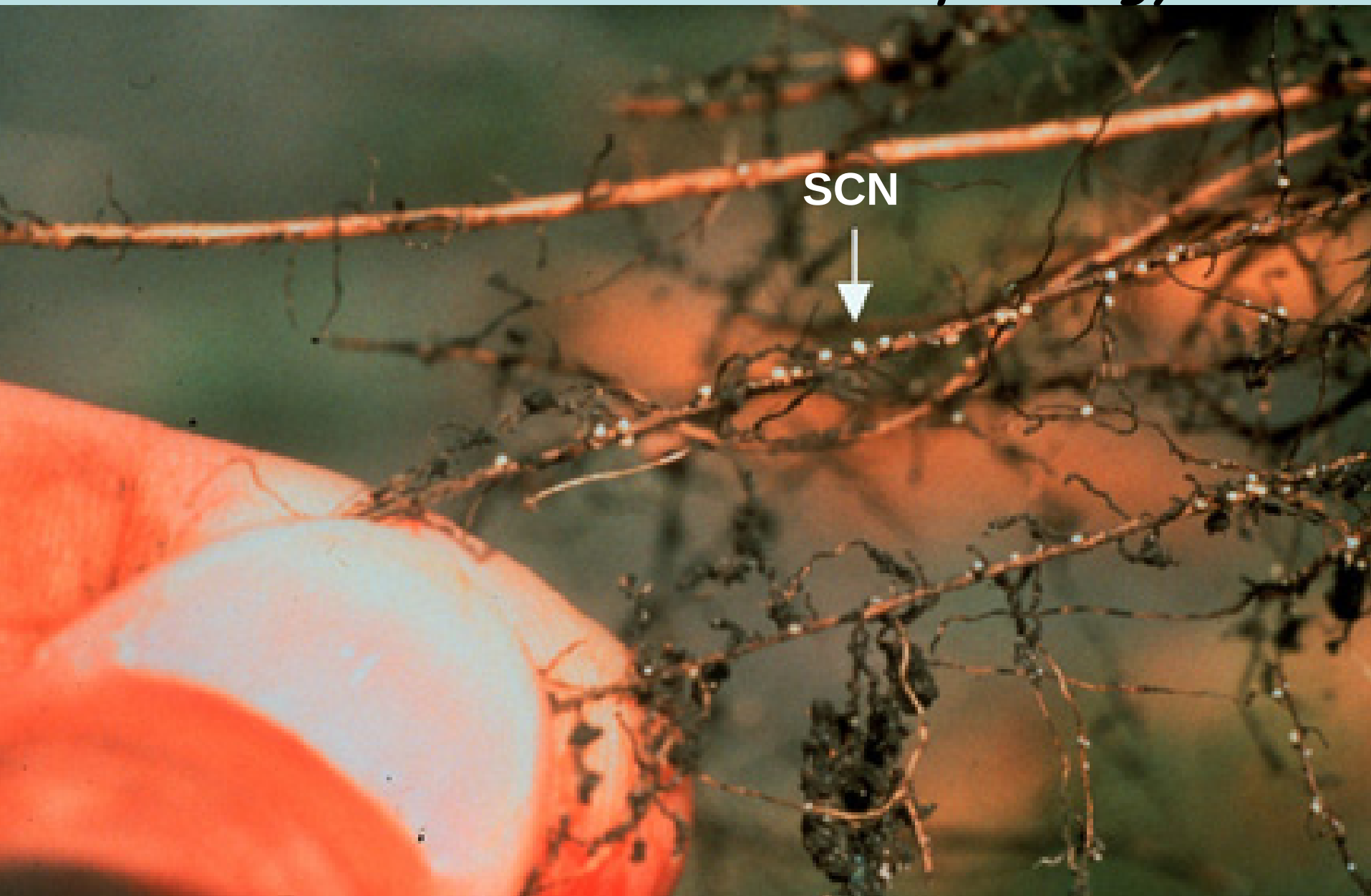
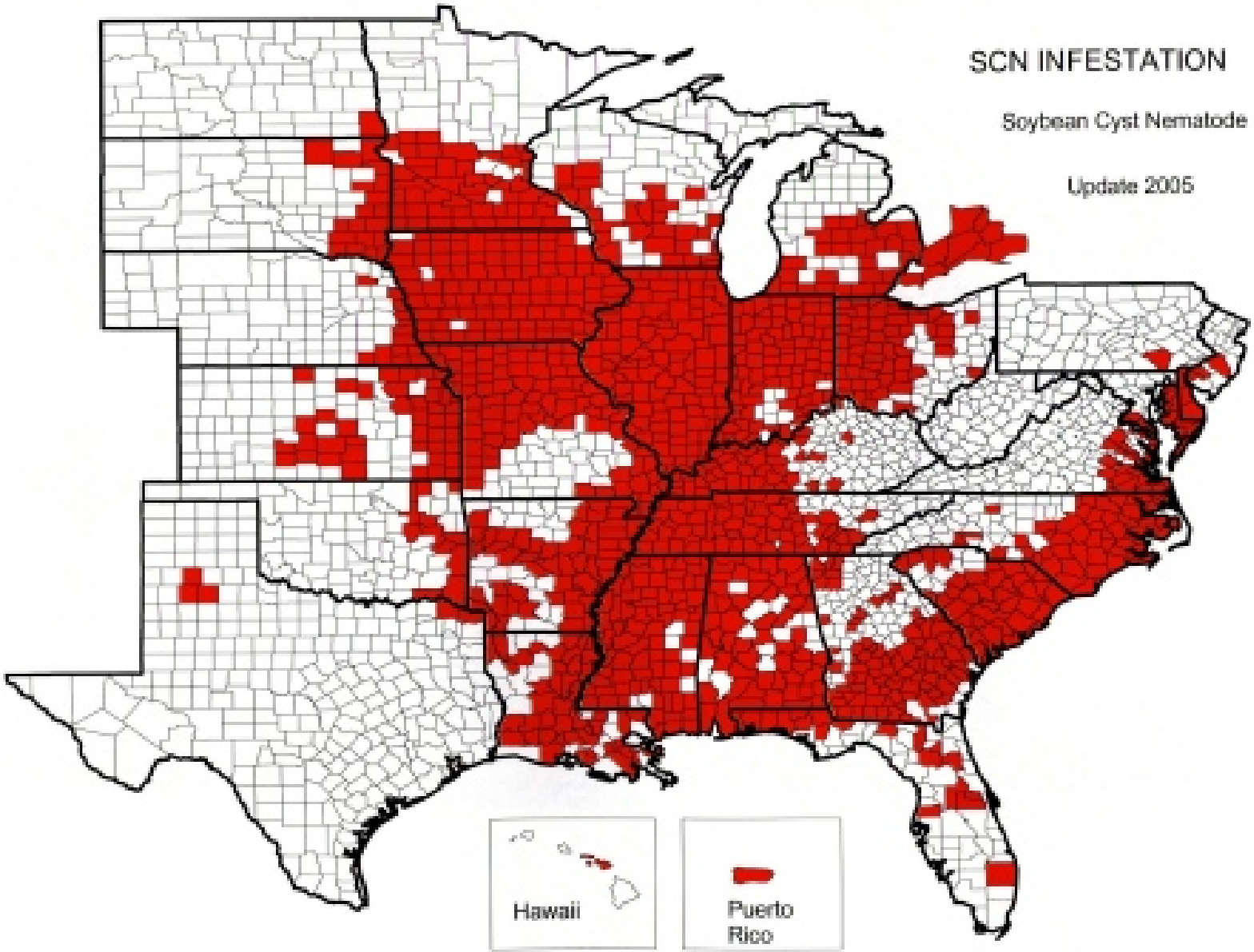
Virulence Profiles of SCN Populations in WI

