

# Soybean Cyst Nematode in Manitoba: What You Need to Know



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Agvise Client Day, March 16, 2016 Portage La Prairie



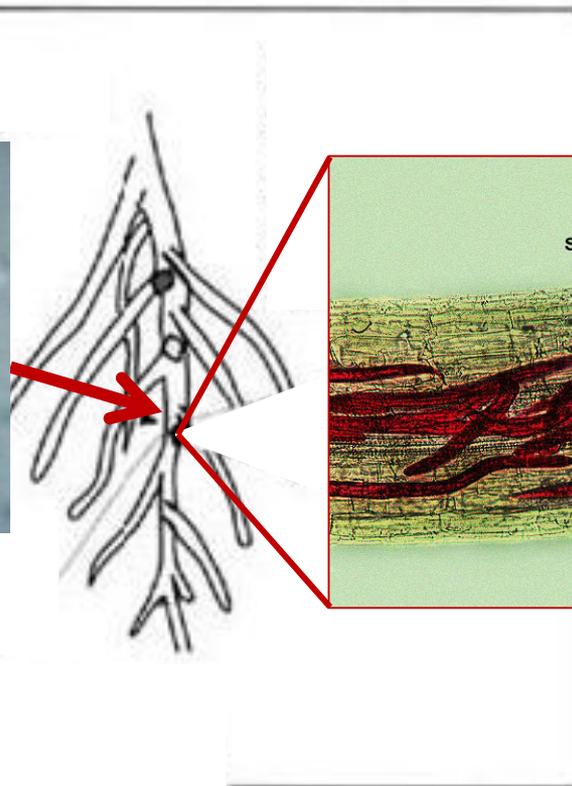
# Soybean Cyst Nematode (SCN)

- Is a nematode (round worm) that parasitizes roots of soybean
- Like people, not all nematodes are bad, but SCN is bad

