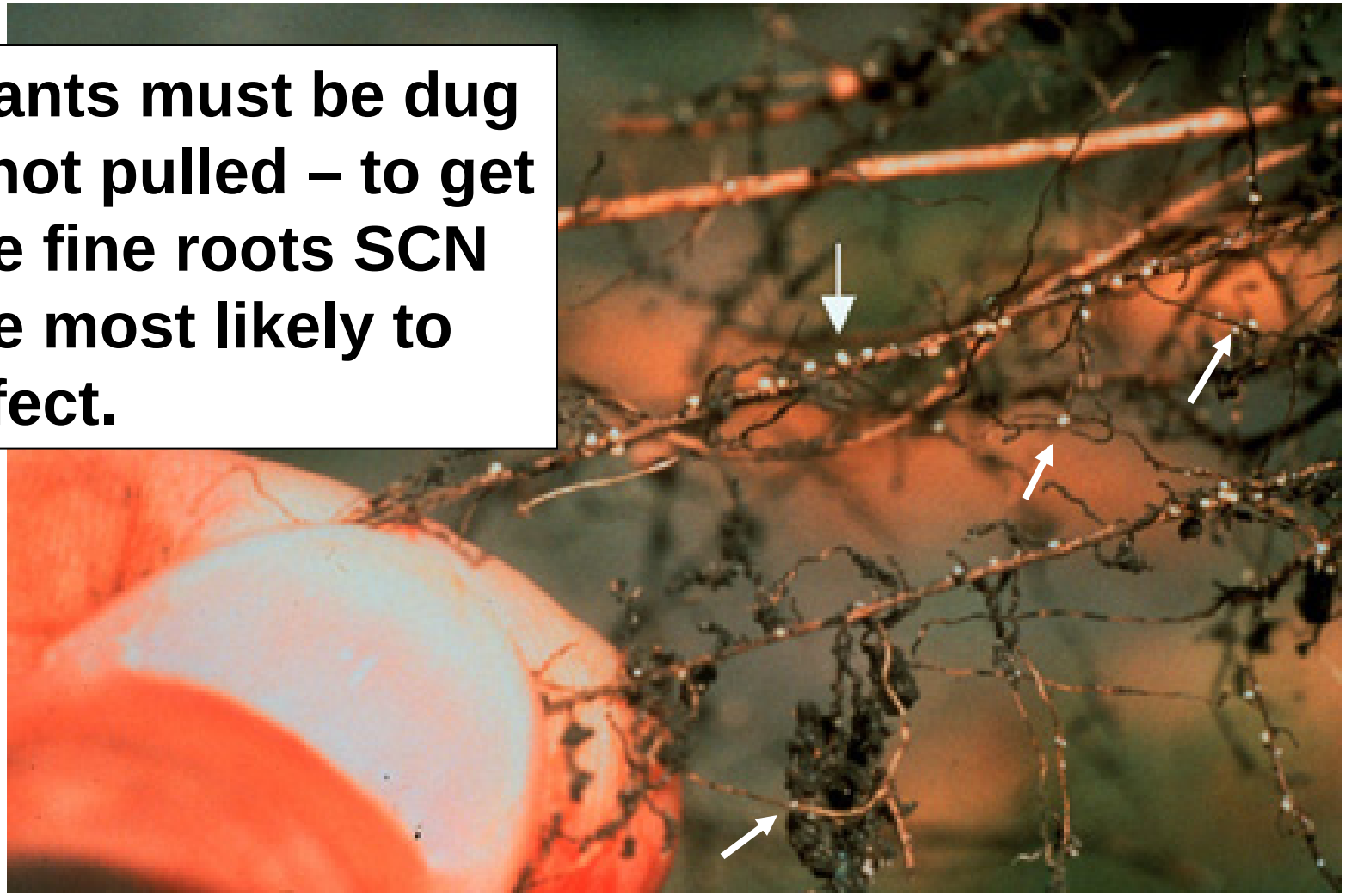




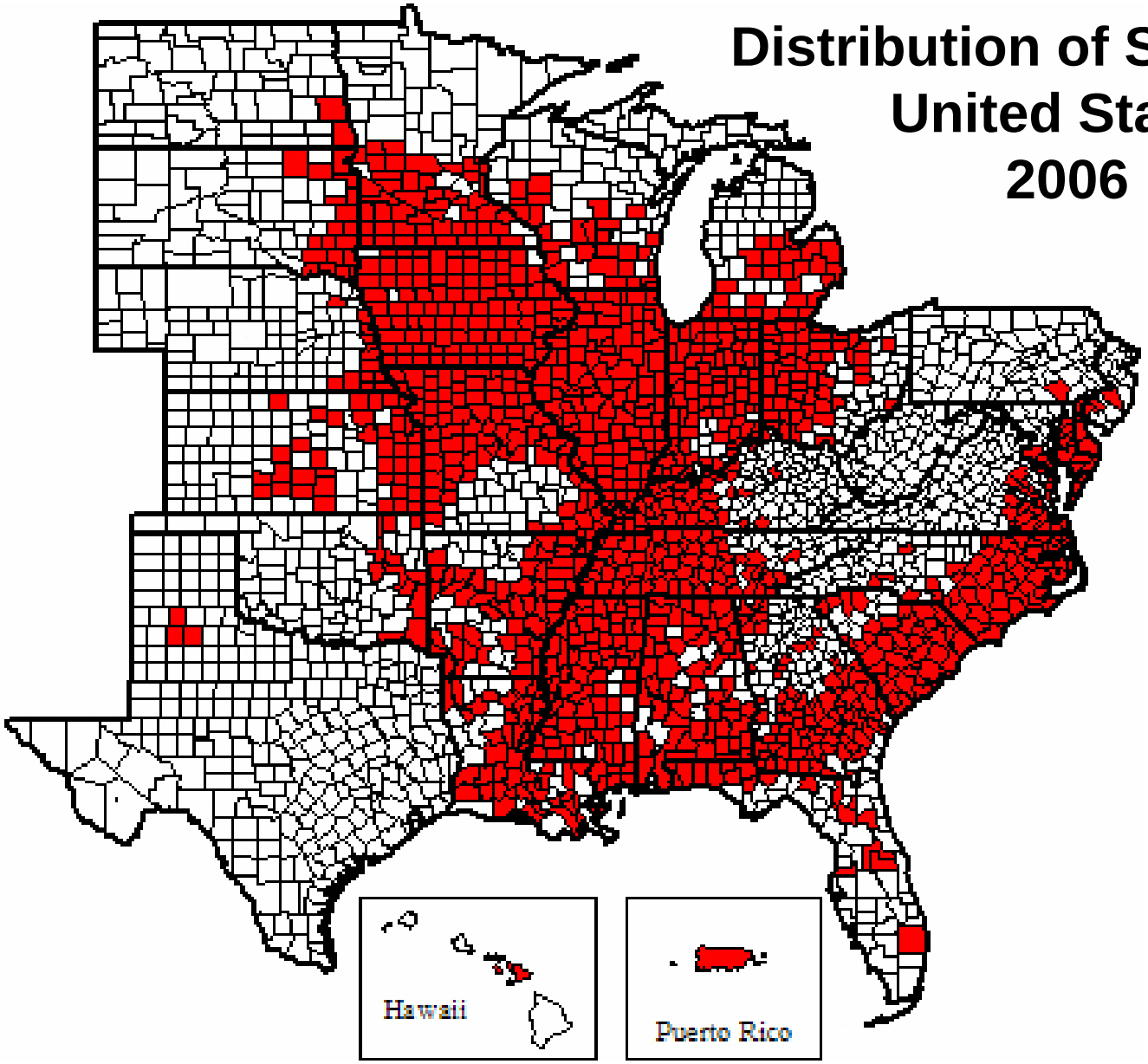
Cross section of a root showing female feeding.

SCN are very small so they are most likely to be in small fine roots.

