2010 Soil Fertility Seminars

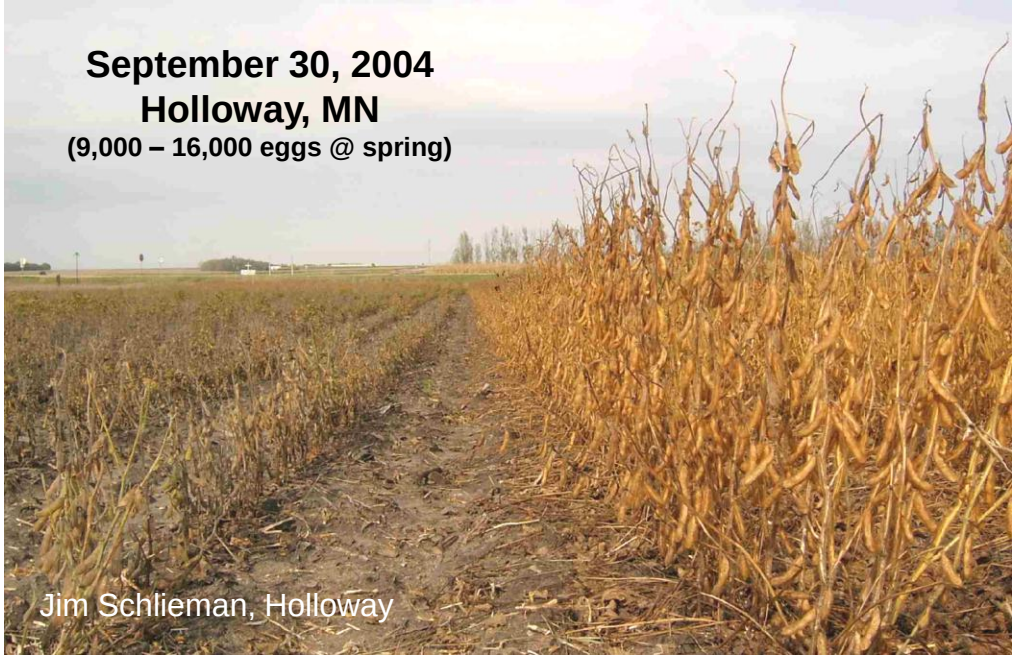
SCN Midwest Status

Richard Jenny
Agronomist
AGVISE Laboratories
Benson, MN

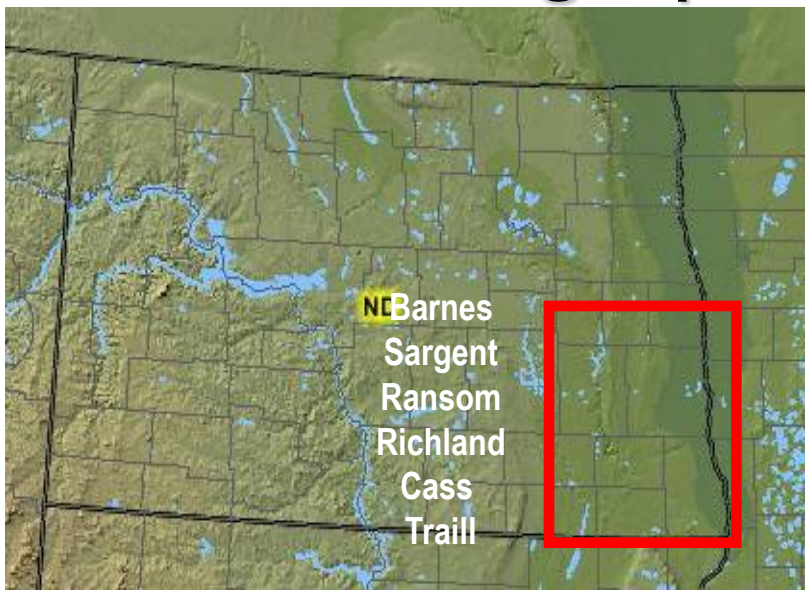
SCN Damage

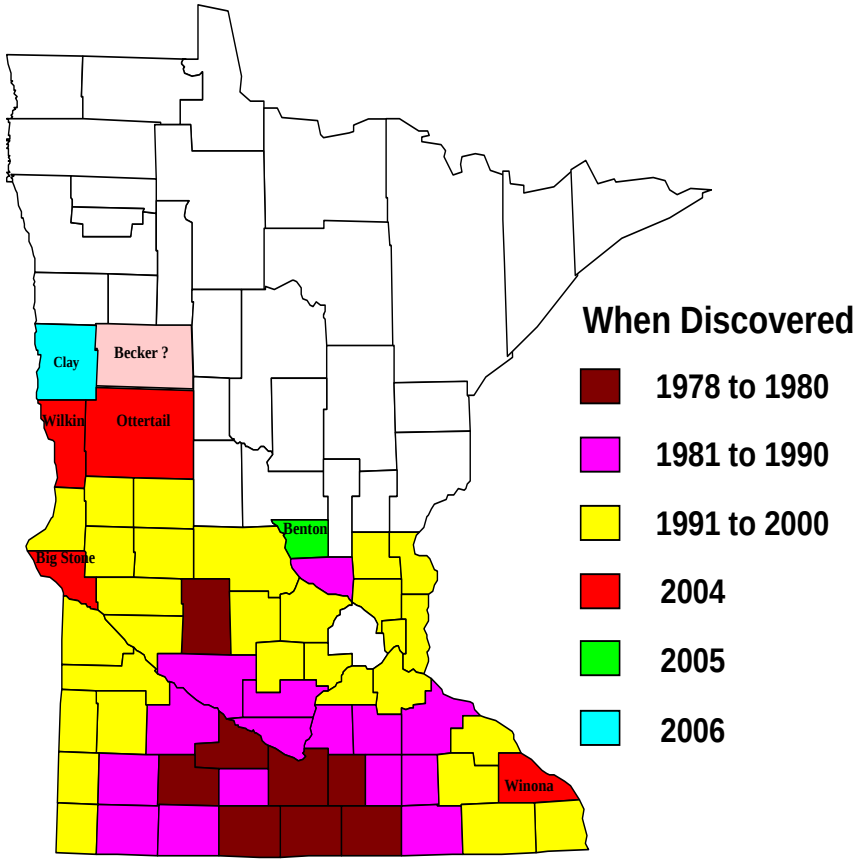

Dr. Greg Tylka, Iowa State University
SCN Resistance Summit, Mankato, MN Sept. 6, 2007


September 20, 2004
Holloway, MN
(9,000 – 16,000 eggs @ spring)


September 30, 2004
Holloway, MN
(9,000 – 16,000 eggs @ spring)
Jim Schlieman, Holloway

Geographic Distribution



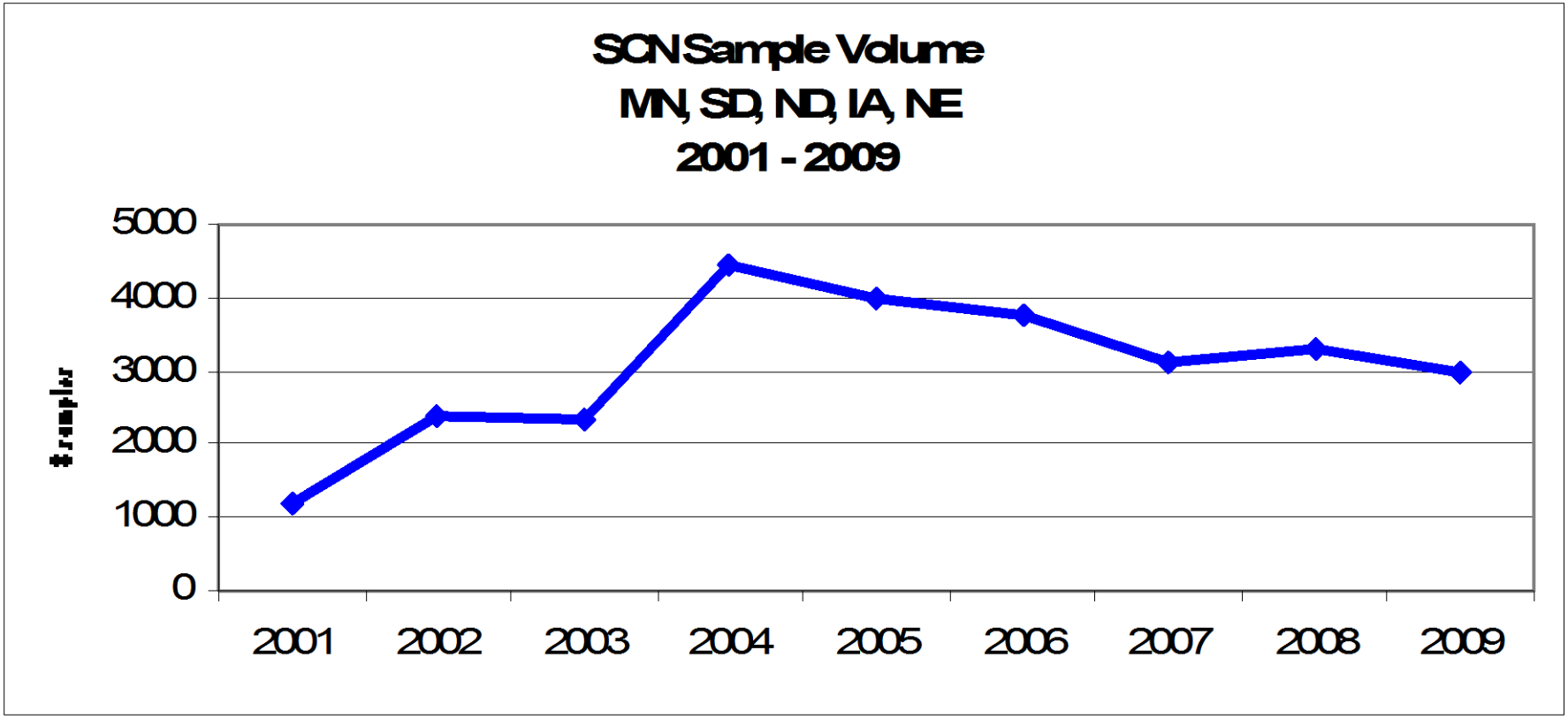


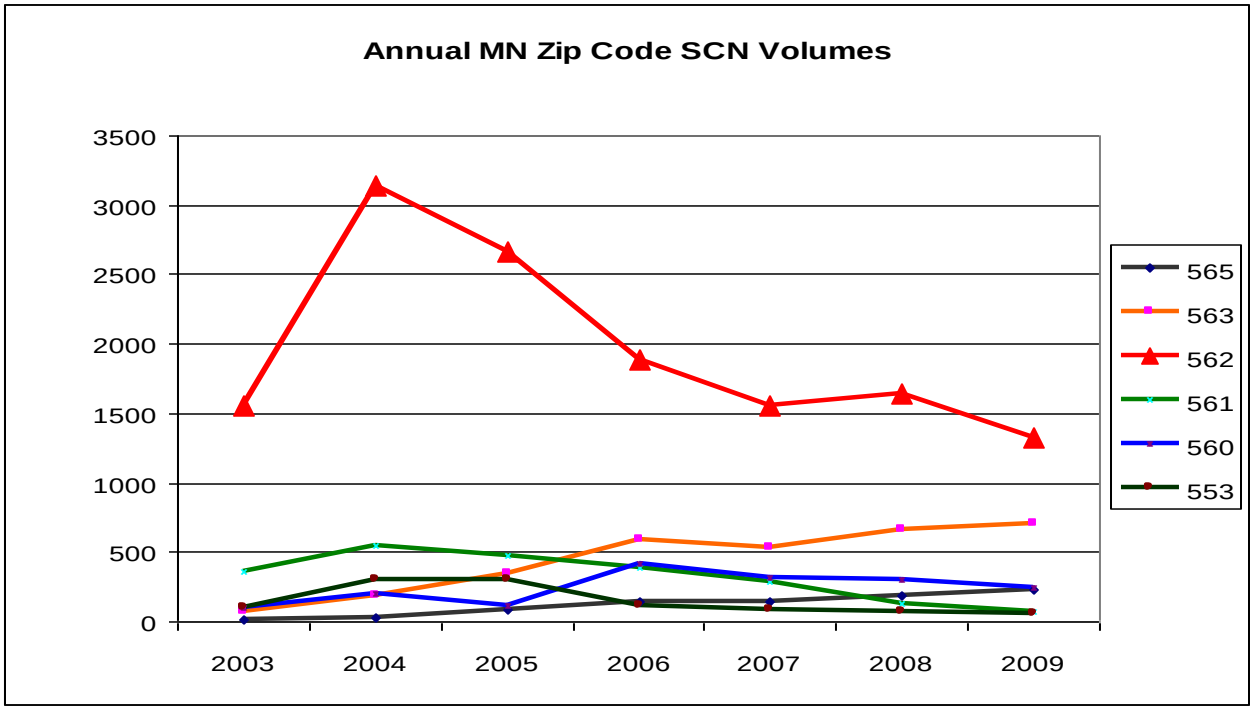
South Dakota

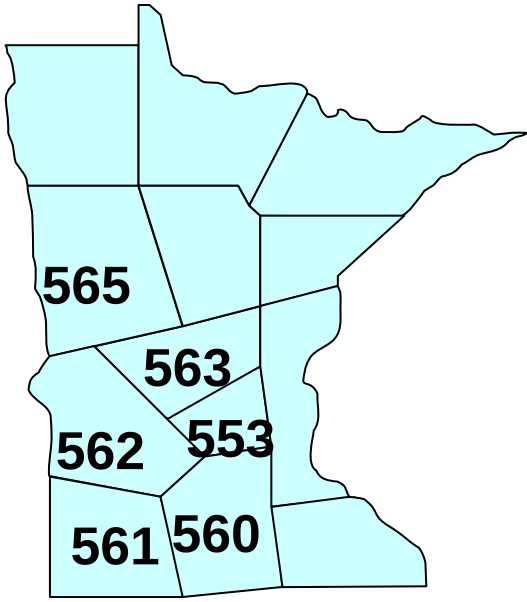
2004: Dark Blue
2002: Yellow
1999: Dark Green
1998: Blue
1997: Green
1996: Orange
1995: Red