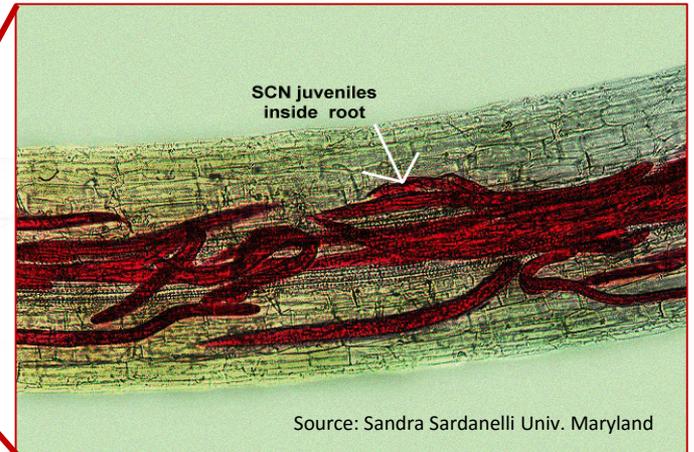


# The Life of a SCN Female

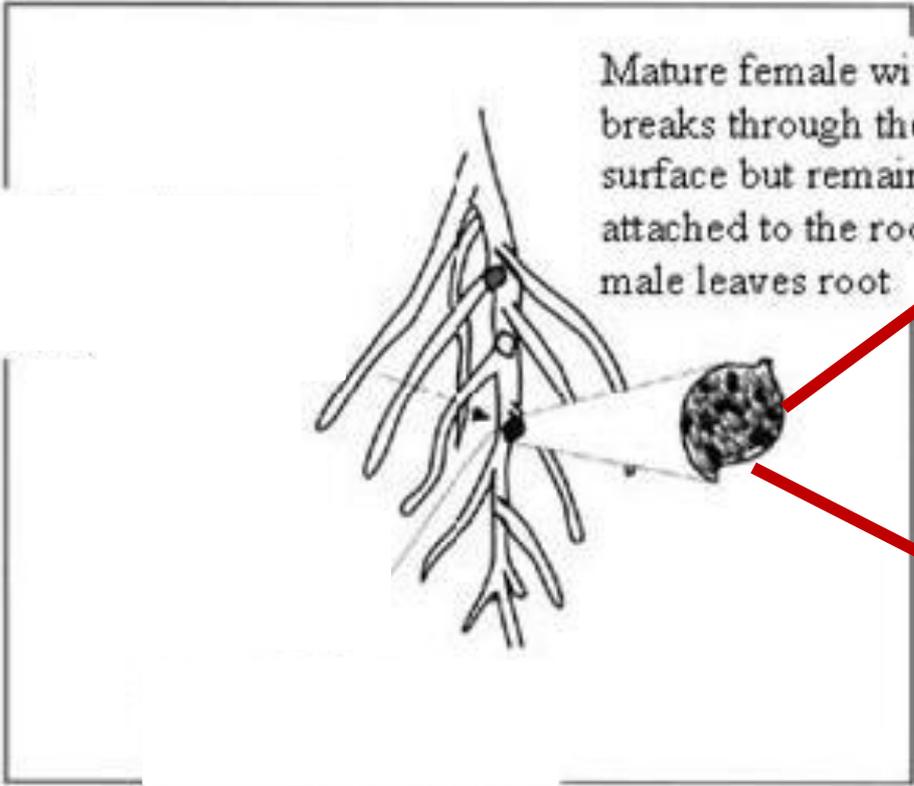
Soil



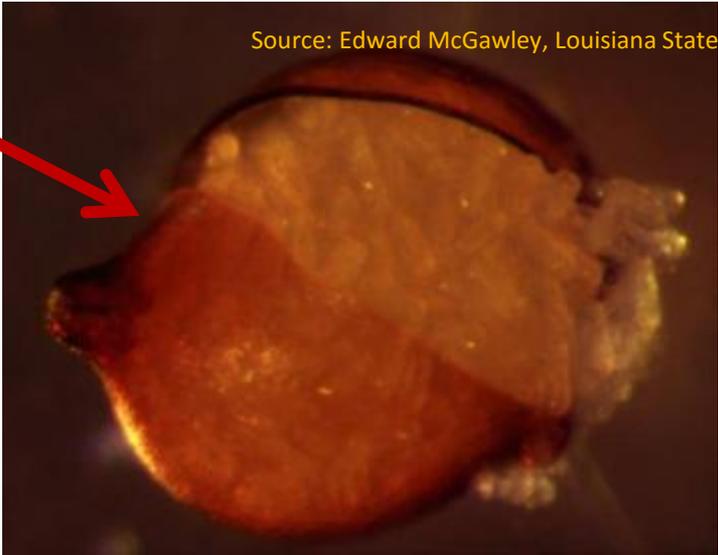
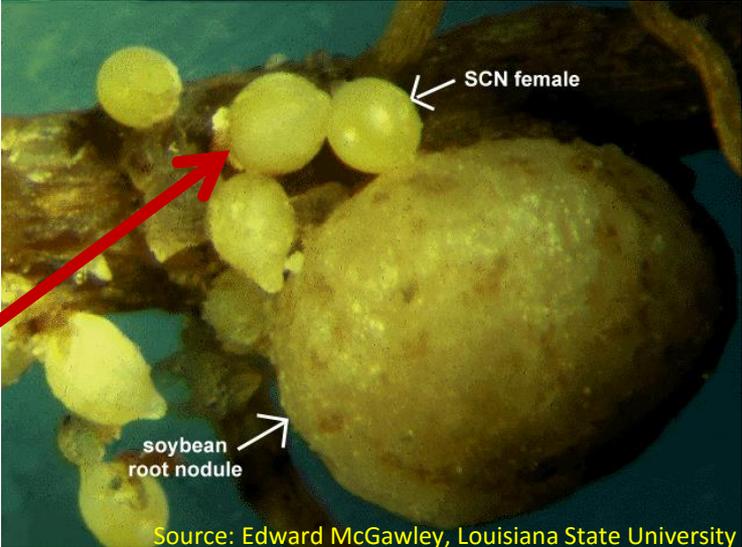
Root



# Female Settles Down to Feed and Produce Eggs



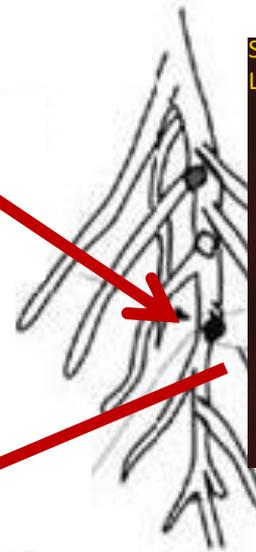
Source: Greg Tylka Iowa State Univ.



# Female Becomes Cyst Eventually Rupturing and Releasing Eggs



Source: Edward McGawley, Louisiana State University



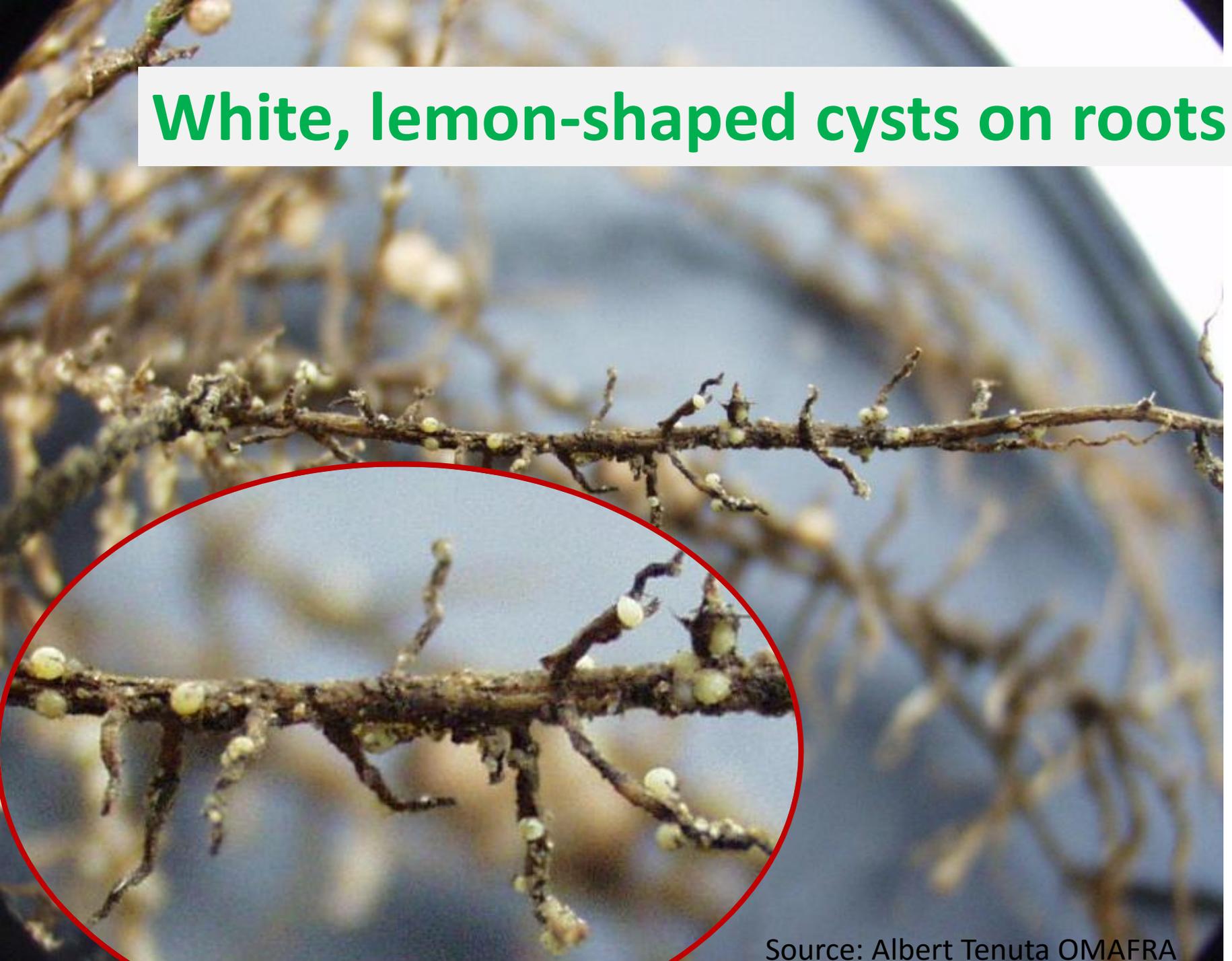
Eggs released in soil, develop into juveniles