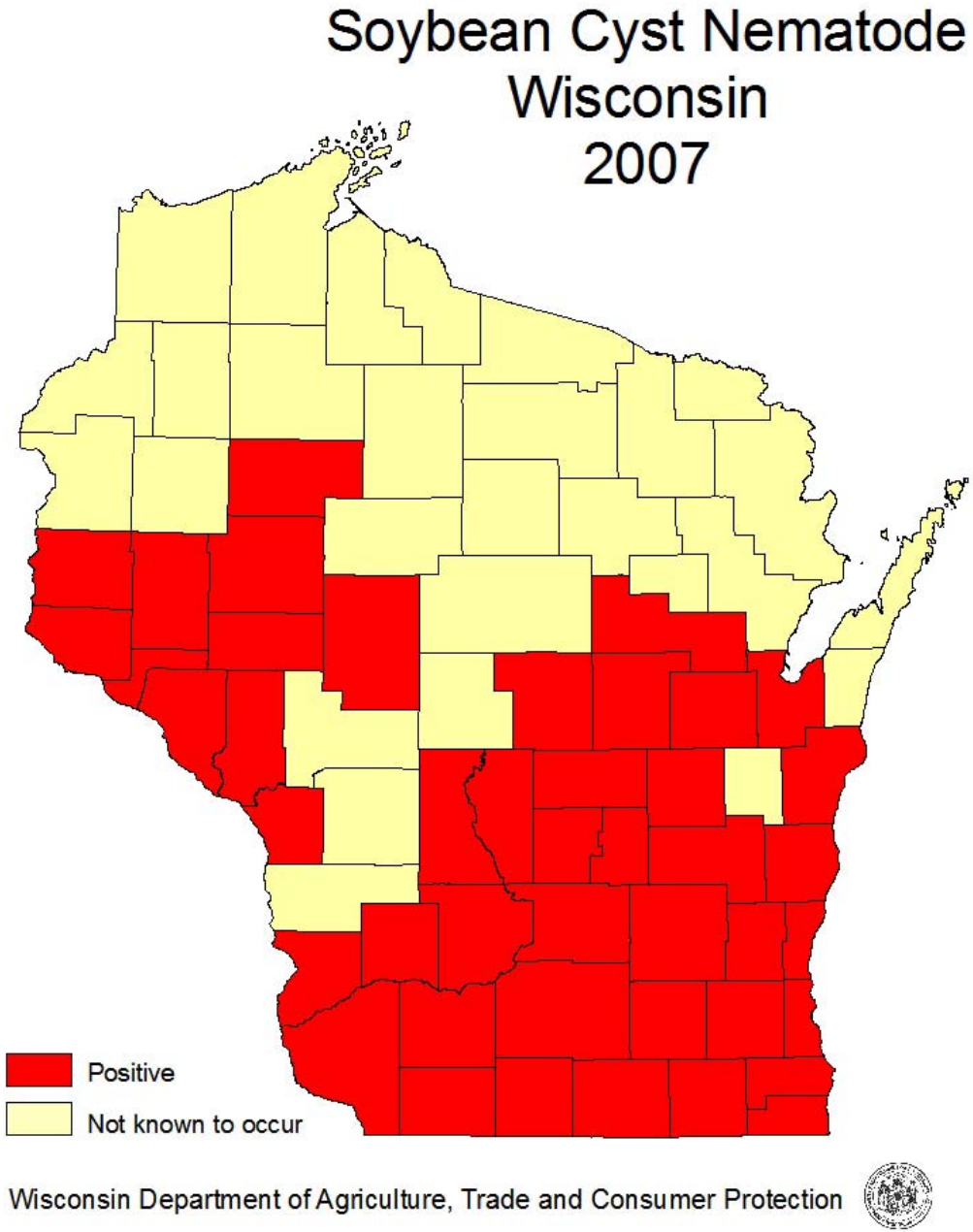
Plants must be dug – not pulled – to get the fine roots SCN are most likely to infect.



Distribution of SCN in the United States 2006



SCN is widespread in the U.S.

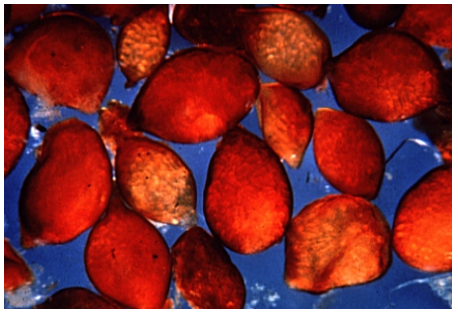


SCN is widespread in Wisconsin. Every year more infested fields are identified through samples submitted to the UW Plant Disease Lab.

Detecting SCN infestations early is important for maintaining yield

- Damage related to population density of SCN
- Yield can be depressed without showing symptoms
- Most newly identified infestations in Wisconsin are at low risk level
- Take advantage of the WSMB-sponsored SCN testing program!