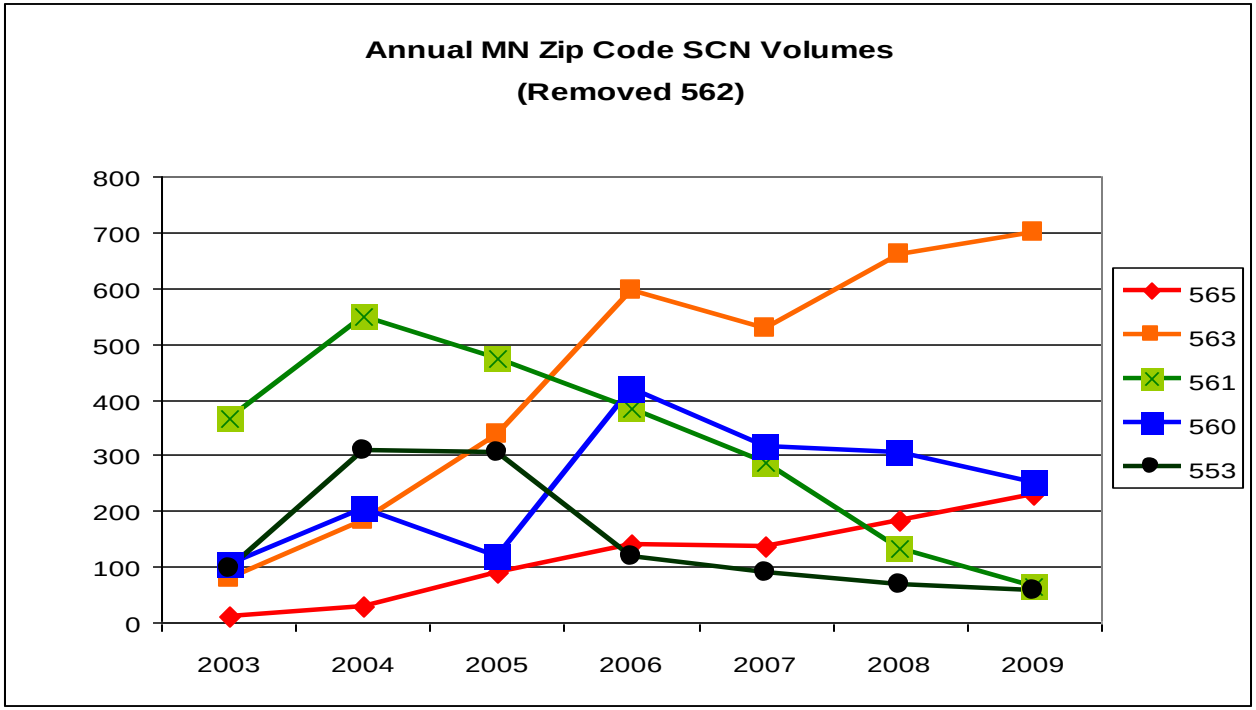
AGVISE LABORATORIES

SCN Sample Volumes at Benson lab




Annual MN Zip Code SCN Volumes
3500
3000
2500
2000
1500
1000
500
0
2003
2004
2005
2006
2007
2008
2009
565
563
562
561
560
553


565
563
562
553
561
560


Annual MN Zip Code SCN Volumes
(Removed 562)
800
700
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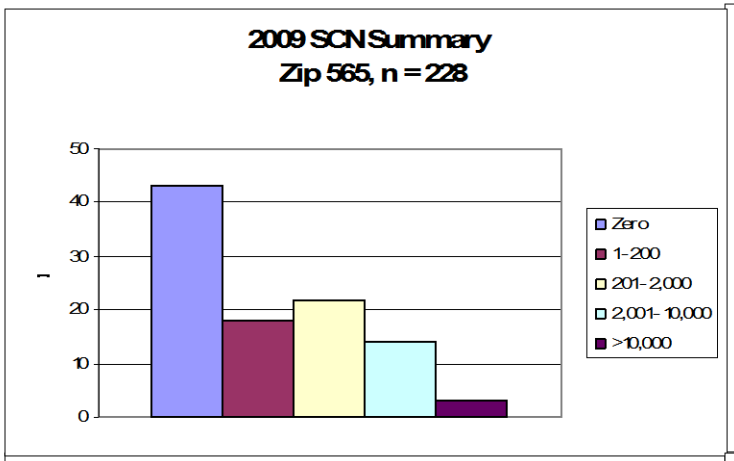
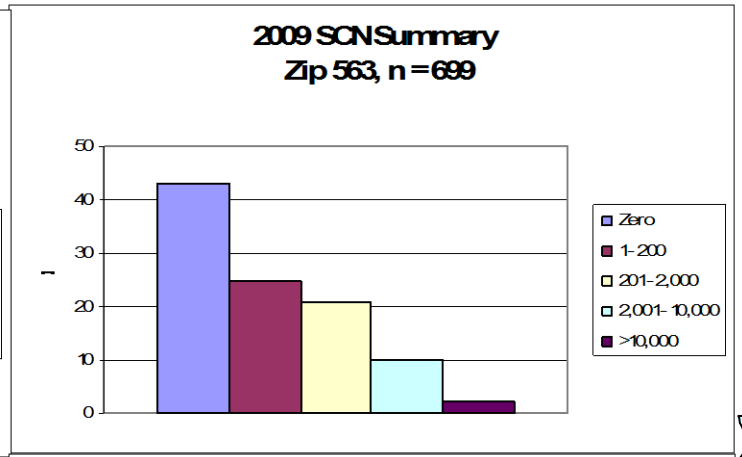
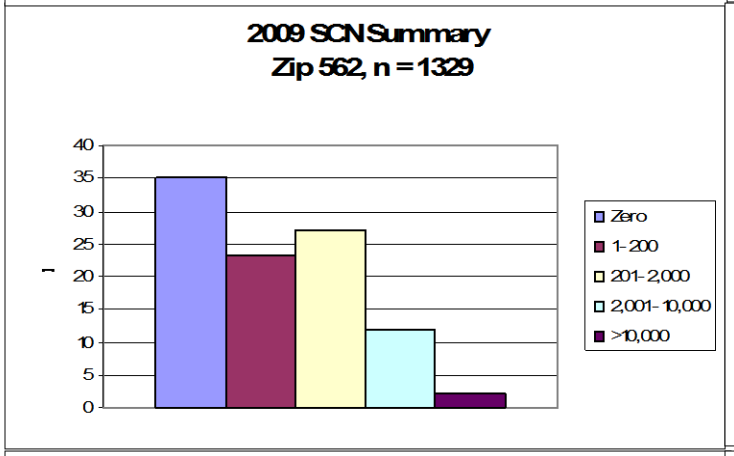
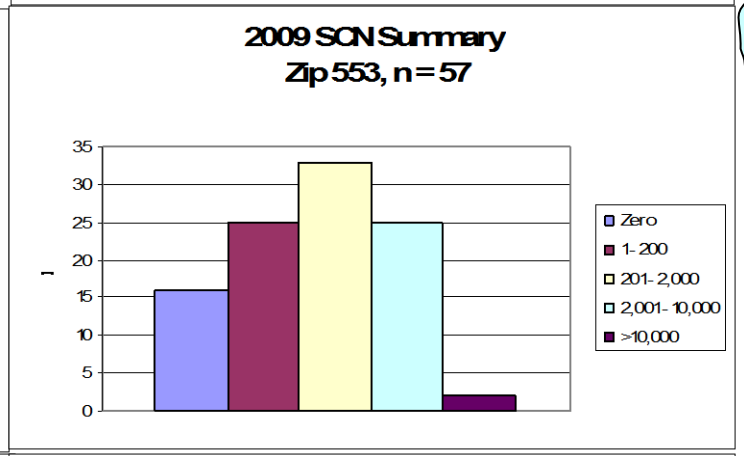
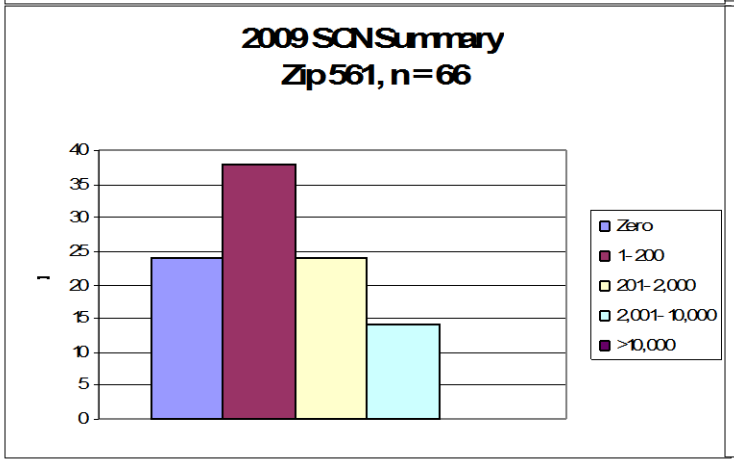
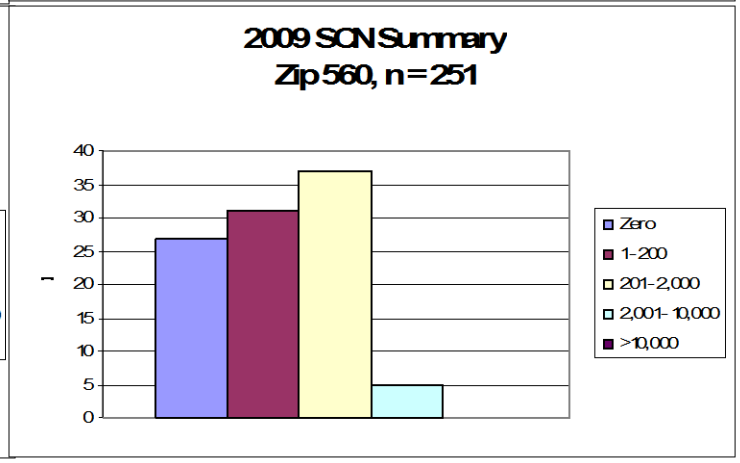