Soil



Source: Edward McGawley, Louisiana State University

# White, lemon-shaped cysts on roots



Source: Albert Tenuta OMAFRA

# Damage Patches in Fields



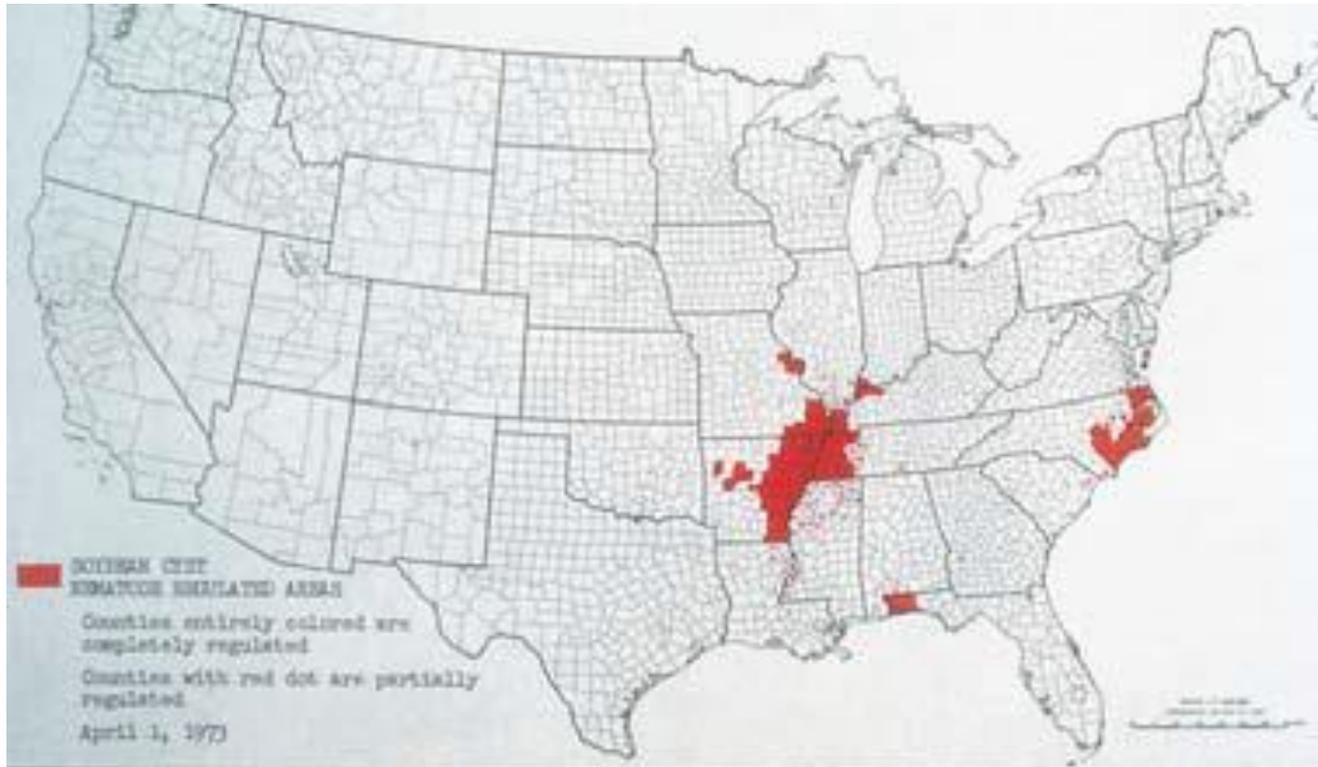
Source: American Phytopathology Society

Source: Albert Tenuta OMAFRA

# SCN is Spreading to all Soybean Areas of Canada and U.S.

- Japan in 1880
- North Carolina in 1954
- Moved rapidly from there through much of soy growing area of the U.S.
- Minnesota in 1978
- Ontario in 1987
- North Dakota in 2003