Ann MacGuidwin – UW Plant pathology

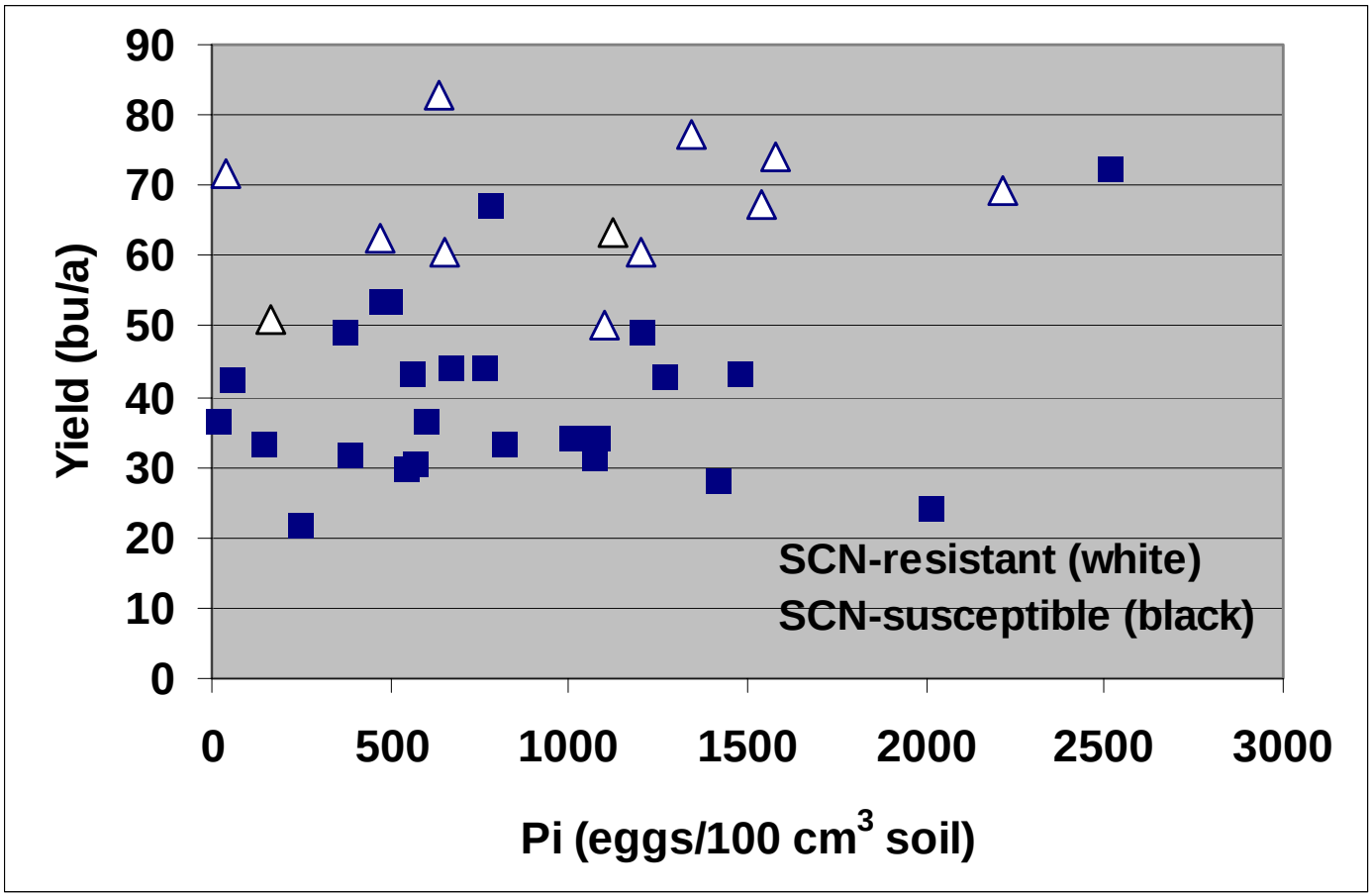




SCN is common across the U.S.