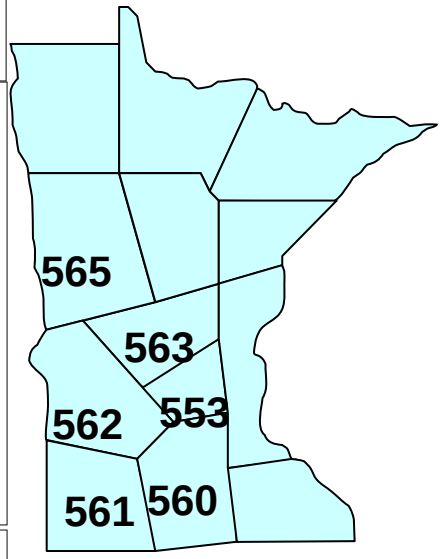








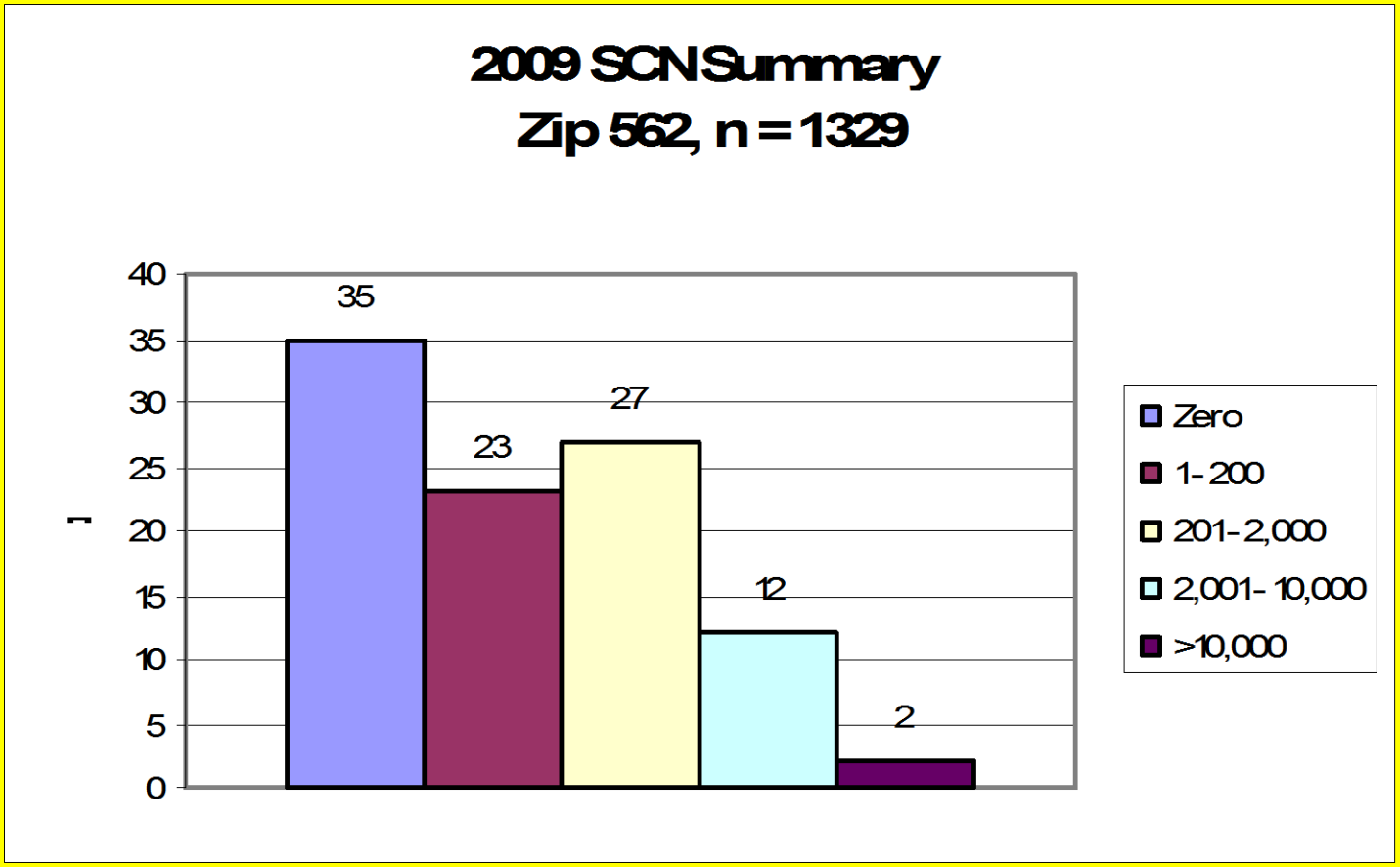


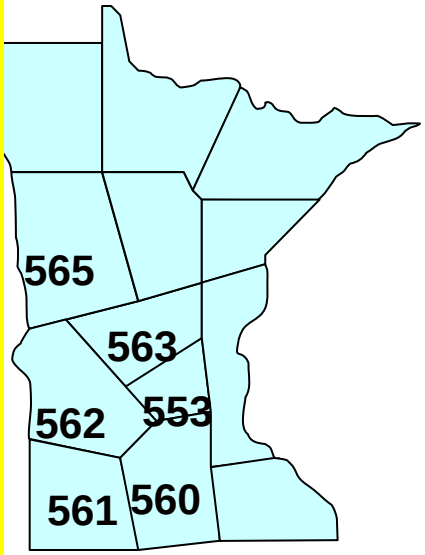


SCN Samples

2006 = 3,514
2007 = 2,907
2008 = 2,996
2009 = 2,635

2009





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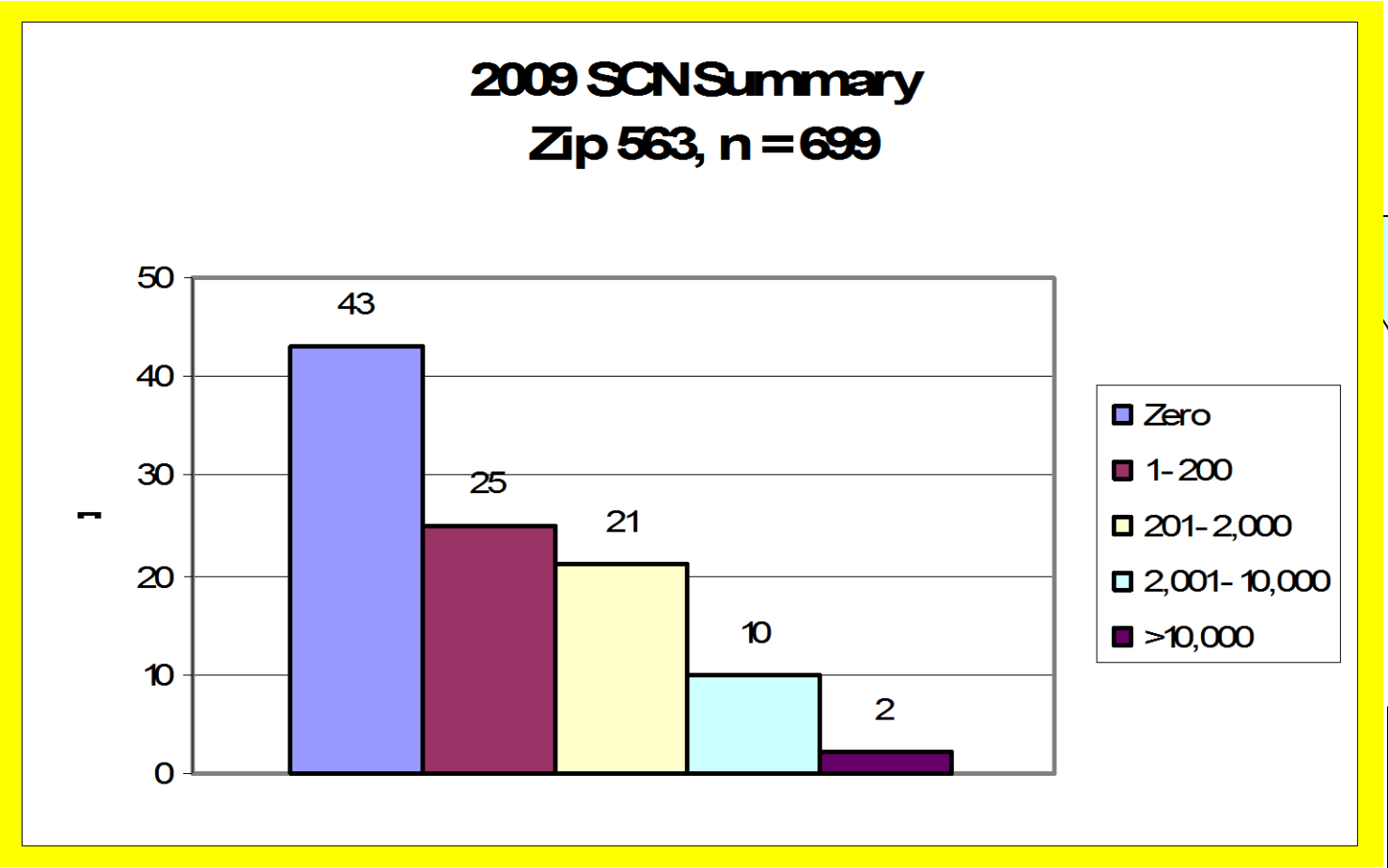

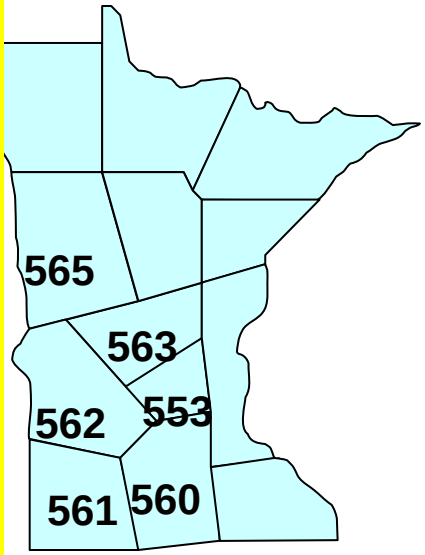

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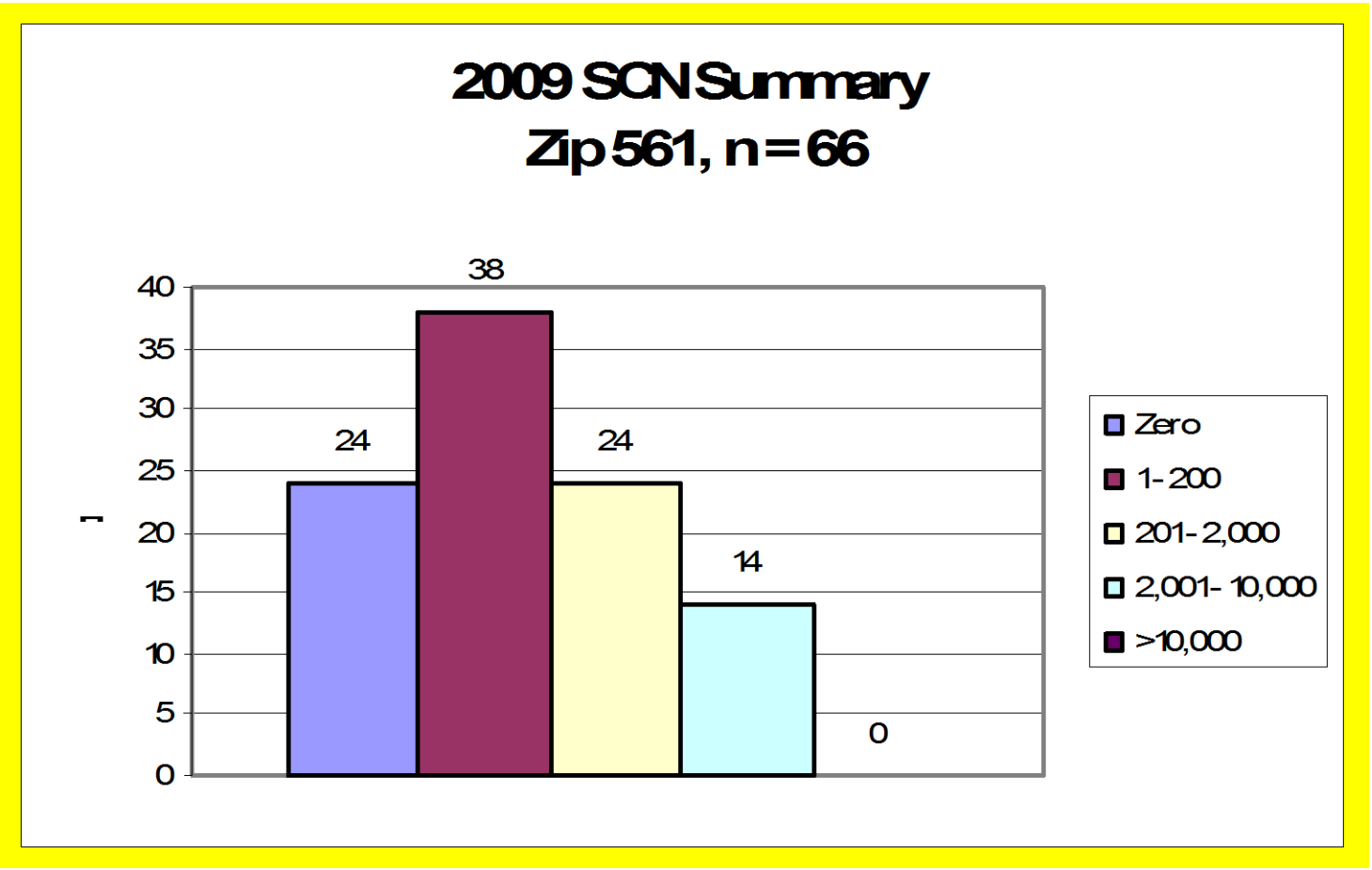

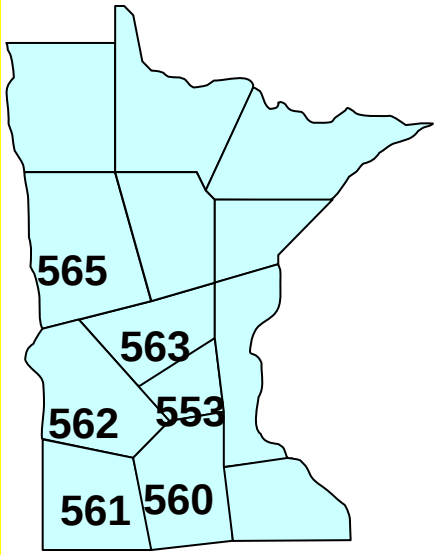

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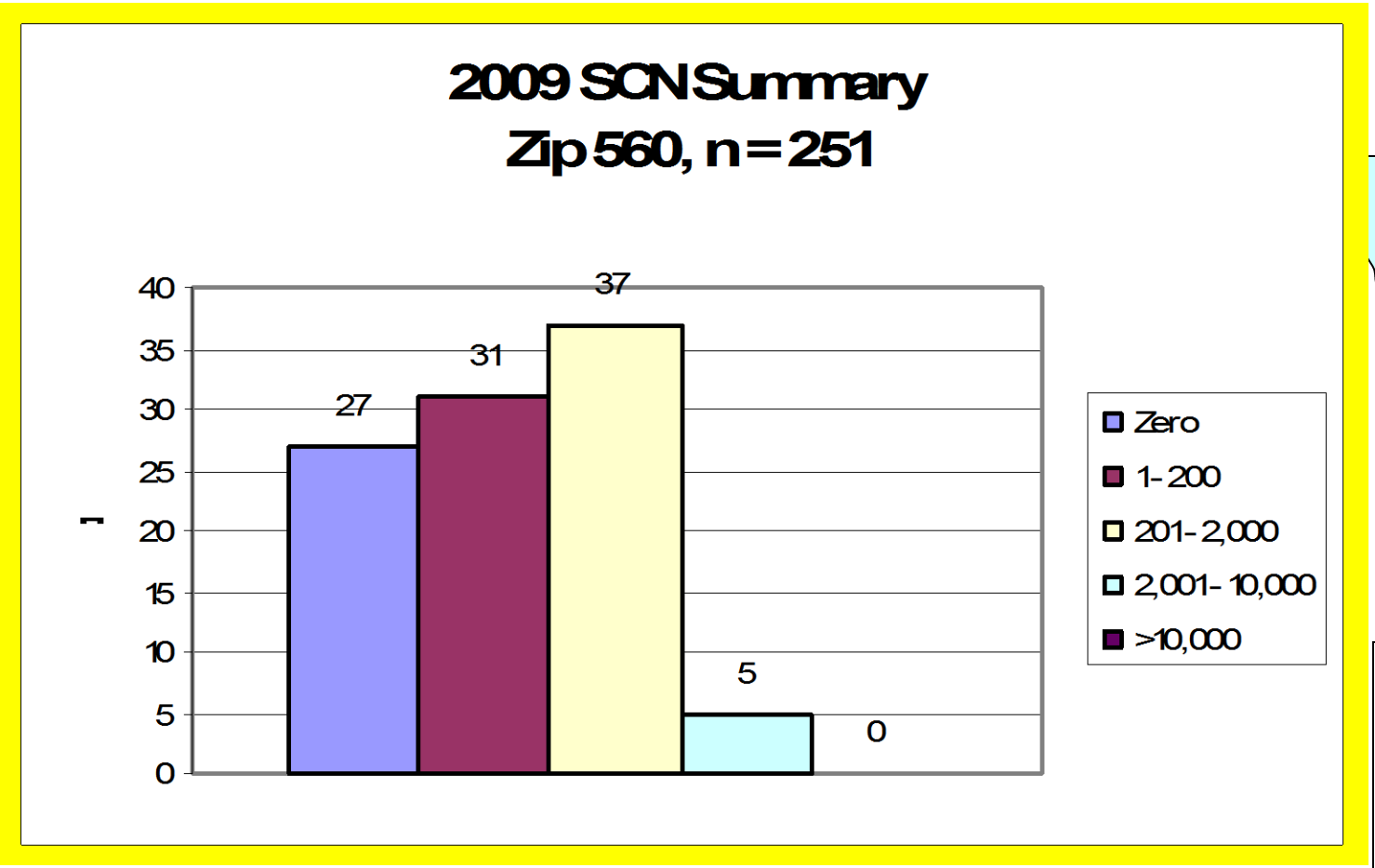