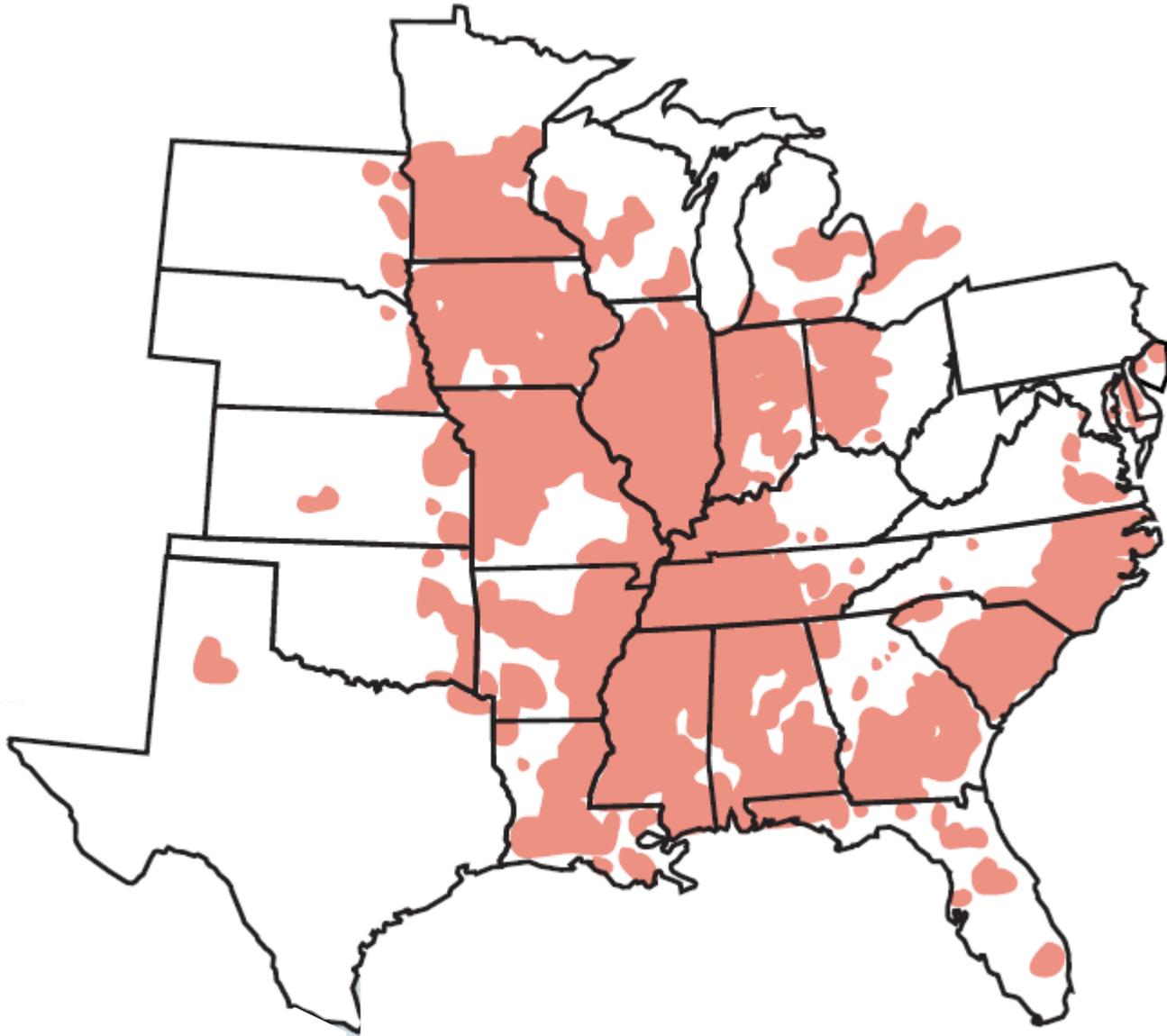
# SCN in the U.S. (1973)



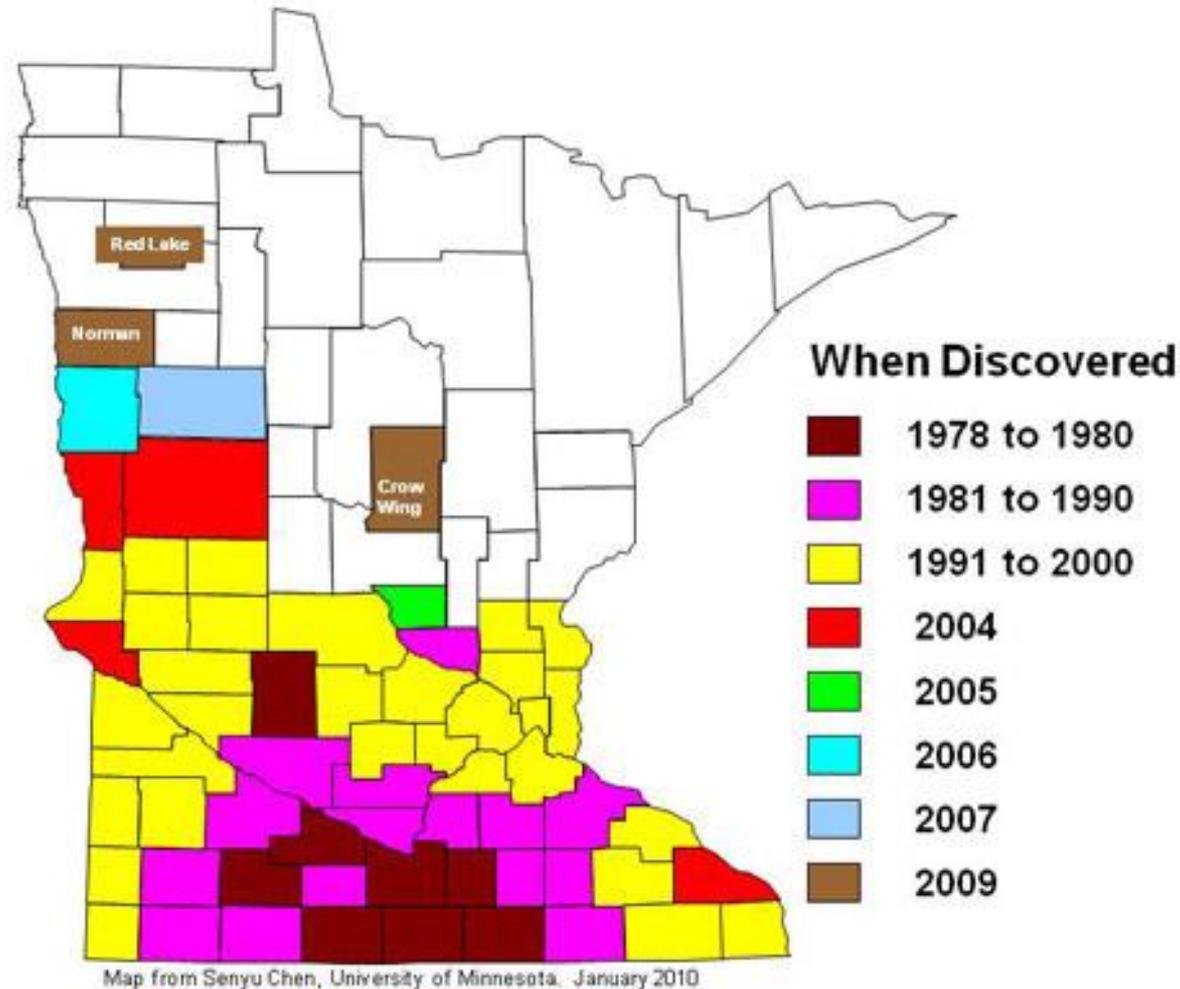
Spread of SCN Took U.S. Nematologists by Surprise