SCN is a permanent resident in fields



- **Eggs remain in dead body of female (cyst)**
- **Eggs don’t age and wait for host plants.**
- **New eggs are produced on every soybean crop (and in between if weed hosts present)**

➢ **SCN is a site characteristic that should be monitored and considered in the farm management plan.**

For fields not known to have SCN

- **Collect samples AT YOUR CONVENIENCE (anytime in the rotation)**
- **SCN assay won't detect other nematodes, but a general nematode assay will detect SCN**
- **Watch for symptoms in soybean crop**
  - **Yield plateau**
  - **Patchy areas of weeds, stunting**
  - **White females on soybean roots**
- **Every field is at risk for SCN!**

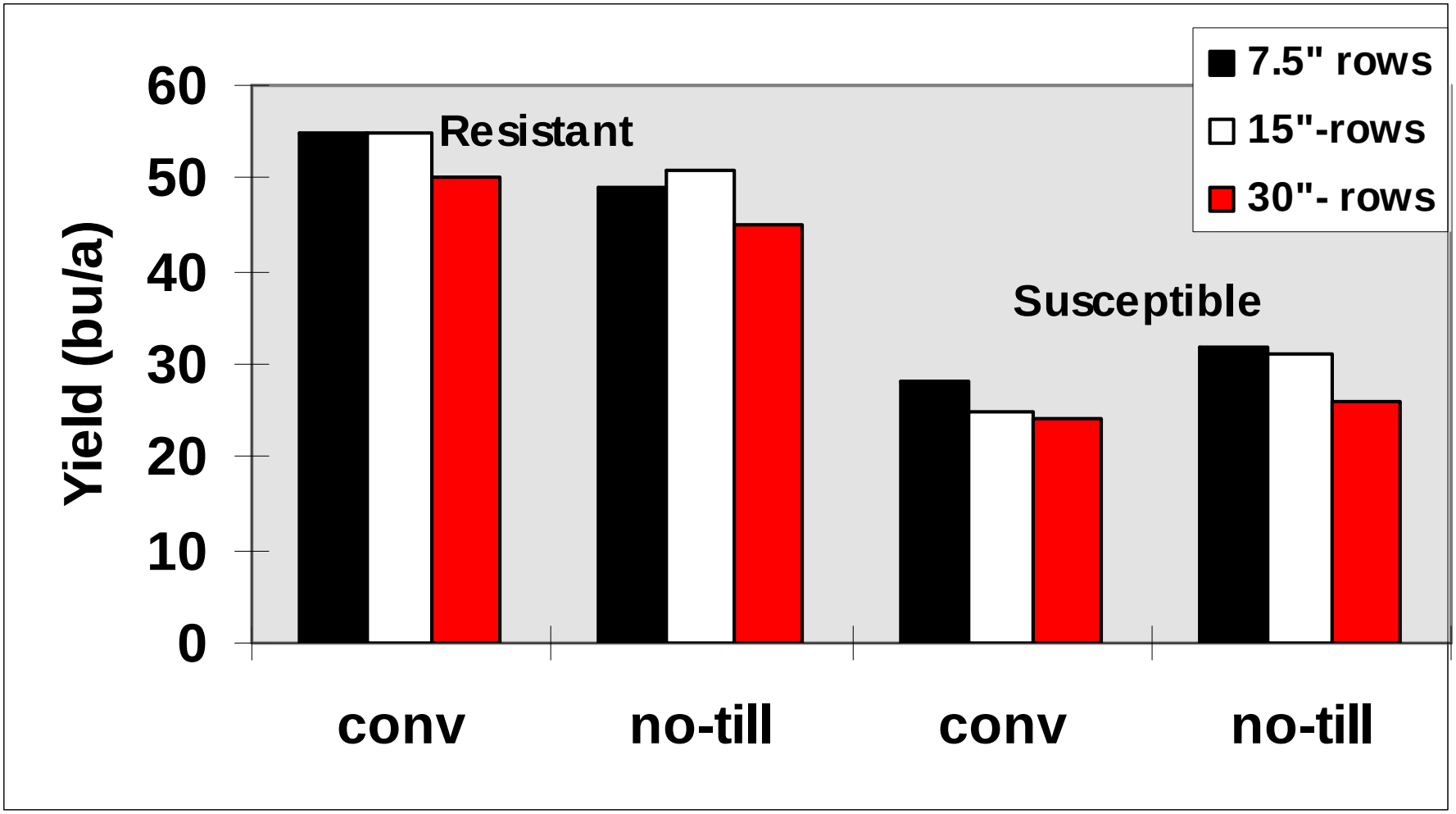
Once SCN is detected

- **Collect a sample(s) representative of the field (can use samples collected for nutrient analysis)**
- **Continue to sample every 2 – 3 soybean crops to make decisions about varieties**
- **Scout for SCN during the soybean year**
  - **White females can be seen during July**
- **Minimize spread by machinery, use practices that increase OM, eliminate weed hosts, rotate with nonhost crops (corn, small grains)**