SCN is an impediment to achieving the full yield potential of soybean

Host resistance is the best way to combat SCN

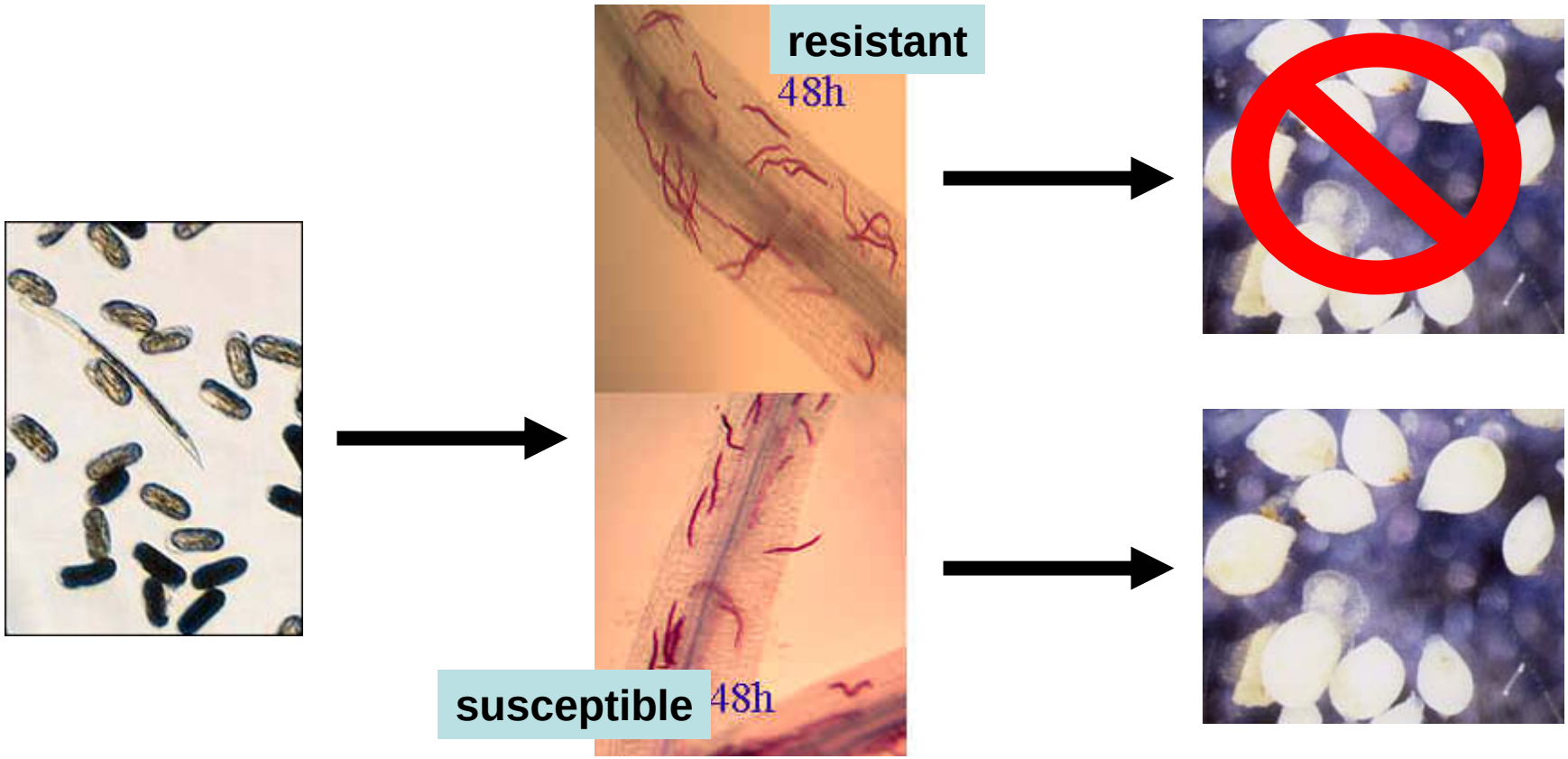


Racine, 2000

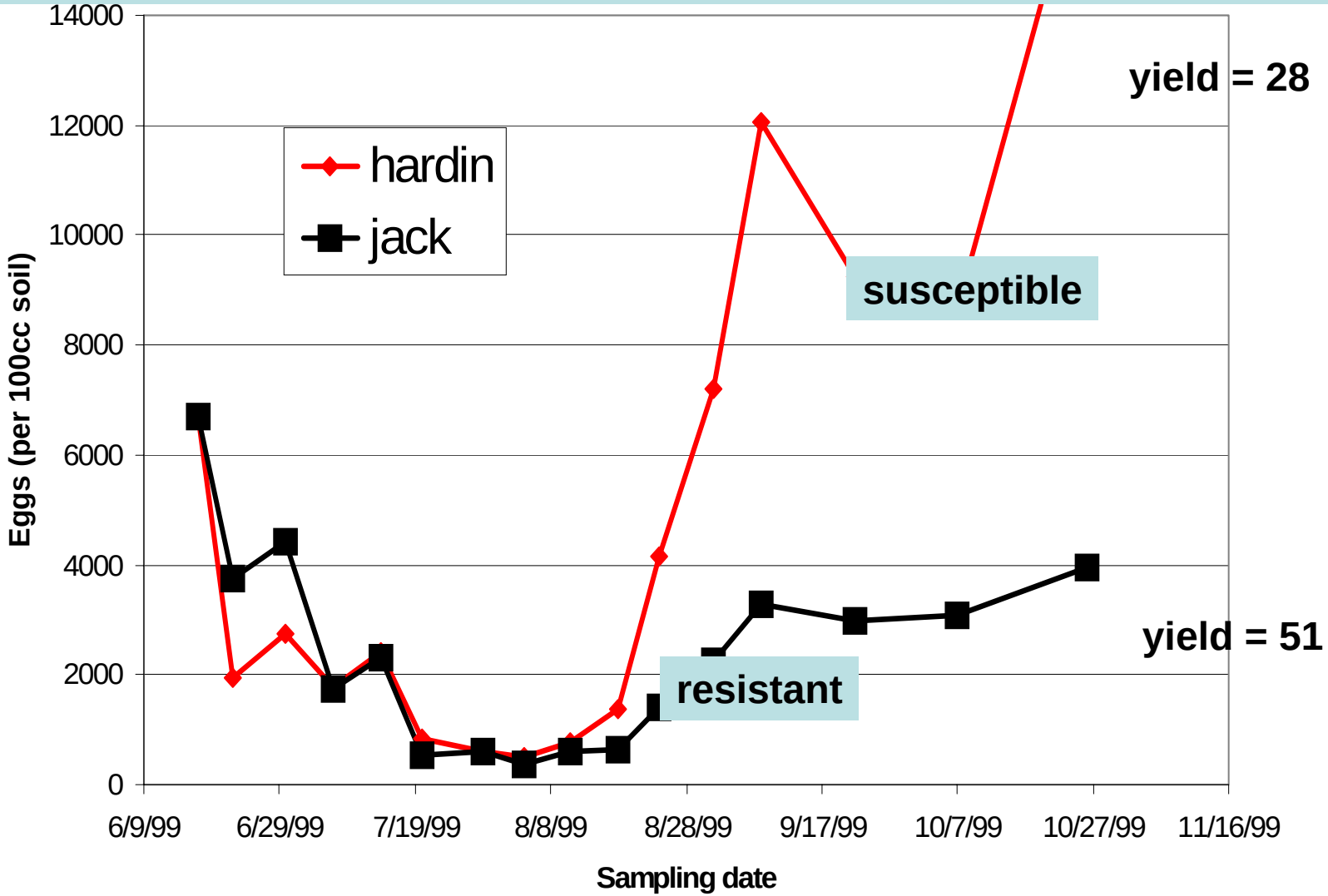
Pi = 905

Average yield gain of resistant variety = 25 bu/A (P = 0.01)