- Doesn't like cold soil (wrong)
- Doesn't like clay soil (wrong)

# SCN in the U.S. (1999)

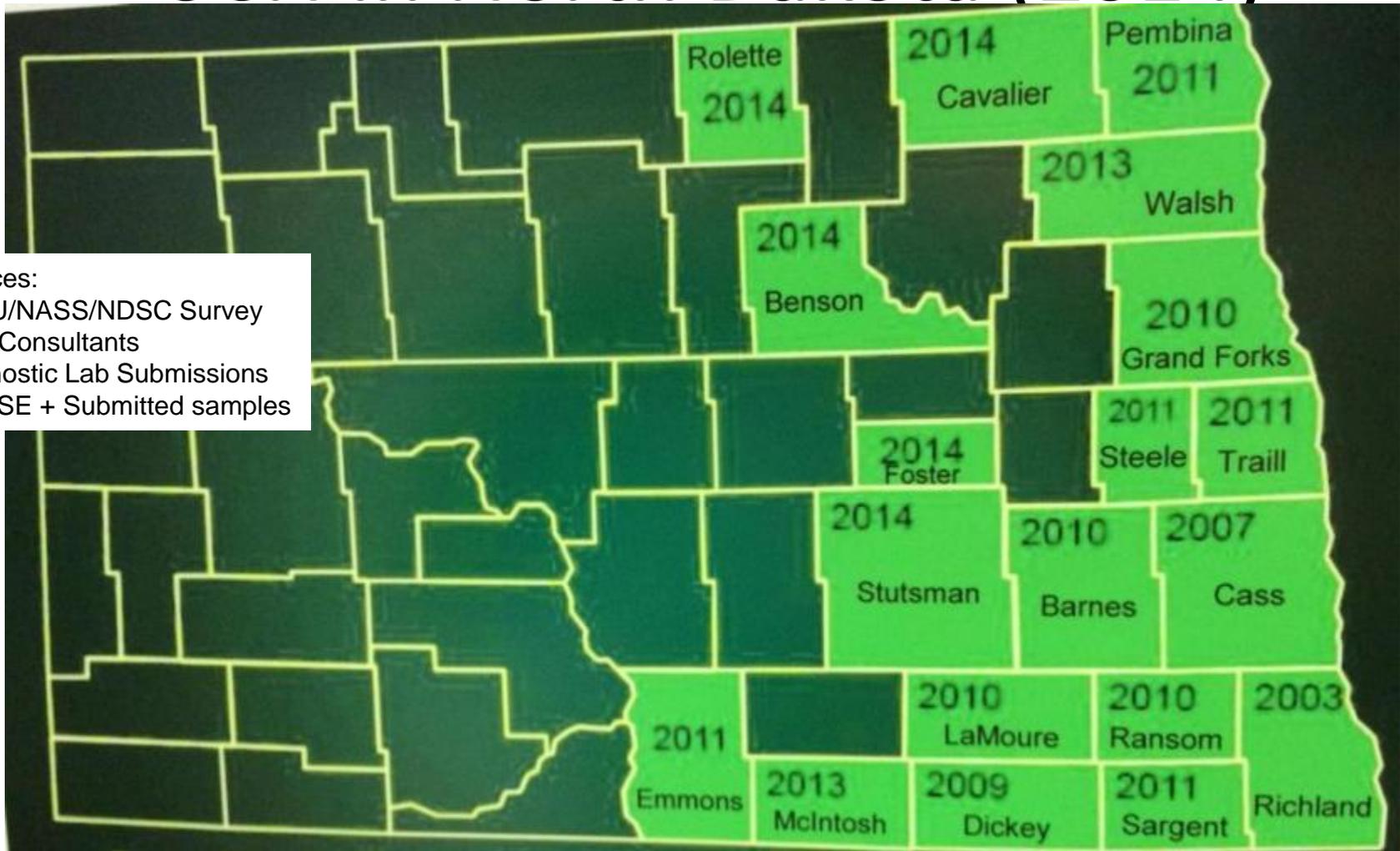


# SCN in Minnesota (2009)



Minnesota counties infested with soybean cyst nematode

# SCN in North Dakota (2014)



Sources:  
NDSU/NASS/NDSC Survey  
Crop Consultants  
Diagnostic Lab Submissions  
AGVISE + Submitted samples

Counties with confirmed Soybean Cyst Nematode

# Can be Confused with Drown Outs



Source: Albert Tenuta OMAFRA

# Can be Confused with Iron Chlorosis



Source: Jay Goos North Dakota State University

# Effects of SCN on Soybean

## What does it do?

- Takes away nutrients
- Water uptake disrupted
- Interferes with nodulation
- Damages roots (holes)

## Field symptoms?

- **Yellowed plants**
  - Resembles Iron Chlorosis
- **Stunted plants**
  - Uneven height
- **Early maturity**
- **Reduction of yield**
- **Fewer pods**
- **Damage shows earlier on sands**

# Avoid Host Plants in Fields

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## Crop Plants

Adzuki Bean

Alsike Clover

Bird's-foot Trefoil

Common Vetch

Cowpea/Black-eyed Pea

Crimson Clover

Crownvetch

Pinto, Navy, Cranberry, Black, Kidney,  
Great Northern, Snap Bean

Hairy Vetch

Lespedezas

Lima Bean

Lupines

Mung Bean

Pea

Soybean

Sweet Clover

## Weed Plants

American Vetch

Carolina Vetch

Common Chickweed

Common Mullein

Field Pennycress

Hemp Sesbania

Henbit

Hop Clovers

Milk Vetch

Mouse-ear Chickweed

Pokeweed

Purple Deadnettle

Purslane

Shepherd's Purse

Wild Mustard

Winged Pigweed

Wood Vetch

# Scout for SCN

- Fields more than 3 years of soybean
- Get out of the truck and walk
- 30 days after emergence, dig roots and look for females
- Collect soil samples and SCN test (Soil Ecology Lab U Manitoba)