SCN resistant varieties

- **Many choices**
- **Most include glyphosate resistance, some include resistance to other diseases**
- **Demonstrated to boost yields in infested fields**
- **Fewer eggs are produced on resistant varieties so SCN populations decline over time**
- **Resistance can lose effecacy over time if the same genetics are used too often**

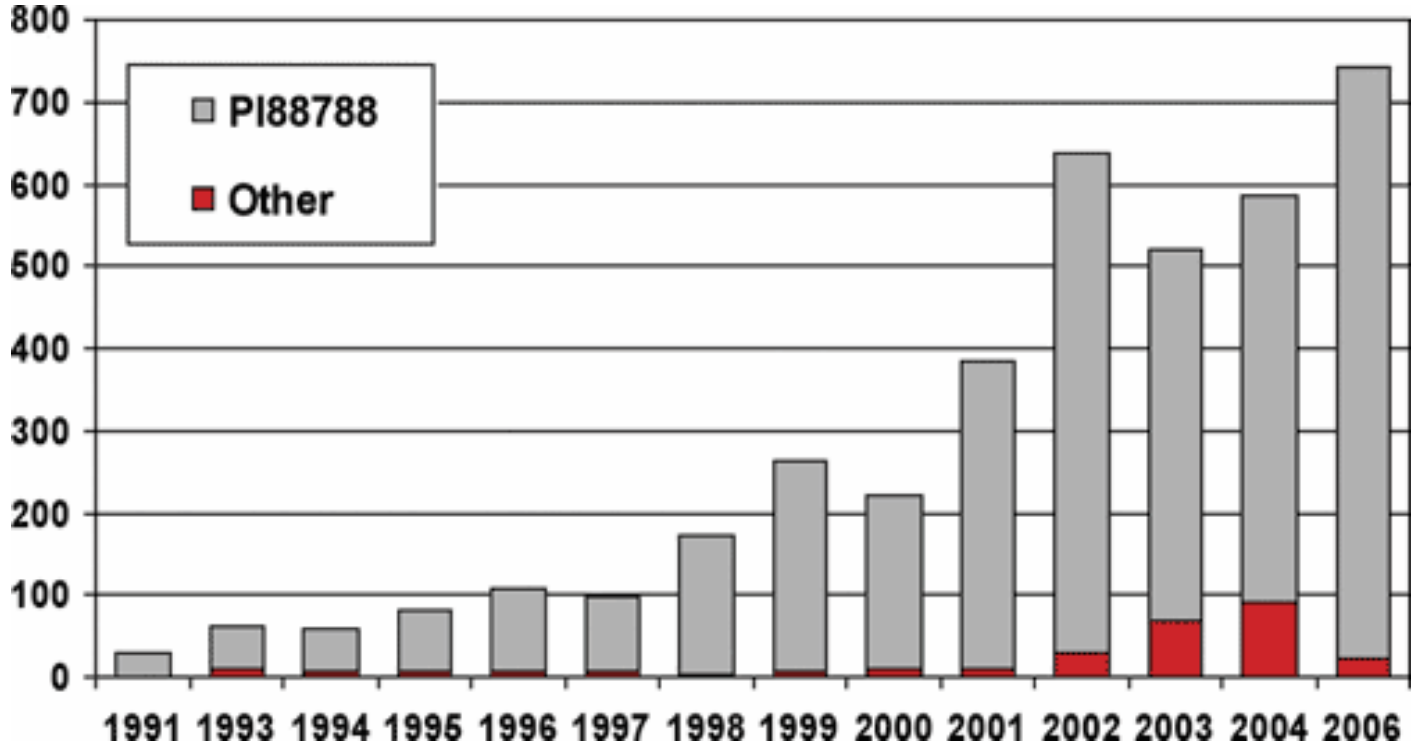
Bottom line: Resistant varieties increase yield in SCN-infested fields



Two considerations once resistant varieties are incorporated into the production plan…..