Resistant soybean varieties stimulate egg hatch, encourage infection, but inhibit nematodes from developing or producing eggs



Less damage when SCN development is aborted



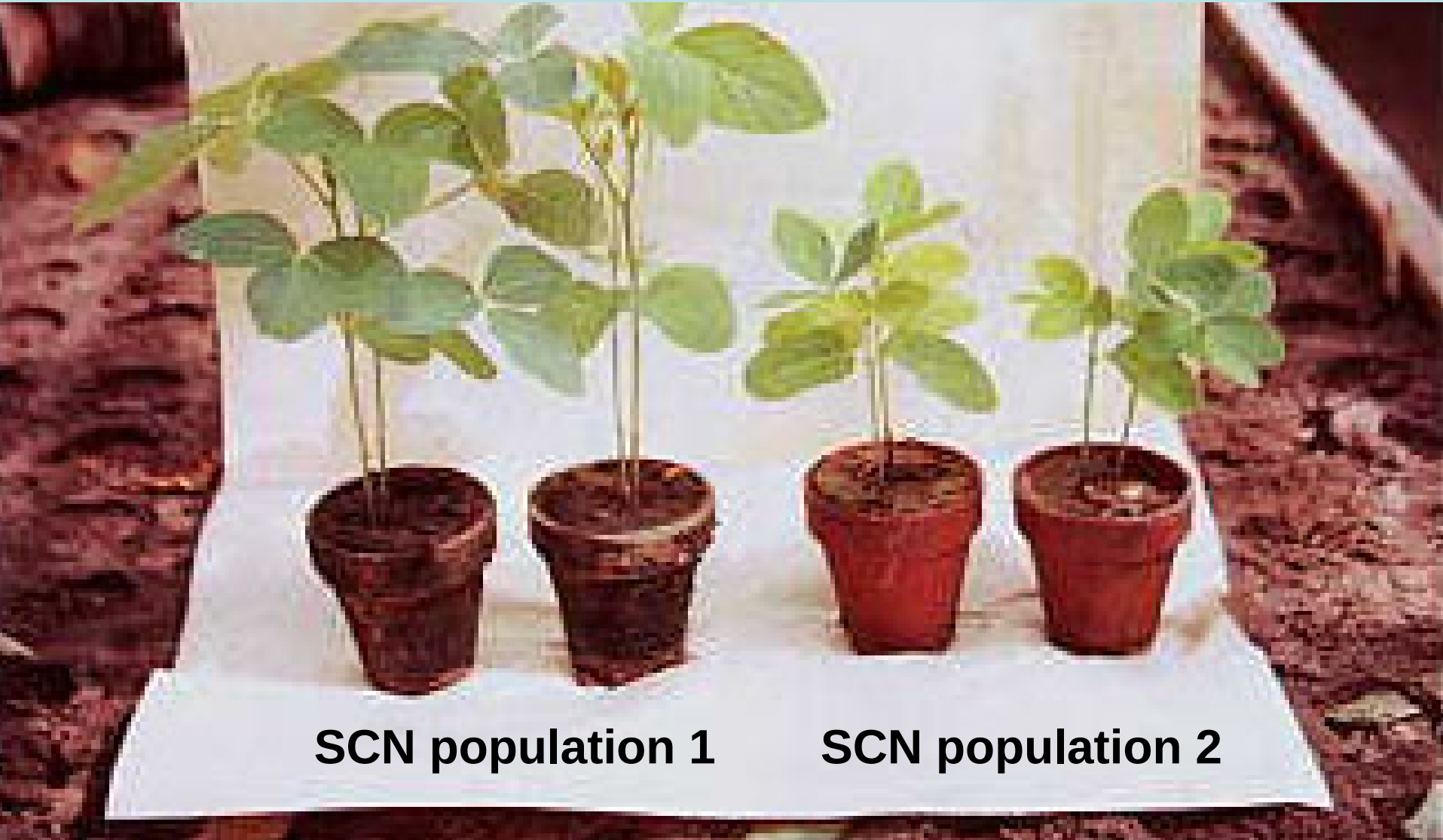
Fewer eggs means lower inoculum for next soybean crop