Dig It



Gently obtain roots

# How to Check Roots

Look for small white lemon-shaped cysts

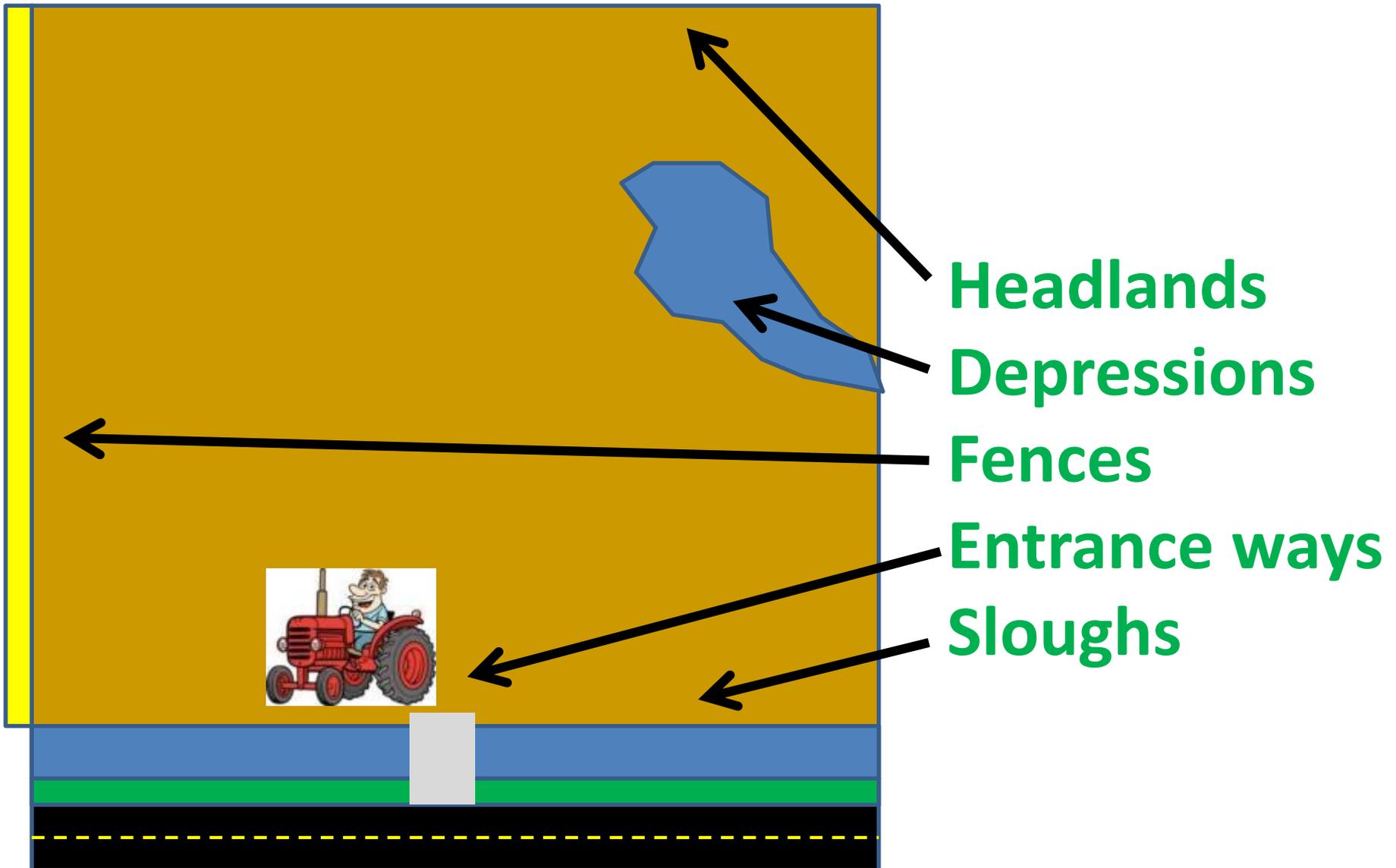


Nodules

SCN Females

[http://www.nwroc.umn.edu/Cropping\\_Issues/2010/July\\_20/SoybeanCystNematodeScouting/index.htm](http://www.nwroc.umn.edu/Cropping_Issues/2010/July_20/SoybeanCystNematodeScouting/index.htm)

# Risk Areas in Fields



# Prevent Soil Movement Between Fields

- Purchase clean used equipment
- Wash implements and tires between fields
- Don't drive pickups between fields
- Clean footwear



Source: Greg Tylka Iowa State Univ.