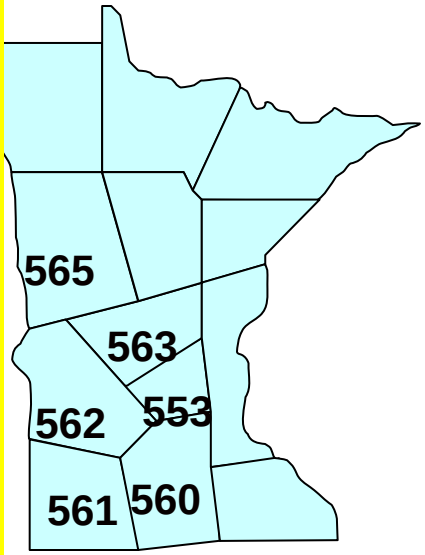

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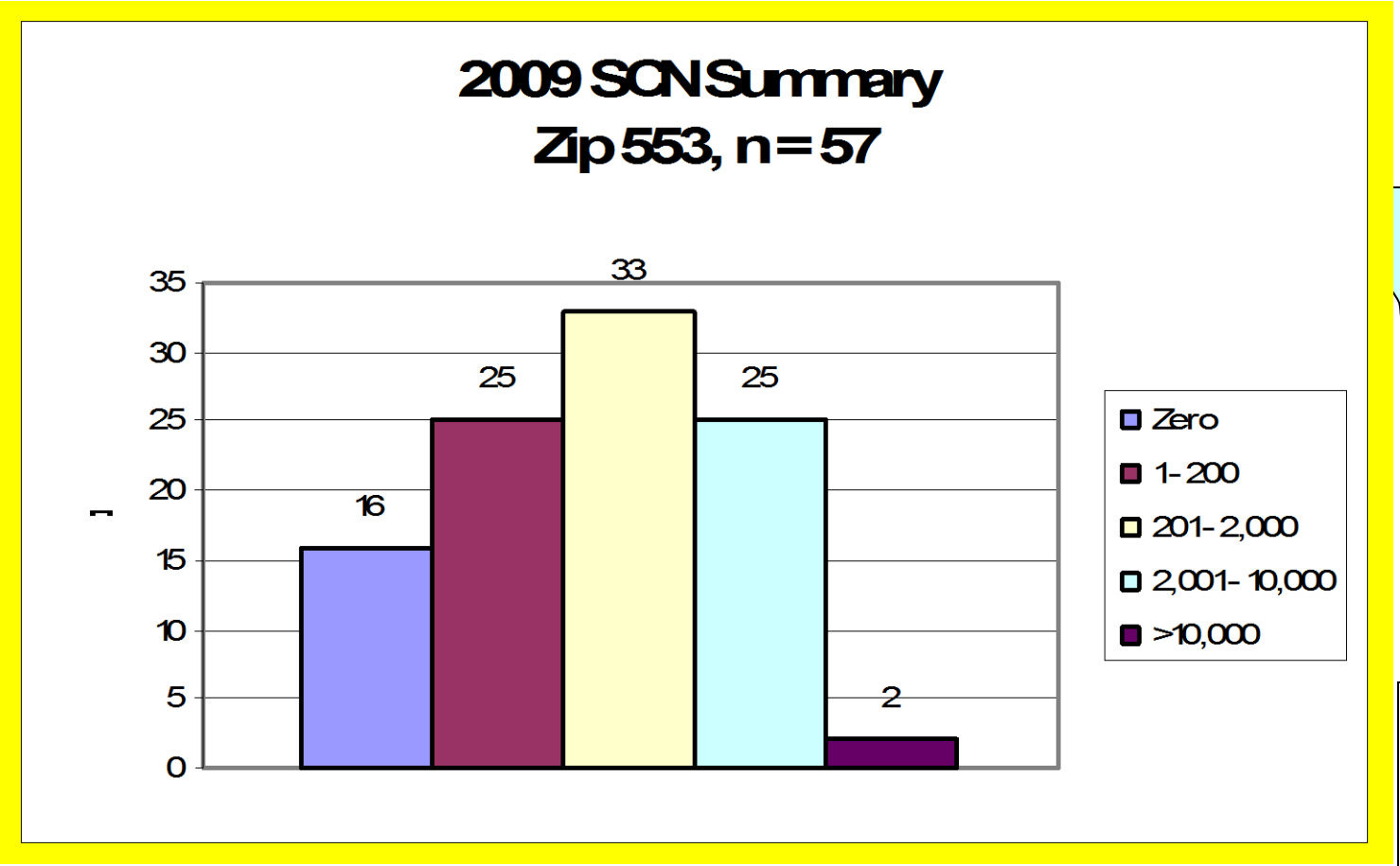

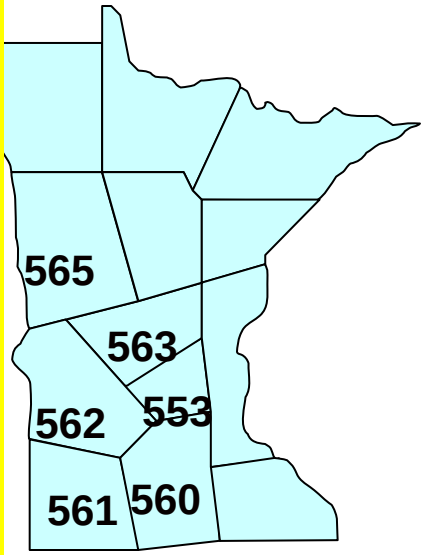

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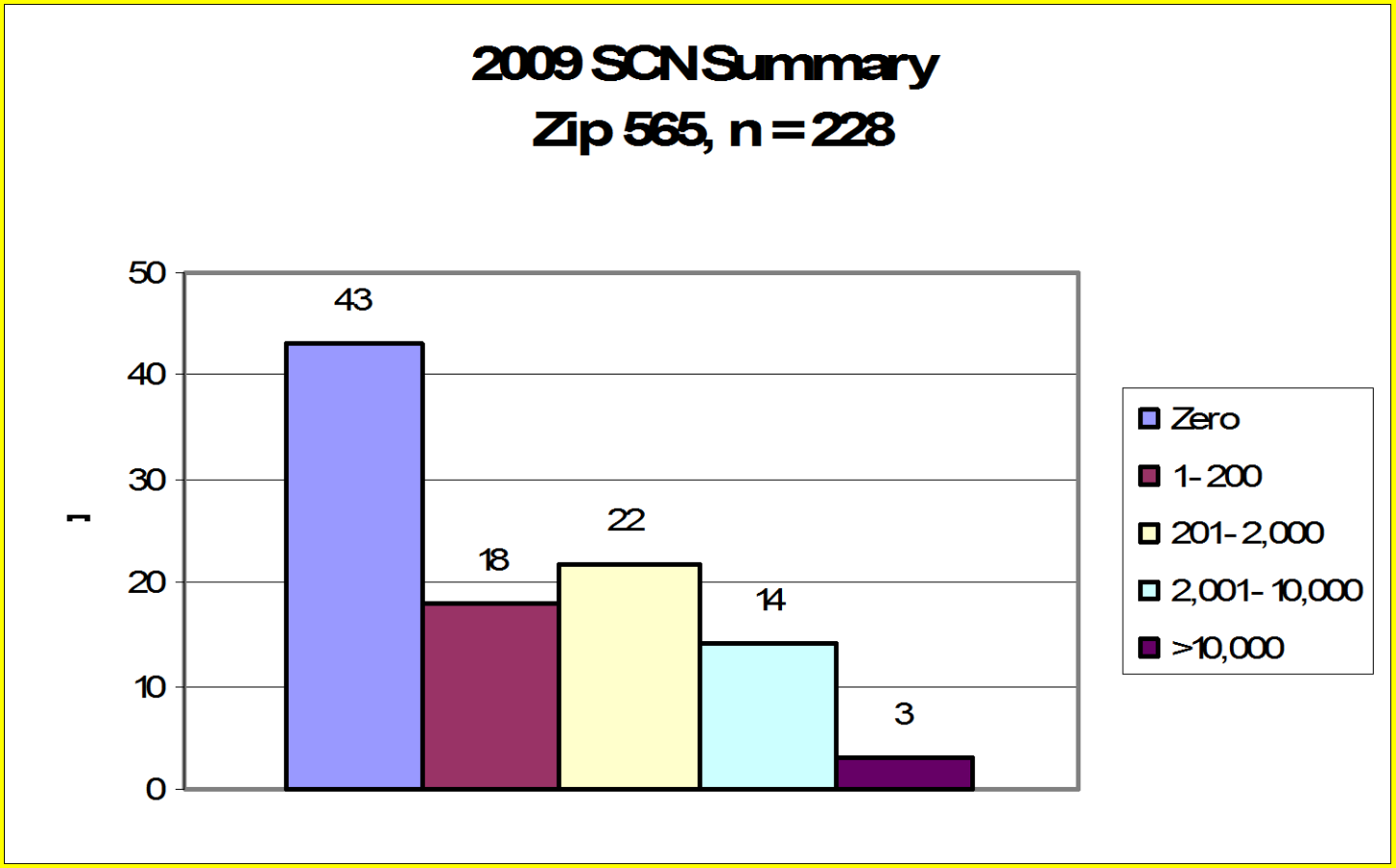

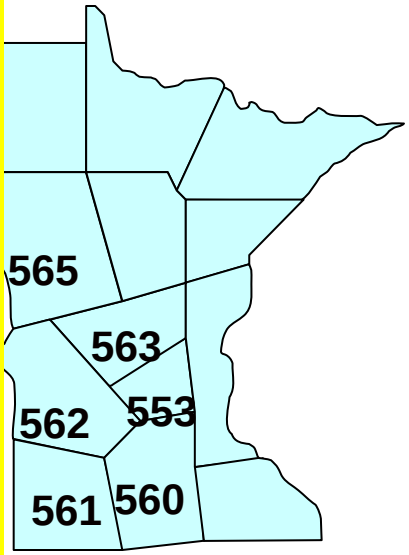

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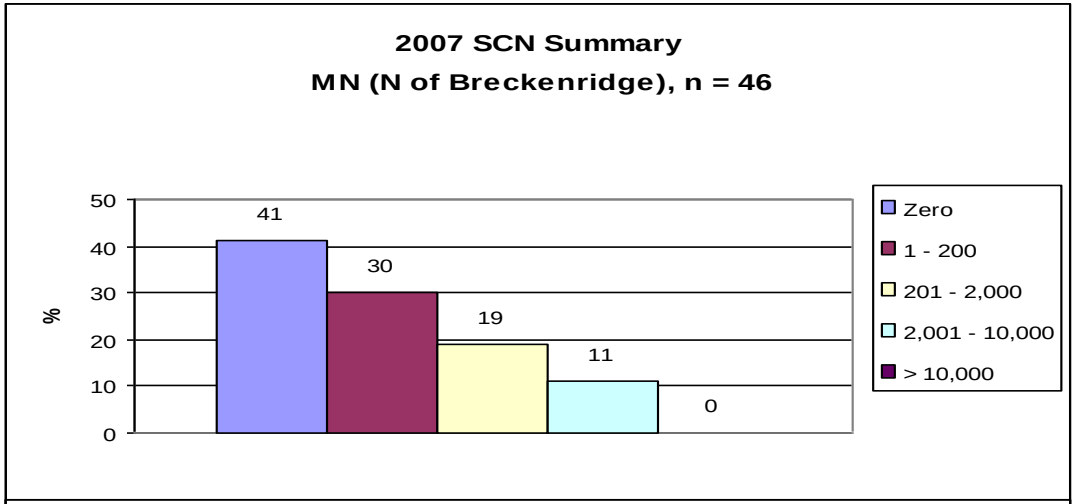
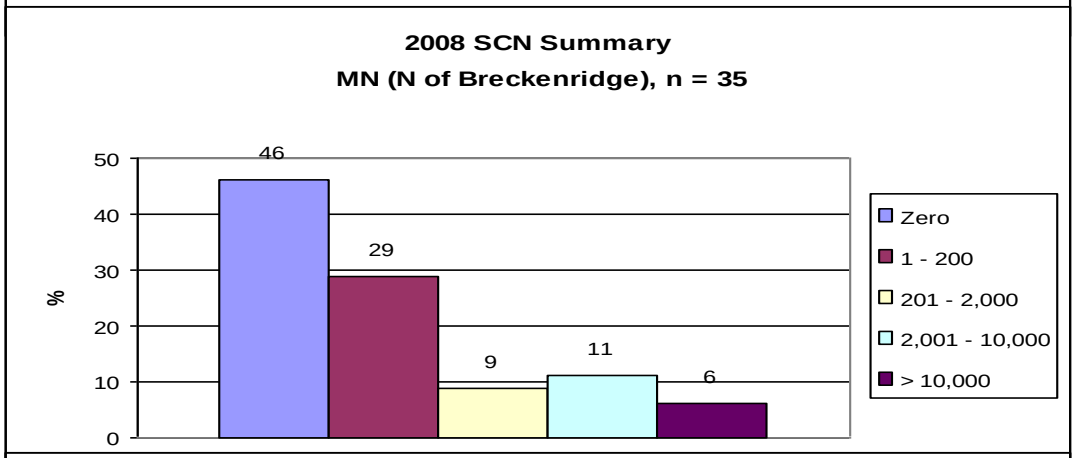
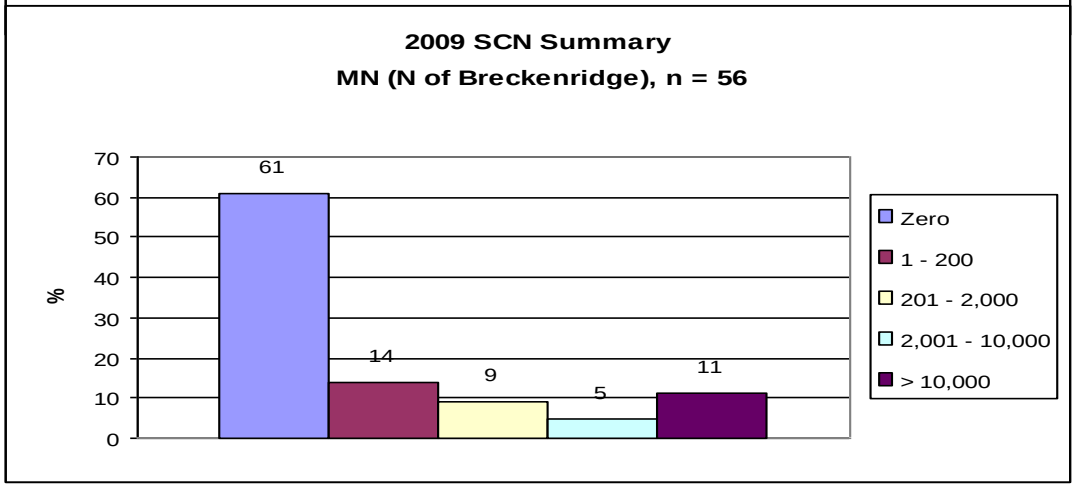
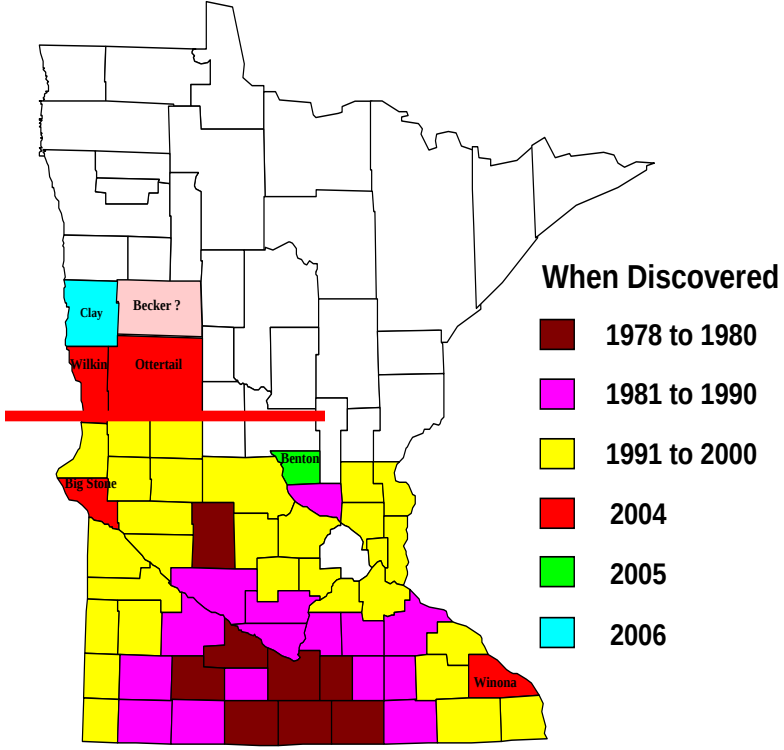