The response of SCN populations to resistant varieties is not the same in all locations

Fate of SCN population
(based on 22 data sets from 1999-2000)

Susceptible variety (n=10)	Resistant variety (n=12)
20% fields remained same	17% fields remained same
80% fields increased	58% fields decreased
	25% fields increased

SCN populations differ in their ability to develop on and damage the same resistant soybean variety. Shown here is one variety infected with two different SCN populations at the same inoculum level. ***SCN Management Guide***

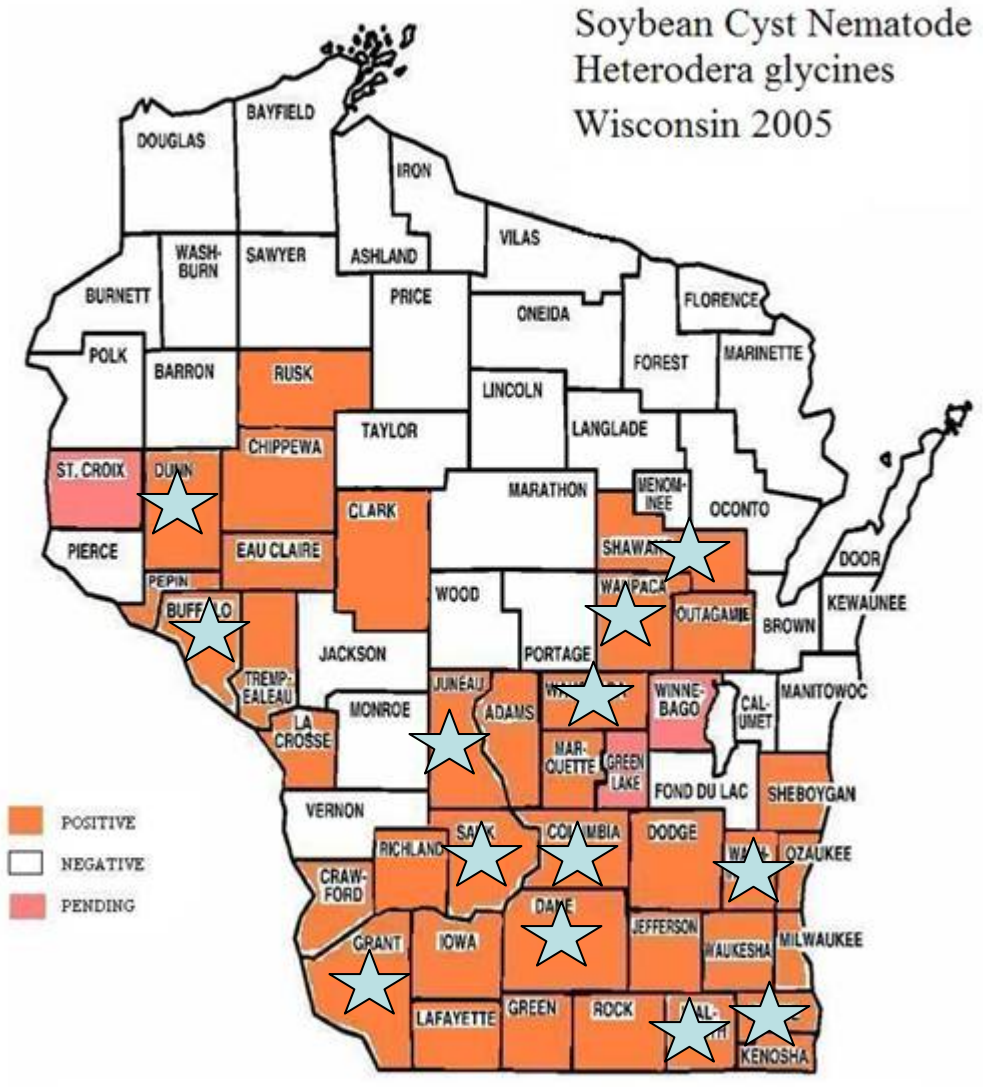


Virulence: ability of a population to develop on a resistant variety

Virulence Profile: description of a population for the ability to develop on a set of resistant varieties

Virulence profile used to:

- understand difference in performance of soybean varieties among locations
- guide decisions of soybean variety selection



Consensus Map Wisconsin Department of Agriculture, Trade and Consumer Protection and University of Wisconsin-Madison.