Source: Sandra Sardanelli Univ. Maryland

# Prevent Birds From Landing on Fields



# Use Resistant Soy Varieties

Not Resistant

Not Resistant

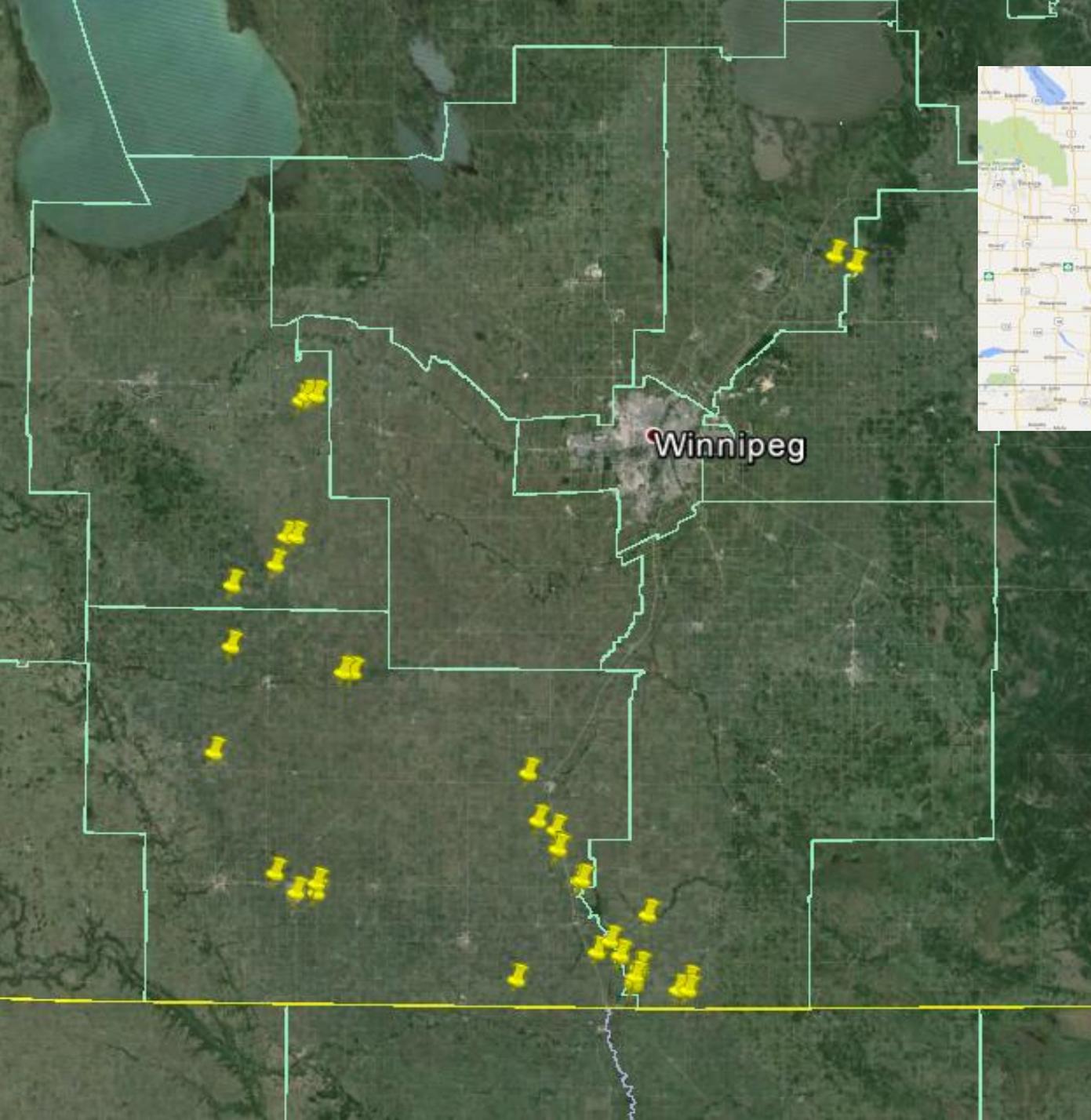
# SCN in Manitoba?

- Canadian Food Inspection Agency (CFIA) has done some survey work of random fields
- CFIA found in survey of potato soil in 2010 what seemed to be a lot of SCN in one field
- CFIA has removed SCN as a Regulated Pest in Canada and thus will not survey fields any longer

# SCN Survey of Manitoba

- 76 soybean fields sampled
- > 5500 soil samples
- 487 composite samples for processing
- Priority fields based on
  - Proximity to water courses from U.S. that flood
  - Number of soybean years
  - History of dry beans
  - Sampled prone areas of fields