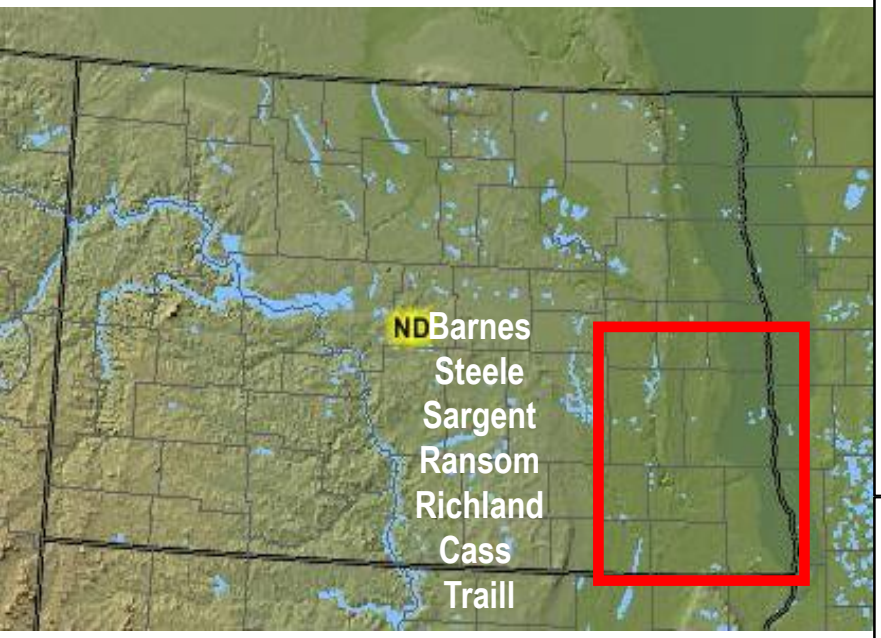


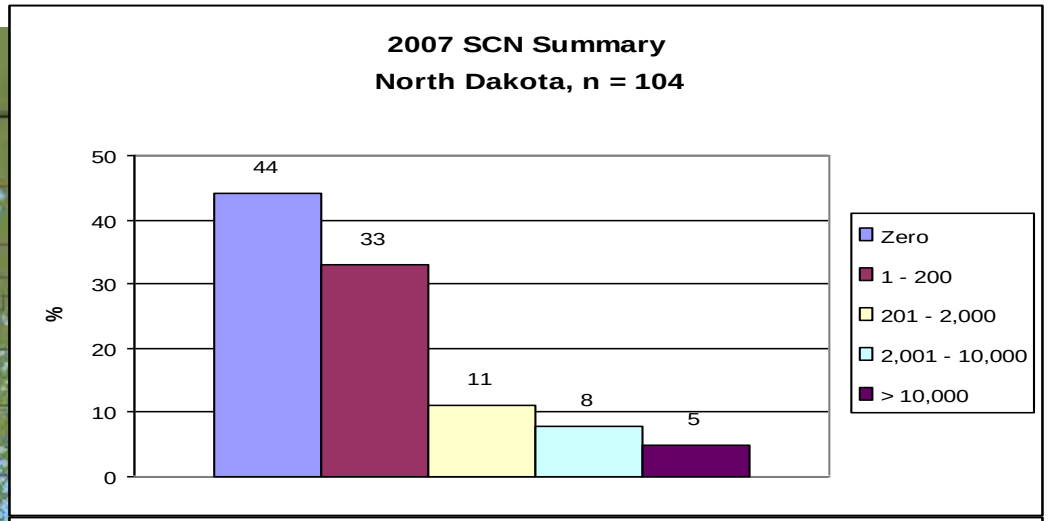


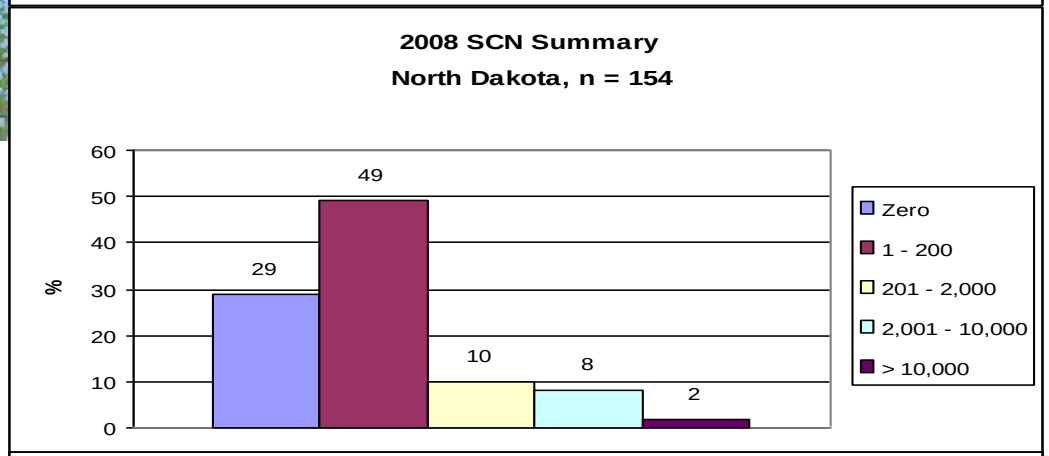
SCN Samples

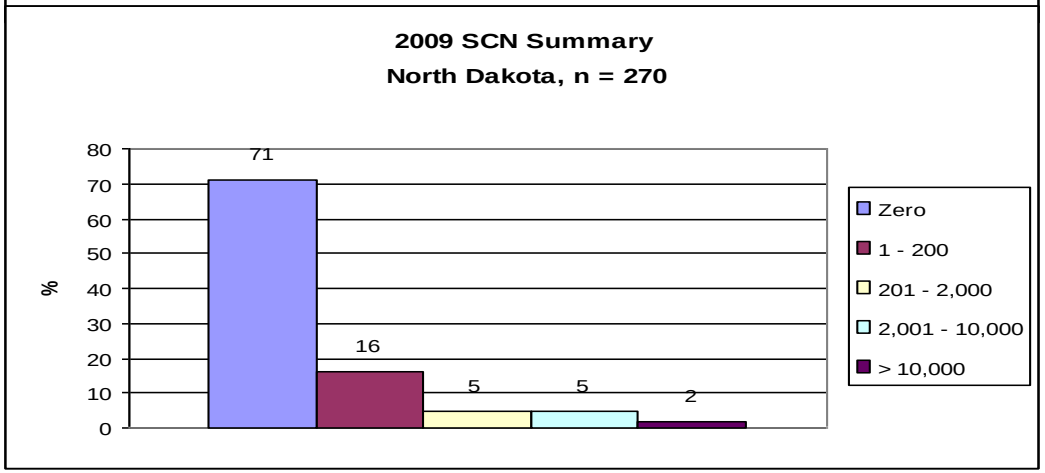
2006 = 10
2007 = 46
2008 = 35
2009 = 56

Breck., Gary, Moorhead, Twin Valley, Glyndon, Ulen, Mentor, Fergus Falls, Argyle, Detroit Lakes









SCN Samples

2006 = 4
2007 = 104
2008 = 154
2009 = 270

AGVISE Labs SCN Sample Summary

NE SD	2006	2007	2008	2009
Zero	27	43	30	30
1 - 200	1	15	24	3
201 - 2,000	3	19	12	4
2,001 - 10,000	1	6	9	1
> 10,000	0	2	0	0
Number of Samples	32	85	75	38

SE SD	2006	2007	2008	2009
Zero	18	29	21	0
1 - 200	4	10	8	1
201 - 2,000	3	2	1	0
2,001 - 10,000	7	0	1	0
> 10,000	23	0	0	0
Number of Samples	55	41	31	1

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SDSU SCN Sample Summary

SDSU SCN Summary			
NE SD	2007	2008	2009
Zero	2	242	100
Positive	7	31	14
Number of Samples	9	273	114
SE SD	2007	2008	2009
Zero	71	251	222
Positive	173	105	62
Number of Samples	244	356	284
Dr. Larry Osborne, SDSU			

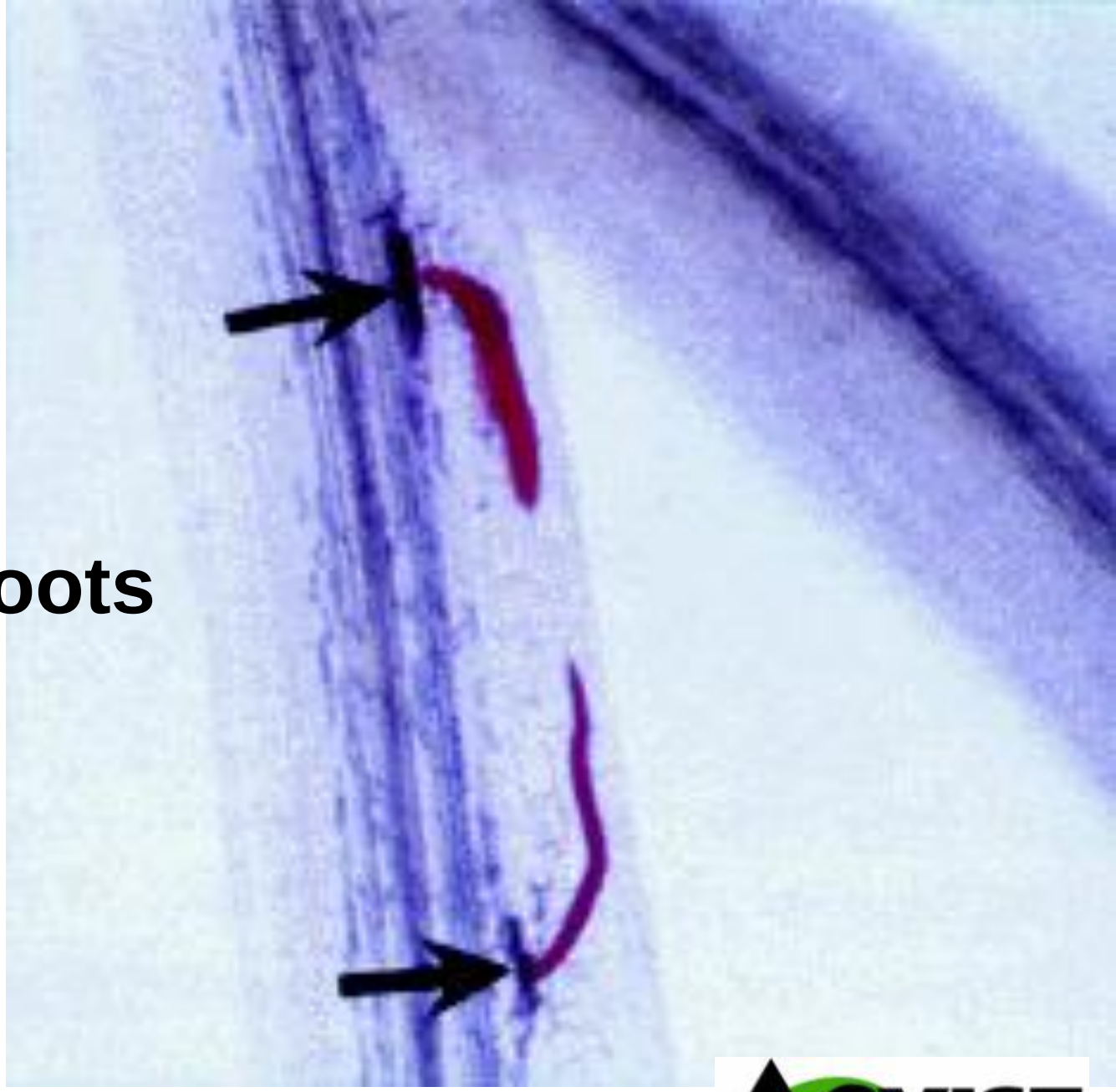
AGVISE LABORATORIES

SCN Biology

- Microscopic, unsegmented roundworms
  - **Animal**, not an insect, fungi, virus or bacteria
- Parasitic: Nematodes feed on or in root tissue with a needle-like stylet used to pierce plant cells and extract nutrients from the cells of the plant root
- Adult females(cyst) can be seen on roots
  - Looks like a grain of sand on roots
  - Much smaller than nodules