Virulence profiles were determined for populations of SCN from 13 counties in WI

Virulence: ability of a population to develop on a resistant variety

- Virulence Profile: description of a population for the ability to develop on a set of resistant varieties

- **Virulence Profile Schemes:**
  - **Race: based on 4 resistant soybean lines**
  - **Hg Type: based on 7 resistant lines**

Hg Type Test uses 7 SCN resistant lines

- PI 548402 (Peking) + "Pickett"
- PI 88788
- PI 90763

SCN Race Test

- PI 437654 (Hartwig)
- PI 209332
- PI 89772
- PI 548316 (Cloud)

resistance: suppression of development in an SCN population by 90% or more

HG Type Test

- Infest soil with SCN eggs & plant soybean
- Harvest plants after 30 days; remove female SCN and count

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

Population is virulent if FI > 10

SCN Population	Trial	# females on Lee	FI on P.I. 88788	Hg Type	Race
Waushara-1	1	107	1	0	1 or 5
	2	78	32	2.5.7	
Columbia-1	1	289	8	7	3
	2	234	30	1.2.5.7	
Shawano-1	1	139	50	1.2.3.5.7	4 or 16
	2	284	40	1.2.3.5.7	
Dunn -1	1	76	6	5.7	3
Dunn-2	1	69	12	2.5.7	1 or 5
Walworth-1	1	134	55	1.2.3.5.6.7	4 or 16
	2	249	62	1.2.3.5.6.7	
Waupaca-1	1	131	10	1.2.5.6	2 or 11
	2	96	32	1.2.3.5.6.7	
Dane-1	1	278	24	2.7	1 or 5
Sauk-1	1	131	35	2.5.7	1 or 5
	2	124	63	2.5.7	
Juneau-1	1	85	81	2.5.7	1 or 5
	2	312	75	2.5.7	
Racine-1	1	98	7	0	1 or 5
	2	176	17	2.5.7	
Racine-2	1	94	19	2.5.7	1 or 5
Buffalo-1	1	95	54	2.5.7	1 or 5
	2	169	73	2.5.7	
Grant-1	1	154	47	2.5.7	1 or 5
	2	62	16	2.7	
Washington-1	1	89	11	2.5.7	1 or 5
	2	64	28	2.5.7	

Hg type includes all P.I.s with FI > 10

Any population with a "2" has the potential to increase on varieties with P.I. 88788 source of resistance

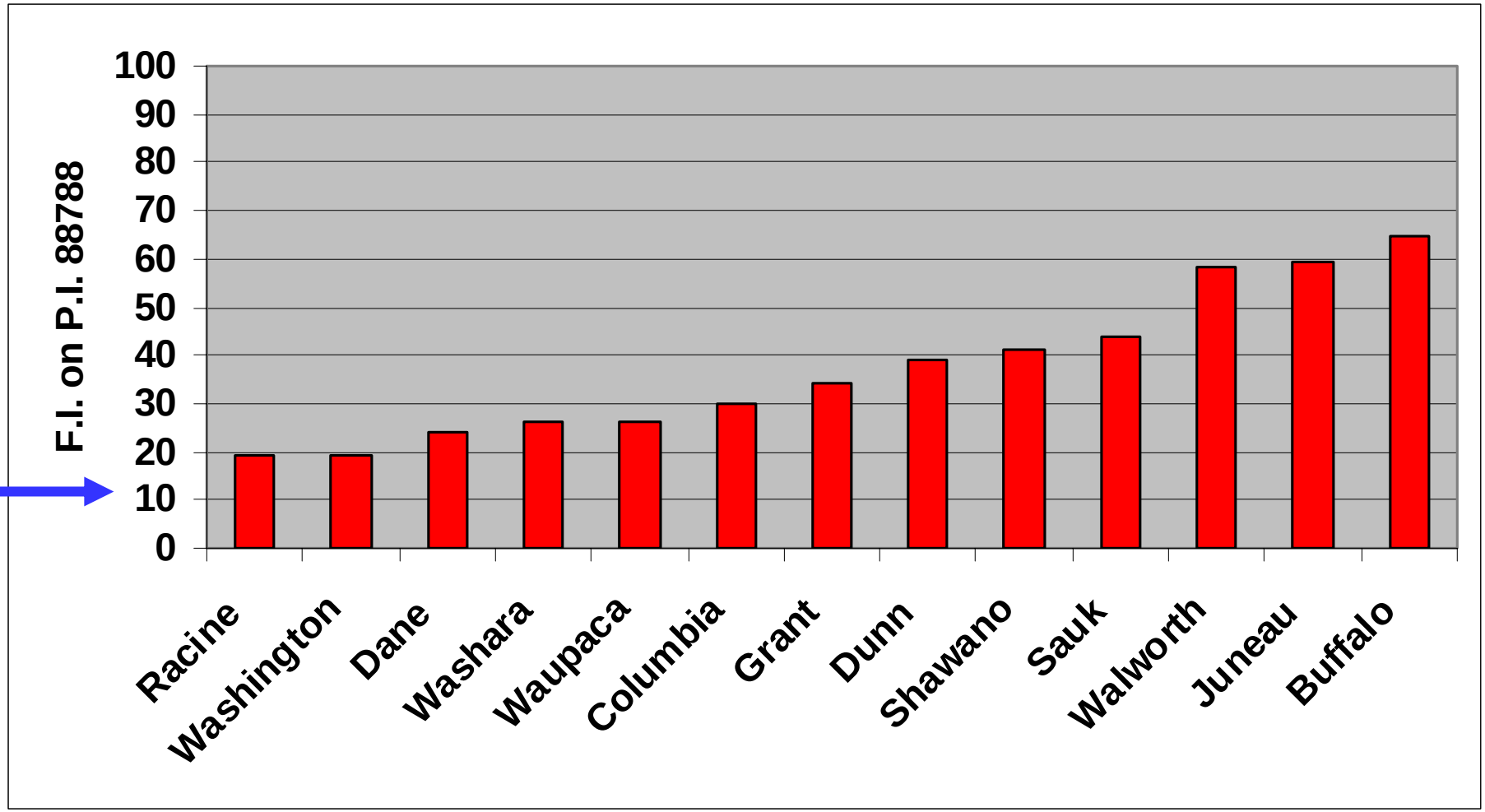
1. PI 548402 (Peking)
2. PI 88788
3. PI 90763
4. PI 437654 (Hartwig)
5. PI 209332
6. PI 89772
7. PI 548316 (Cloud)