- Most commercial varieties share the same SCN resistance genes
- Populations of SCN in different fields may react differently to those resistance genes

SCN resistance for most varieties comes from PI 88788



Number of SCN-resistant soybean varieties available for Iowa growers from 1991 to 2006. No data were available for 1992 or 2005. The gray portion of each bar represents the number of varieties with SCN resistance from PI88788; the red portion of each bar indicates the number of resistant varieties with SCN resistance other than PI88788. - Greg Tylka

PI 88788 resistance is not the same for all populations of SCN. Shown here is one variety infected with two different SCN populations at the same inoculum level.

SCN Management Guide

SCN populations can be compared for their reaction to PI 88788 using the female index (FI)

$$\text{Female Index} = \frac{\#\text{ females on PI 88788}}{\#\text{ females on 'Lee' 74}} \times 100$$

The female index is only an INDICATOR of what will happen in the field:

- **Determined using indoor tests**
- **using the source of resistance, not the variety bred from that source and**
- **measures nematode development, not yield**
- **as represented by SCN collected in the sample**

FI for SCN in Wisconsin for PI 88788

FI = 100 when the SCN population has the same response to PI 88788 as to the standard susceptible variety "Lee"

NORTH		FI
Northeast	Shawano	45
CENTRAL		
West Central	Buffalo	63
	Dunn	25
	Dunn	30
	Trempeleau	29
Central	Juneau	72
	Waupaca	26
	Waushara	10
East Central	Brown	48
	Outagamie	13
	Outagamie	14

SOUTH		FI
Southwest	Grant	52
	Iowa	30
	Sauk	49
South Central	Columbia	18
	Columbia	8
	Dane	33
	Dane	44
	Dodge	16
	Jefferson	98
	Jefferson	4
	Rock	27
Southeast	Kenosha	40
	Ozaukee	58
	Racine	13
	Racine	19
	Walworth	57
	Walworth	19
	Walworth	15
	Washington	14
	Washington	68
	Washington	2
	Washington	7
	Waukesha	18

SCN with a FI > 10 are designated as Hg Type 2

Hg Type Test = when all seven sources of resistance are included in the FI assay

- **Hg Type describes a <u>population</u>, not an individual**
- **Useful for explaining unexpected yield performance of SCN resistant varieties**
- **Can be used to track changes in SCN populations in response to the use of resistant varieties**

Hg Types in Wisconsin

Resistant Soybean Lines

NORTH		1	2	3	4	5	6	7
Northeast	Shawano	x	x	x		x		x
CENTRAL								
West Central	Buffalo		x			x		x
	Dunn	x	x	x		x	x	x
	Dunn		x			x		x
	Trempeleau		x			x		x
Central	Juneau		x			x		x
	Waupaca	x	x	x		x	x	x
	Waushara		x			x		x
East Central	Brown	x	x	x		x	x	x
	Outagamie	x	x	x		x	x	x
	Outagamie	x	x	x		x	x	x

x Lines with a FI > 10

Resistant Soybean Lines

SOUTH		1	2	3	4	5	6	7
Southwest	Grant		x			x		x
	Iowa		x			x		x
	Sauk		x			x		x
South Central	Columbia		x			x		x
	Columbia					x	x	x
	Dane		x			x		x
	Dane		x			x		x
	Dodge		x			x		x
	Jefferson	x	x	x		x	x	x
	Jefferson							
	Rock		x			x		x
Southeast	Kenosha		x			x		x
	Ozaukee	x	x			x	x	x
	Racine		x			x		x
	Racine		x			x		x
	Walworth	x	x	x		x	x	x
	Walworth		x					x
	Walworth	x	x	x			x	x
	Washington		x					x
	Washington		x			x		x
	Washington							x
	Washington							x
	Waukesha		x					x

SCN can be managed!

- **Moniter risk level of SCN in a field (submit samples to obtain egg count)**
- **Plant a resistant variety**
- **Rotate 1) sources of resistance**
  2) varieties
- **Watch yields**
- **Contact UW if resistant varieties no longer working…….**
- **Use crop rotation and practices that encourage biologically active soils**