AGVISE LABORATORIES

Microscopic roundworm feeding on roots



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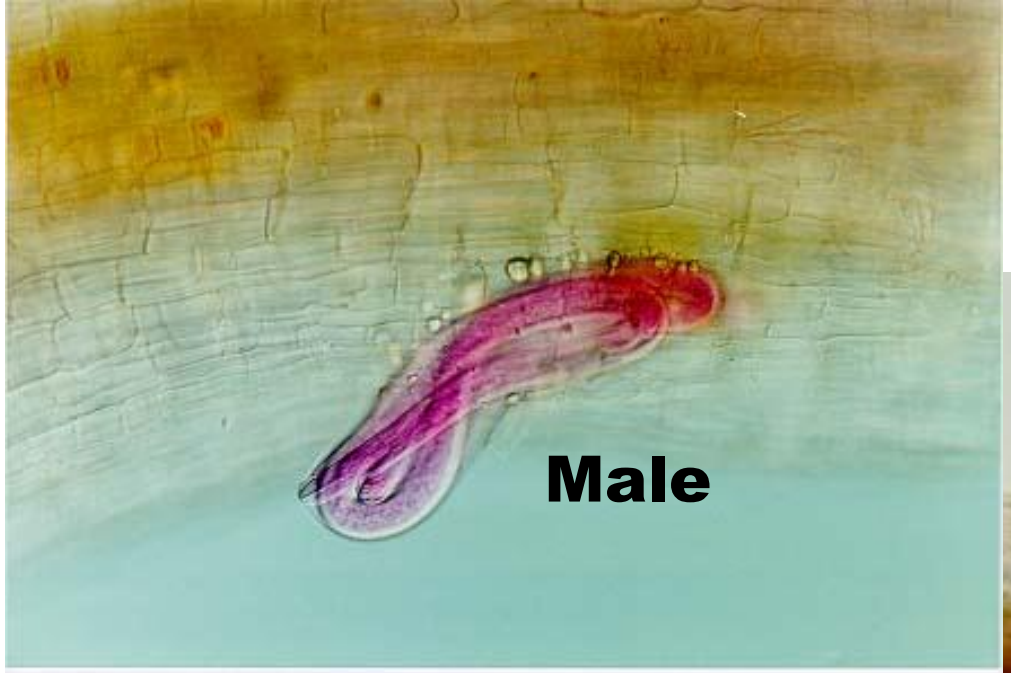
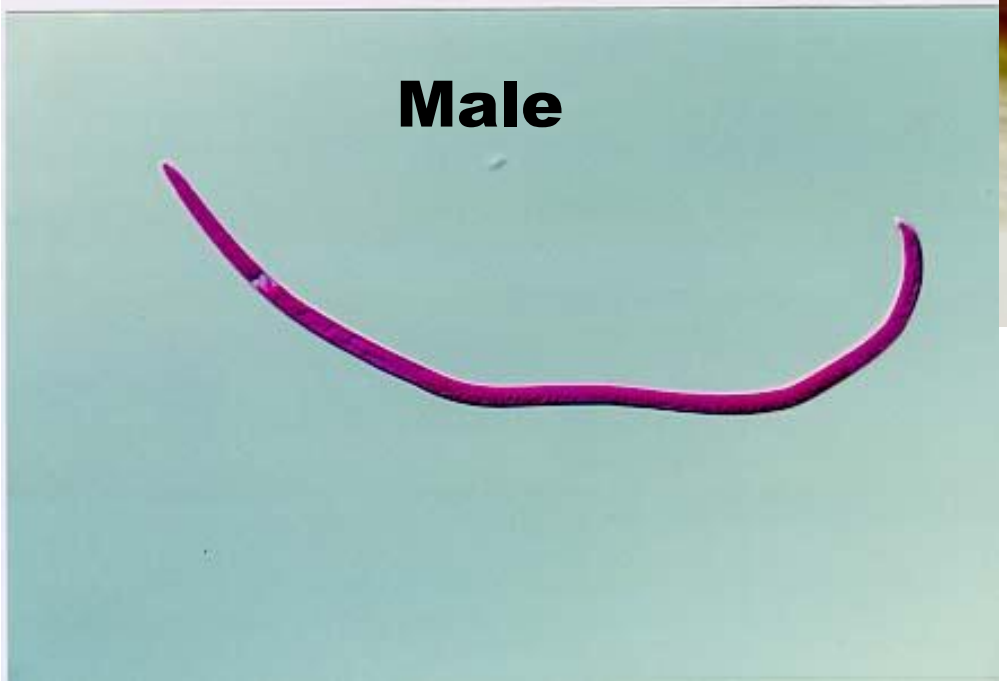
SCN Biology

- The cyst is the female
- Cyst protects the unhatched eggs
- Cysts can survive in soil for up to 10 years
- The cyst may contain several hundred eggs
- Life cycle every 4-5 weeks under favorable conditions
- Transported and spread from field to field quite easily

AGVISE LABORATORIES

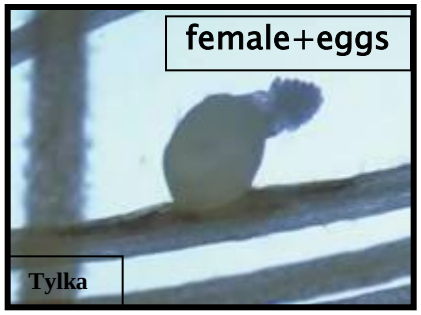


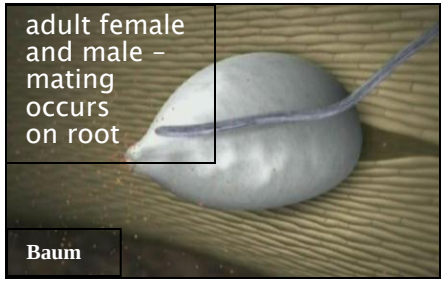


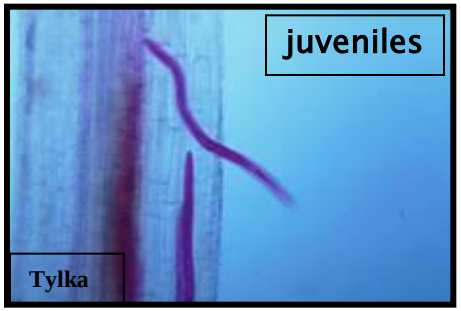
AGVISE LABORATORIES

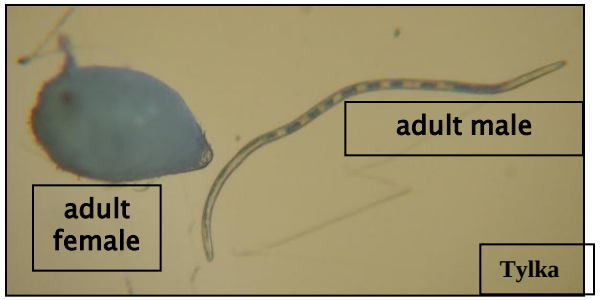
Life Cycle of SCN

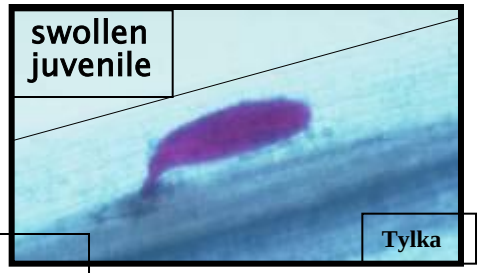
- ~24 days
- >200 eggs per female
- eggs survive >10 years











Dr. Greg Tylka, Iowa State University
SCN Resistance Summit, Mankato, MN Sept. 6, 2007

SCN Biology

- Survives very well in cold climates
- Survives very well in higher pH soils, along with lower pH soils
- Do not like poorly drained, wet soils
- Reproduces quickly on susceptible soybeans

AGVISE LABORATORIES

How are Fields Infested?

- **Any way** that moves soil can infect fields
- Soil carried on equipment from field to field
- Soil in seed
- Wind, water movement
- Animals
- Trenching/ditching equipment
- Soybeans may not have visible injury symptoms

AGVISE LABORATORIES

Severe Visual

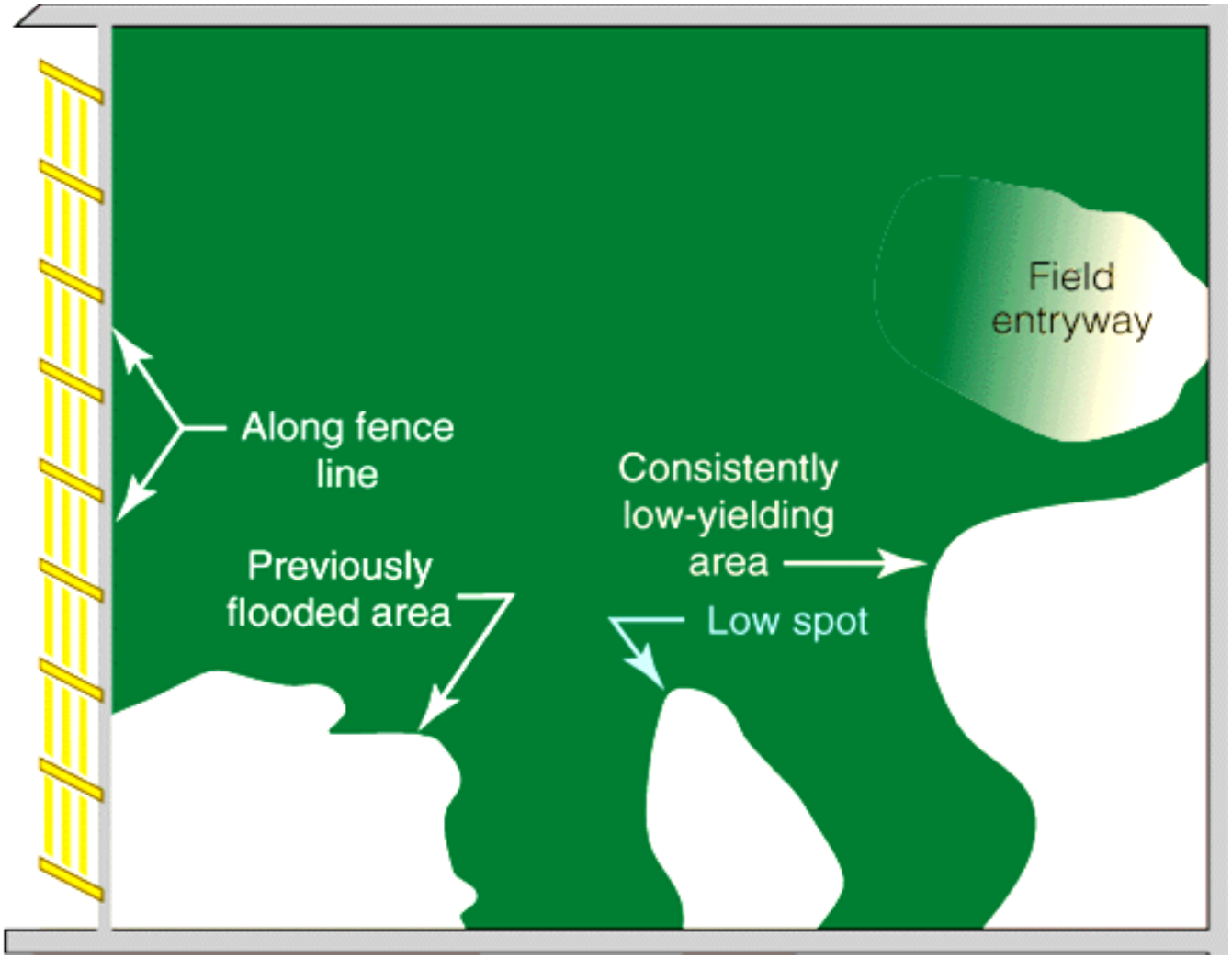
(Highly variable in fields)

Source: Dr. S. Chen, U of MN

Moderate Visual

Source: Marty Draper, SDSU

SCN "hot spots"



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Overwinter Survival of SCN

(Geographic Areas of USA)

- Southern U.S.
  - May have **up to 90% reduction** in egg count from year to year
    - More microbial actions for longer periods of time throughout the year to attack the SCN
- Northern U.S.
  - May have **only 10 to 40% (50-60%) reduction** in egg count from year to year

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Managing SCN
IPM Strategy

The key to successful long-term management of SCN is to keep population densities low.

The greater the population density, the greater the possible soybean yield loss.