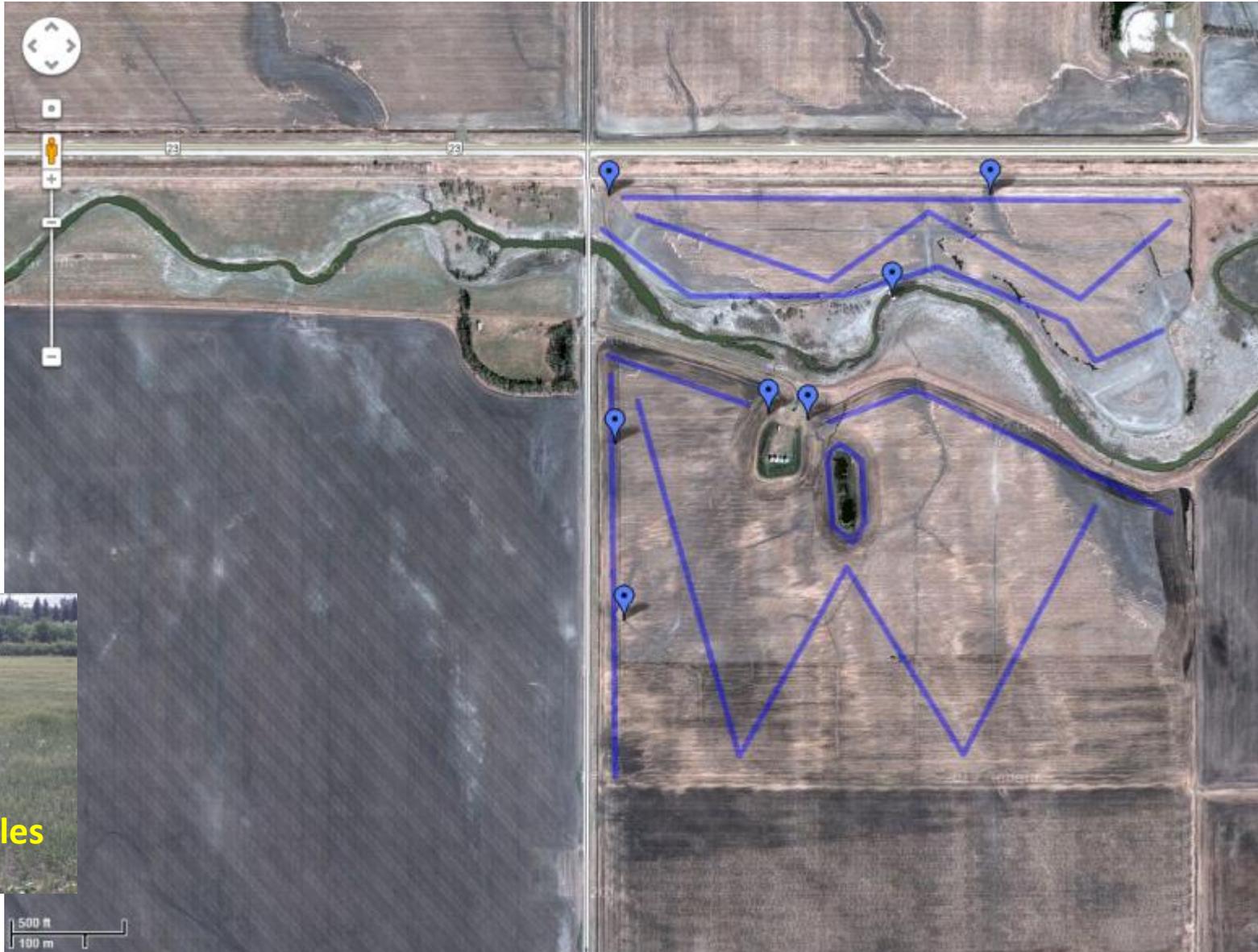
2015



35 fields sampled  
Oct/Nov 2012

13 fields sampled  
July/Aug 2013

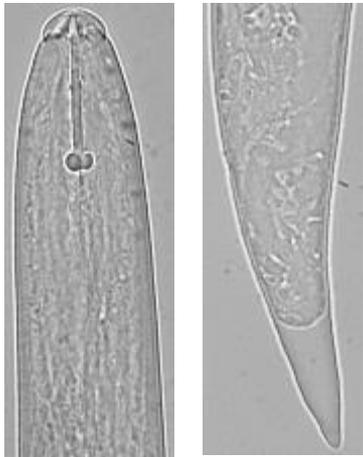
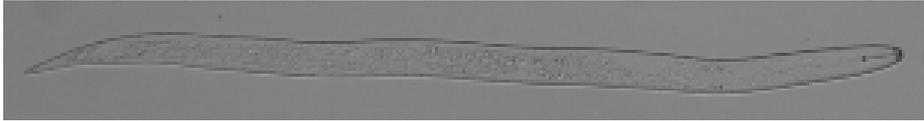
# Collecting Soil Samples



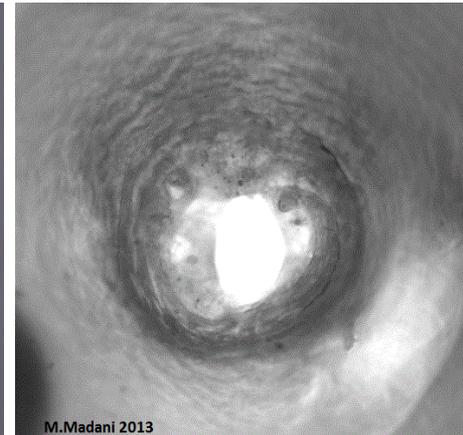
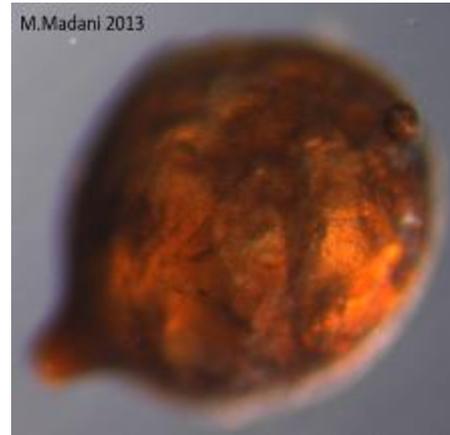
1 foot samples

500 ft  
100 m

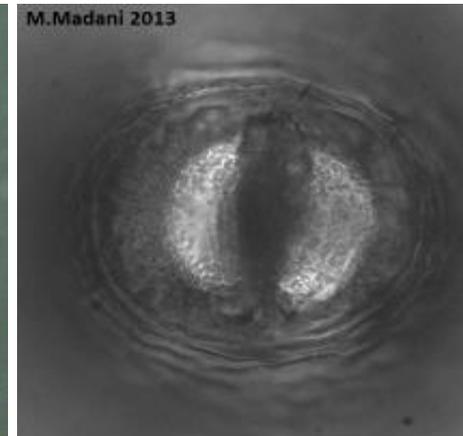
# Juveniles and Cysts



**Circumfenestrate**



**Bifenestrate**



# Results 2012/13

- 37 composite samples from 22 fields had cysts
- Total of 60 cysts recovered
- 26 cysts were not damaged
- 23 cysts had circumfenestrate vulval cone structures – *Cactodera*, *Punctodera*, *Betulodera*
- 3 cysts were bifenestrate – *Heterodera*

# Results

- 15 circumfenestrate cysts had eggs or juveniles
- 1 bifenestrate cyst had eggs and juveniles
- ITS sequencing, species-specific PCR
- Circumfenestrate cysts ITS matched *Cactodera*
- Bifenestrate cyst ambiguous – *Heterodera* by morphology, SCN by 2/3 primer sets, *Cactodera* by ITS sequencing

# Results 2014/15

- 28 fields sampled
- 205 composite samples analyzed
- 32 samples had cysts, but only a few each
- Most cysts were found and lemon shaped
- Cone top patterns circumfenestrate
- 6 cysts yielded DNA for analysis, failed to be SCN

# Results

- We have not found a field positive for SCN yet
- But the search goes on.....

# CCA Exam Study Points

- SCN can silently rob yield
- SCN is confused with other crop problems
- SCN is marching in our direction and is inevitable
- Can delay and lessen damage by
  - Clean machinery, tires and footwear
  - Know your field risk areas
  - Dig plants to scout fields
  - Weed suppression
  - Avoid tight rotations
  - Don't rotate with edible beans and pea
  - SCN soil test
  - Use resistant varieties
  - Bird suppression

# Acknowledgements

- Numerous colleagues for pictures
- Partners: Dennis Lange, Kristen Podolsky, Holly Derksen, growers, Tom Welacky (AAFC Harrow), Albert Tenuta (OMAFRA)
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- Funders: MPSG, MRAC, Pulse Science Cluster II, ARDI, WGRF
- Canada Research Chair Program in Applied Soil Ecology

# Three Things Are Forever

- Diamonds
- Taxes
- SCN