AGVISE LABORATORIES

Managing SCN
IPM Strategy

1. Recognition (scout) for early detection
   a. Check roots for cysts
   b. Soil sample for egg counts
2. Rotate to nonhost crops
3. Rotate to resistant soybean varieties
4. Rotate to different type of resistant soybean varieties
   a. Choose High Yield soybeans
   b. Choose High Resistant soybeans

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Nodules

SCN Cysts

June-August: Make a visual check for SCN cysts on roots

Dig roots and look for SCN females

Dr. Greg Tylka, Iowa State University
SCN Resistance Summit, Mankato, MN Sept. 6, 2007

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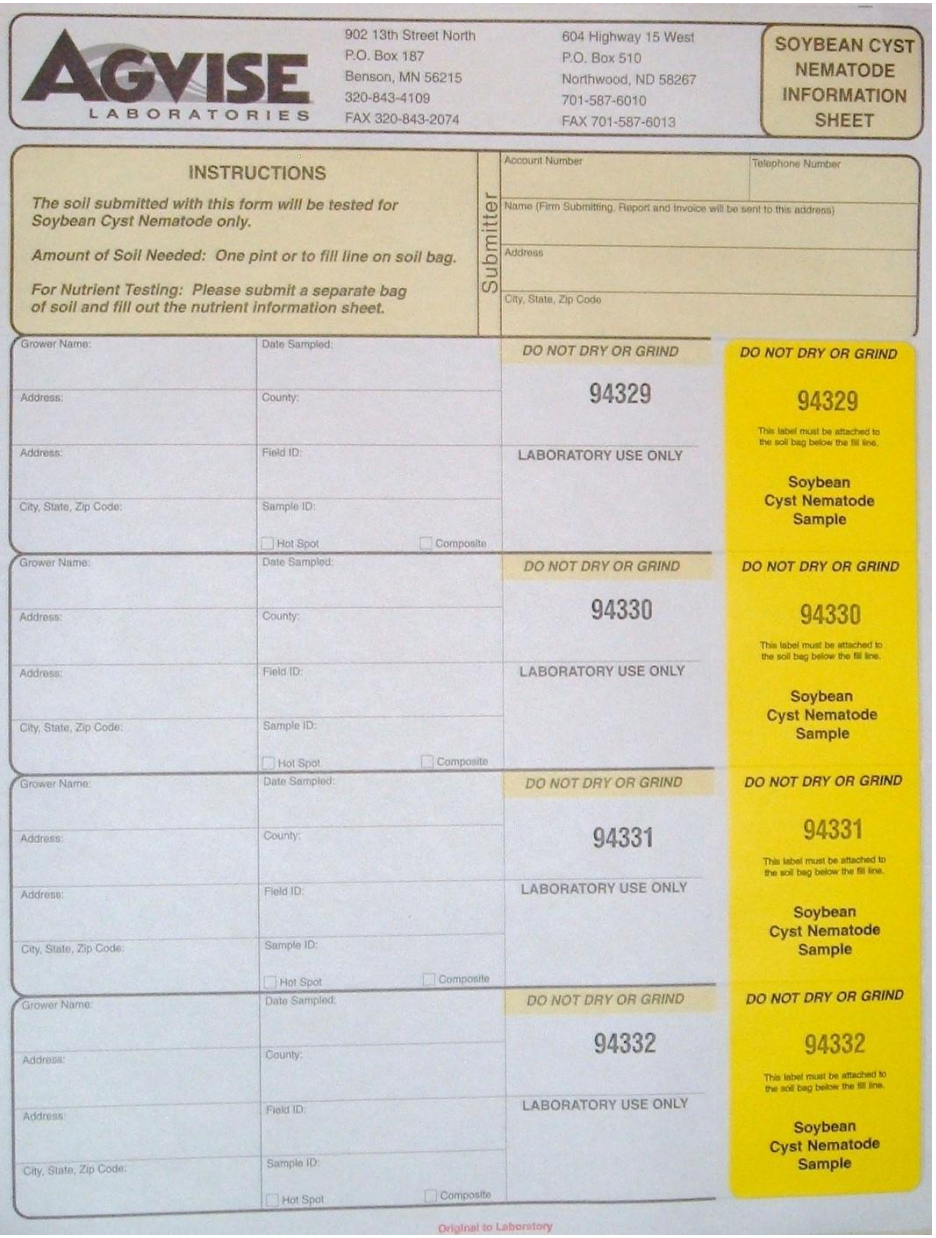
Collect soil samples to test for SCN
Topsoil Sample Only

Soil Sampling for SCN						
1) Sample Depth:	Topsoil (0-6 or 0-8)					
2) Sample Location:	In the soybean row to capture root tissue.					
3) Sample Amount:	10 - 20 cores per sample					
4) Time of Sample:						
	a) Prior to or just after soybean harvest.					
	b) Fall - Winter - Early Spring					
	c) Summer sampling may indicate SCN presence, but may not be a time to					
		get an accurate count.				

AGVISE LABORATORIES



AGVISE LABORATORIES

902 13th Street North
P.O. Box 187
Benson, MN 56215
320-843-4109
FAX 320-843-2074

604 Highway 15 West
P.O. Box 510
Northwood, ND 58267
701-587-6010
FAX 701-587-6013

SOYBEAN CYST NEMATODE INFORMATION SHEET

INSTRUCTIONS

The soil submitted with this form will be tested for Soybean Cyst Nematode only.

Amount of Soil Needed: One pint or to fill line on soil bag.

For Nutrient Testing: Please submit a separate bag of soil and fill out the nutrient information sheet.

Submitter

Account Number | Telephone Number

Name (Firm Submitting, Report and Invoice will be sent to this address)

Address

City, State, Zip Code

Grower Name: | Date Sampled:
Address: | County:
Address: | Field ID:
City, State, Zip Code: | Sample ID:
☐ Hot Spot ☐ Composite

DO NOT DRY OR GRIND
94329
LABORATORY USE ONLY

DO NOT DRY OR GRIND
94329
This label must be attached to the soil bag below the fill line.
Soybean Cyst Nematode Sample

Grower Name: | Date Sampled:
Address: | County:
Address: | Field ID:
City, State, Zip Code: | Sample ID:
☐ Hot Spot ☐ Composite

DO NOT DRY OR GRIND
94330
LABORATORY USE ONLY

DO NOT DRY OR GRIND
94330
This label must be attached to the soil bag below the fill line.
Soybean Cyst Nematode Sample

Grower Name: | Date Sampled:
Address: | County:
Address: | Field ID:
City, State, Zip Code: | Sample ID:
☐ Hot Spot ☐ Composite

DO NOT DRY OR GRIND
94331
LABORATORY USE ONLY

DO NOT DRY OR GRIND
94331
This label must be attached to the soil bag below the fill line.
Soybean Cyst Nematode Sample

Grower Name: | Date Sampled:
Address: | County:
Address: | Field ID:
City, State, Zip Code: | Sample ID:
☐ Hot Spot ☐ Composite

DO NOT DRY OR GRIND
94332
LABORATORY USE ONLY

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94332
This label must be attached to the soil bag below the fill line.
Soybean Cyst Nematode Sample

Original to Laboratory

SCN Field Sheet

Yellow peel-off stickers go on sample bags, so samples are not dried and ground when they get to the lab.

Sample Submission

1) Discounted ~ 30% June 1- Sept. 15
2) Full price: Sept. 16 – May 31
3) Separate sample for nutrient testing

Screen out the cysts
#20 and #60 mesh screens
(water bath filtering)

Weigh 185 grams soil.
Mix soil and water
surfactant solution.
Screen through mesh.

Centrifuge the Sample Solution

Add sucrose (sugar) to solution.

This separates the cysts and soil.

Cysts floats to the top

Sand/soil sinks to the bottom

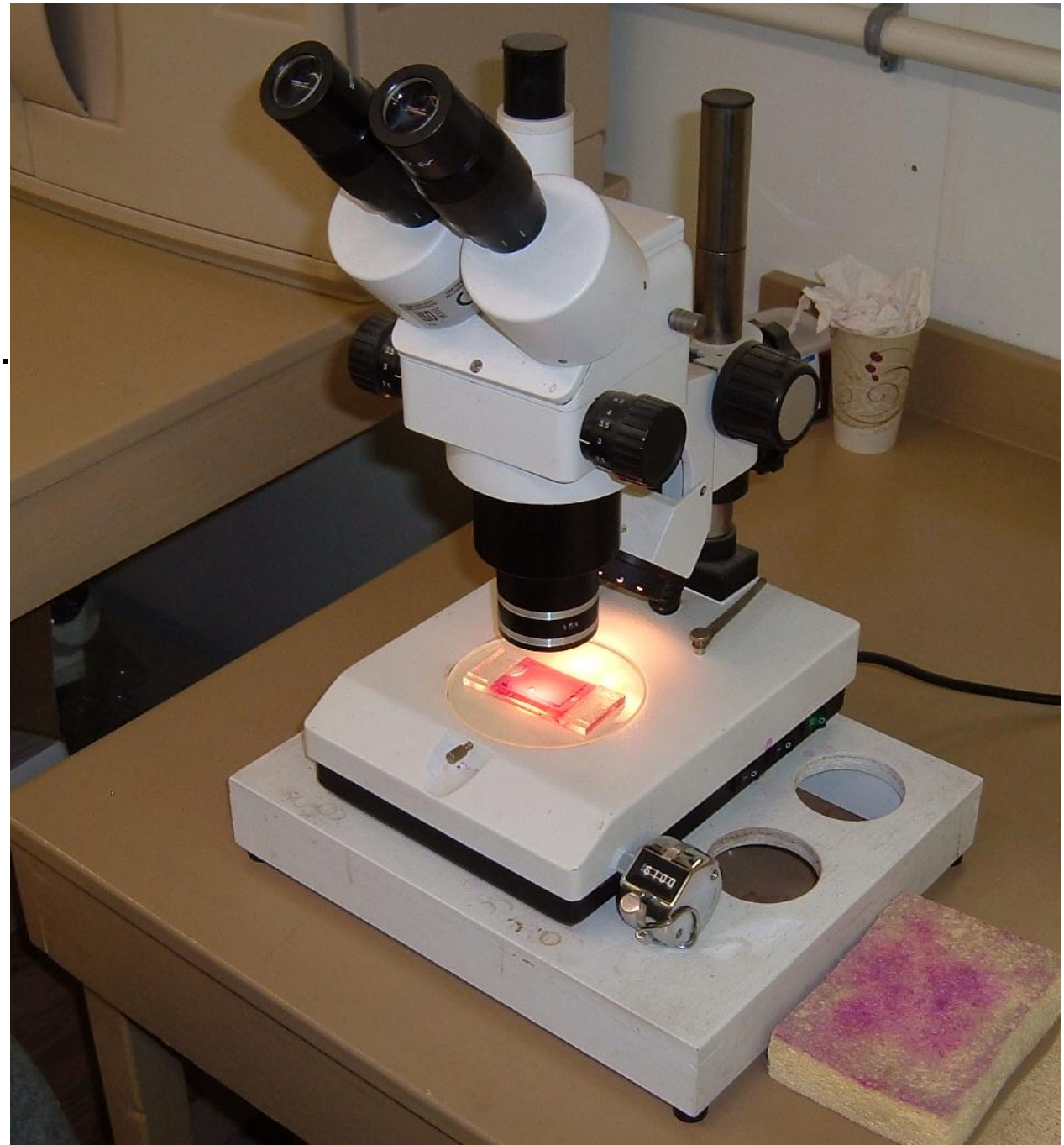
Rubber Stopper
Separation of Cysts and Eggs
#60 mesh screens

The top 2/3 of centrifuged sample.
(cysts and organic debris)

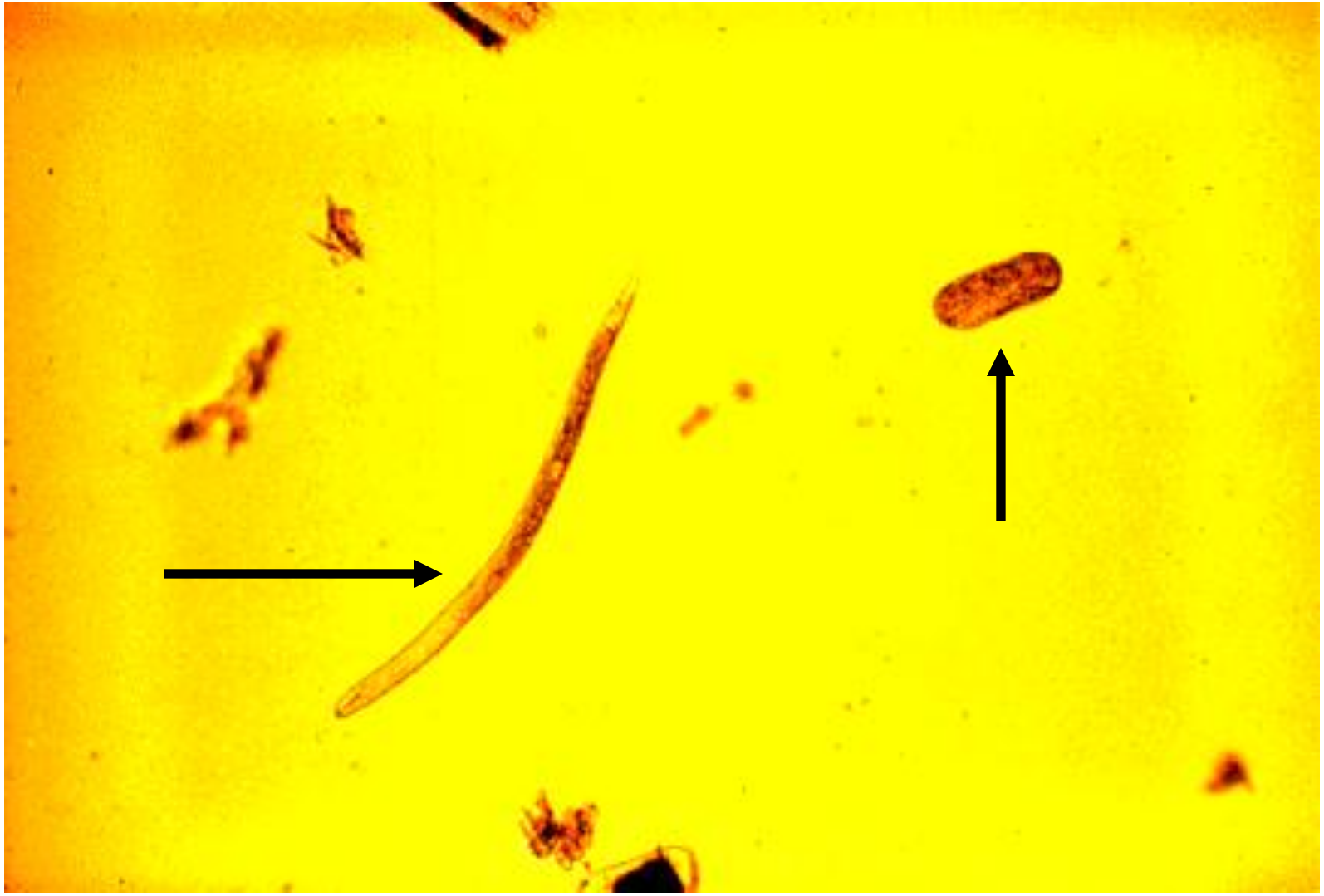
Screen out and collect the eggs
#200 and #500 mesh screens

Dyed Sample
Ready to Read on the Microscope

<u>Microscope</u>
Etched “grid” pattern
on the microscope slide.
1 ml of sample



SCN egg and juvenile stage.



Planting Decision Guide
U of M

SCN Egg Density	Planting Decision
0 – 200	Use Susceptible Variety
200 – 2,000	Use Resistant Variety
2,000 – 10,000	Yield loss likely to occur, even if a resistant variety is planted
> 10,000	Do not plant soybeans

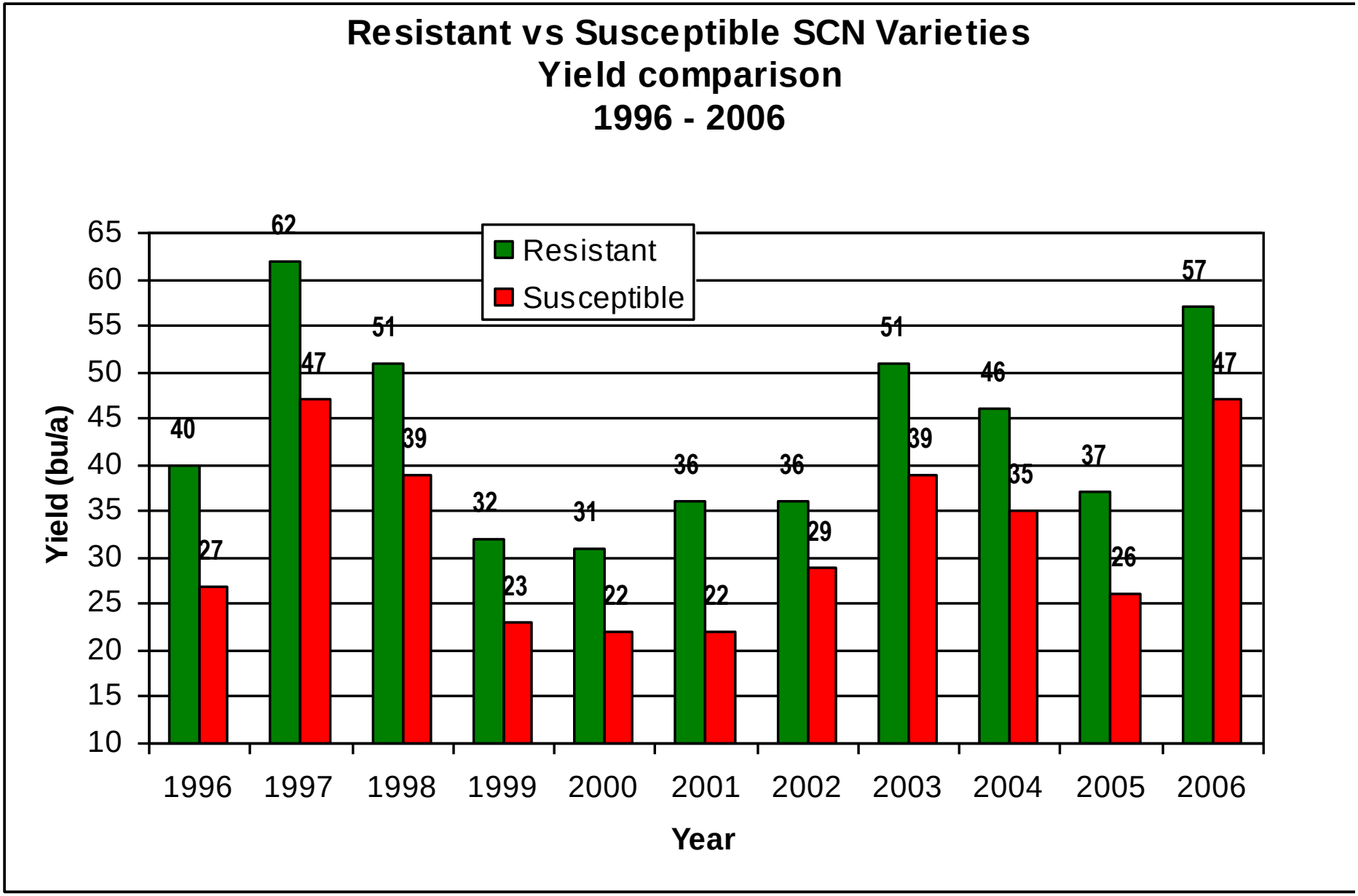
AGVISE LABORATORIES

SCN Host & Non-host Crops

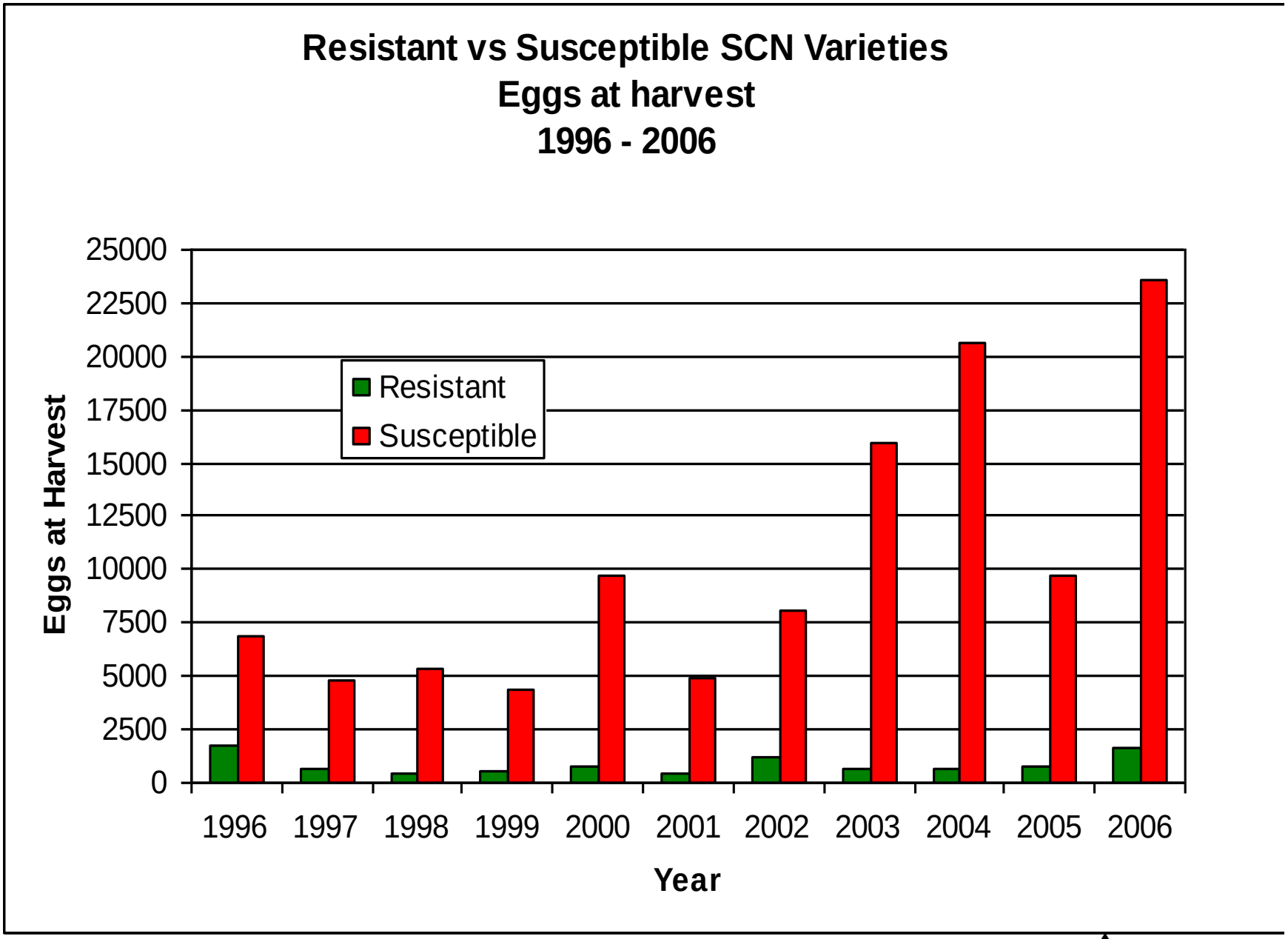
- **<u>Non-host crops</u>**
  - Corn
  - Small grains
  - Canola
  - Sugar beet
  - Flax
  - Sorghum
  - Sunflowers
  - Alfalfa
  - *Trifolium* clovers
  - Forage grasses

- **<u>Host crops</u>**
  - Soybeans
  - Dry or snap beans
  - Peas
  - Cowpea
  - Lupines
  - Sweetclover
  - Vetch
  - Birdsfoot trefoil

AGVISE LABORATORIES



SD Extension Fact Sheet 902-A
SDSU test plots in Clay, Roberts, Turner and Union Counties, 1996 – 2006.



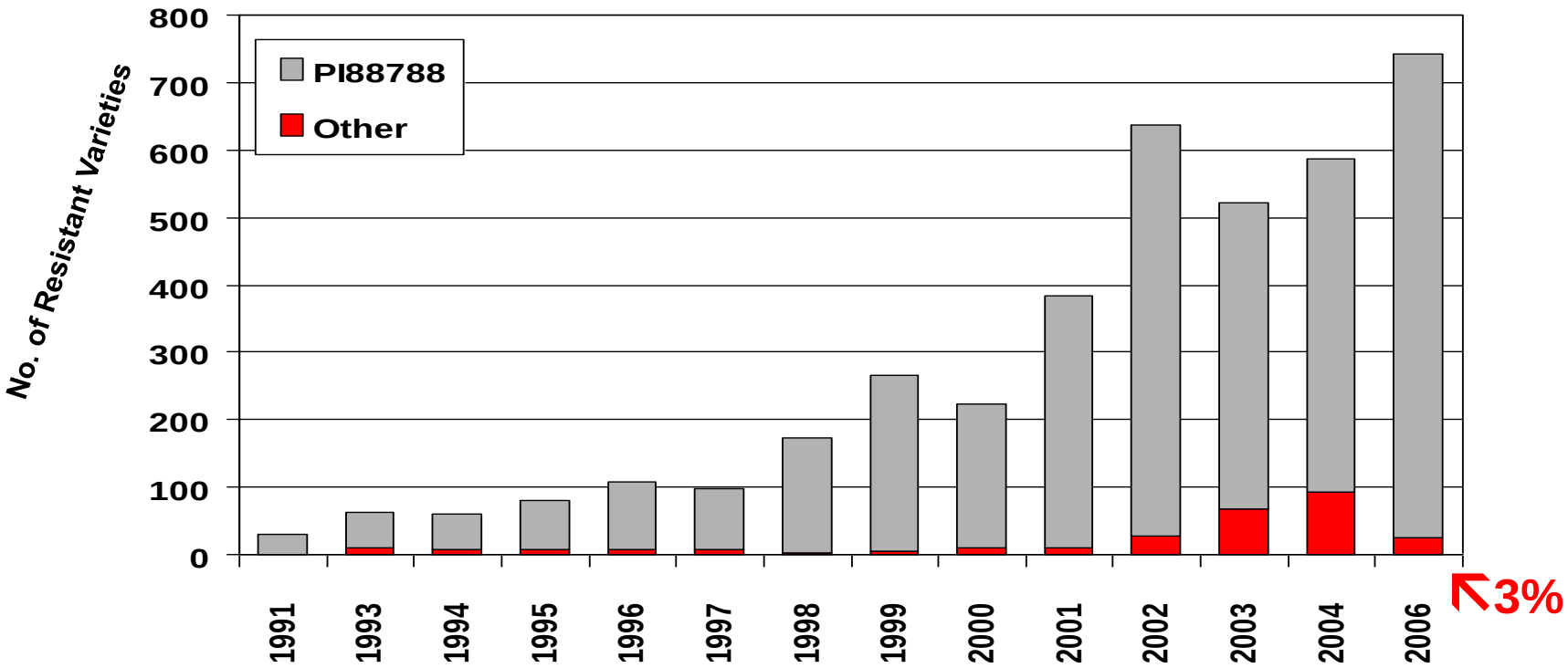
SD Extension Fact Sheet 902-A
SDSU test plots in Clay, Roberts, Turner and Union Counties, 1996 – 2006.

AGVISE LABORATORIES

SCN-resistant Soybean Varieties Available for Iowa

(maturity groups 0, 1, 2, 3)

1991 - 2006



University of Illinois Extension – Marion Shier:

974 SCN-resistant varieties in MG 0, 1, 2, 3 for 2006

95% are PI88788

SCN Summary

- SCN may not cause obvious symptoms
- SCN symptoms may look like other causes
- SCN is not always visible on the roots
- SCN can cause substantial yield loss without causing and symptoms
- Use SCN resistant varieties
- Monitor the soil test levels of SCN
- Rotate – Rotate - Rotate

AGVISE LABORATORIES

Thank You Very Much

Have a Great Year

AGVISE LABORATORIES