The Hg type is related to "race" designation

Four soybean host differential lines distinguish 16 races of SCN

Race	"Pickett"	"Peking"	P.I.88788	P.I.90763
1	-	-	+	-
2	+	+	+	-
3	-	-	-	-
4	+	+	+	+
5	+	-	+	-
6	+	-	-	-
7	-	-	+	+
8	-	-	-	+
9	+	+	-	-
10	+	-	-	+
11	-	+	+	-
12	-	+	-	+
13	-	+	-	-
14	+	+	-	+
15	+	-	+	+
16	-	+	+	+

Female Index for 13 SCN populations on P.I. 88788



Values are the average FI from multiple experiments

Hg Type Test

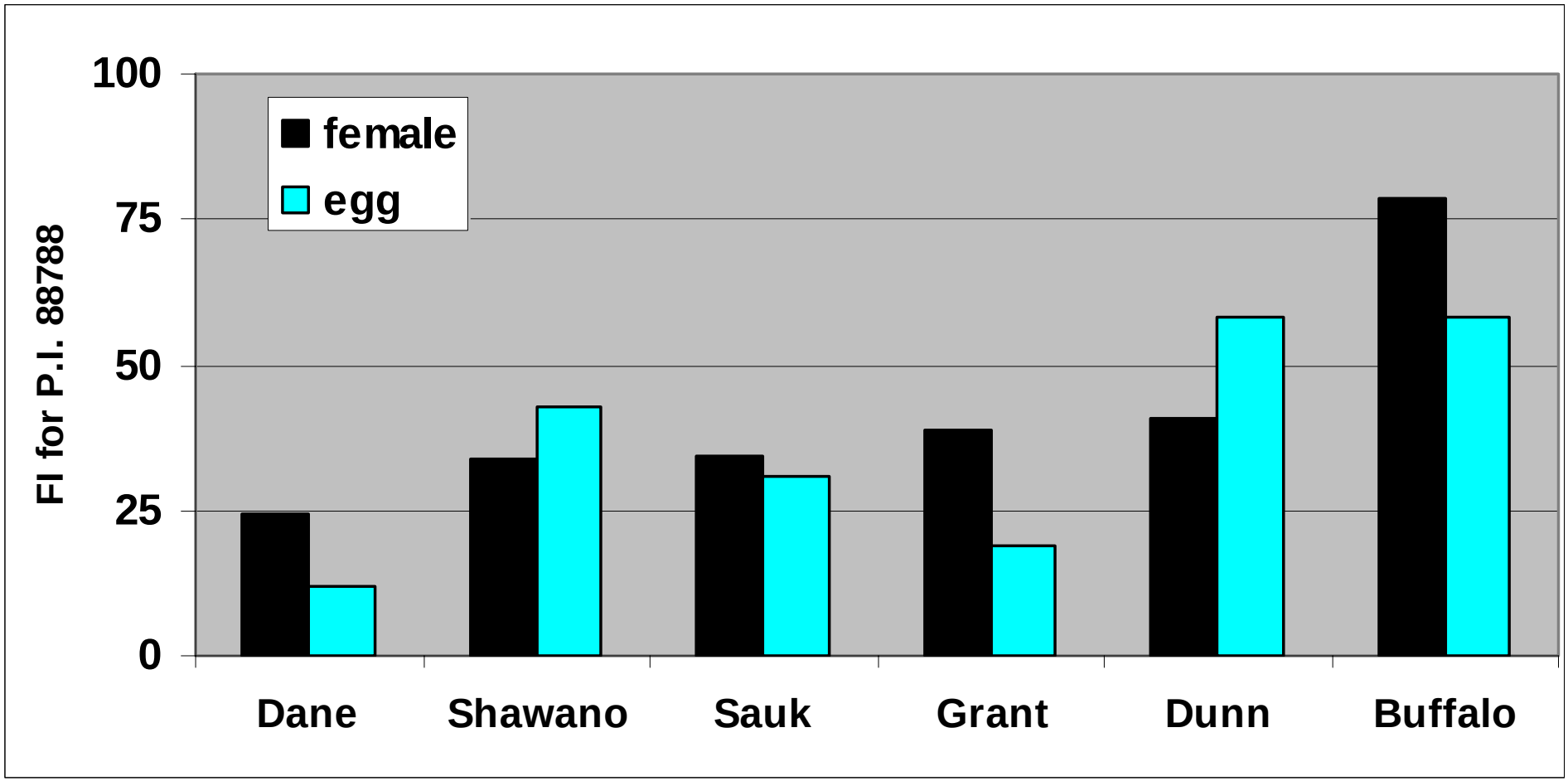
Data:

relative % of females that develop

Interpretation:

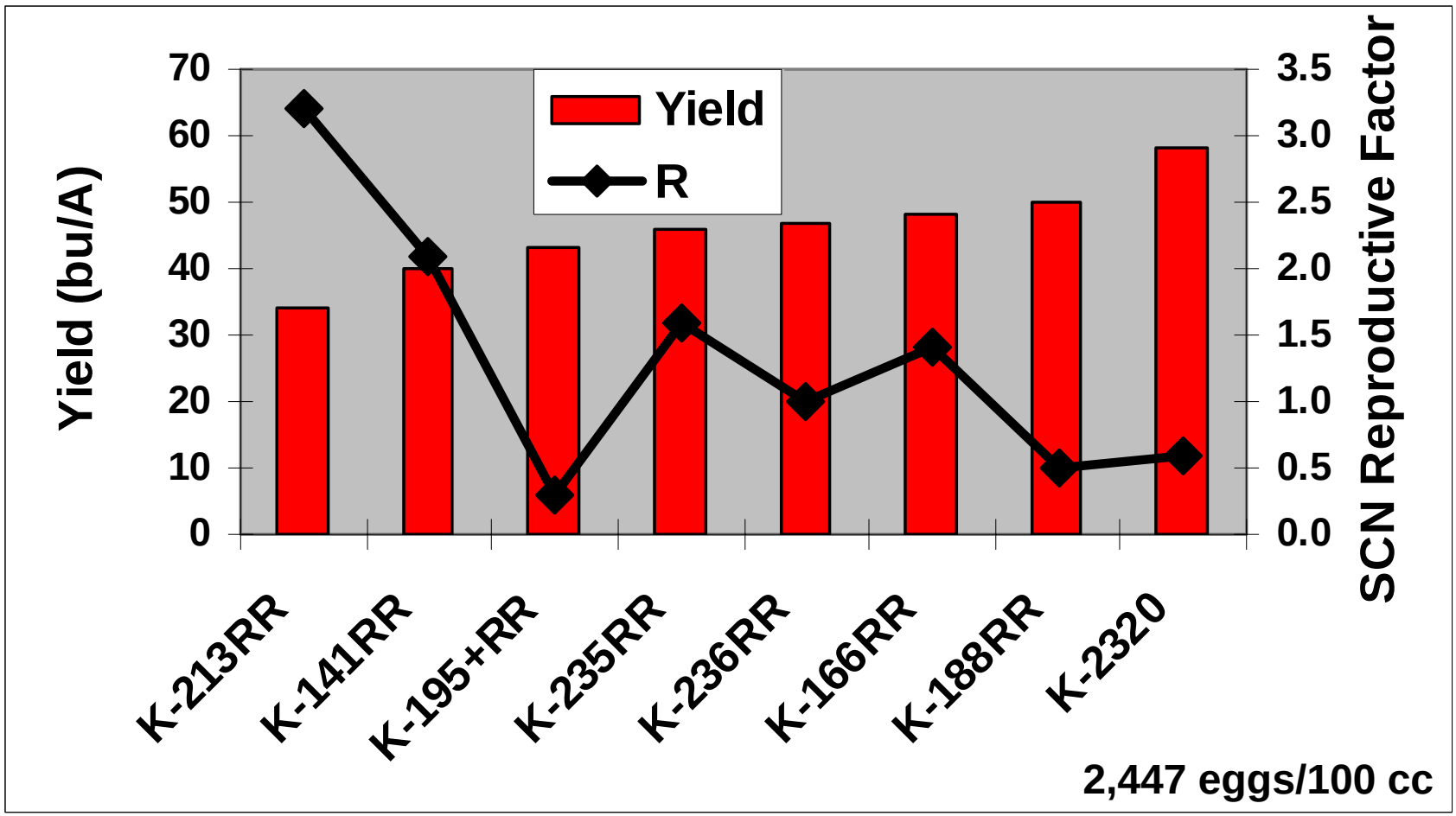
- ✓ more females = greater yield loss
- ✓ more females = more egg inoculum produced for next soybean crop
- ✓ FI on the source of resistance is a good indicator of FI on varieties

Development to the female stage is a good (but not perfect) indicator of egg production



more females = more egg inoculum produced for next soybean crop

Eight varieties, all with P.I.88788 source of resistance, vary in response to the same SCN population.



Data from 2005 SCN variety trials –Walworth Cty. *(Borges et. al., 2005)*

EVERY producer with SCN should:

- **know SCN levels in their field**
- **take action appropriate to inoculum potential of SCN**
  - **1- 150 eggs** **consider planting resistant variety**
  - **150 – 10,000** **plant a resistant variety**
  - **> 10,000** **avoid planting soybean if possible**
- **rotate with nonhost crops**
- **rotate soybean varieties (with different sources of resistance if possible)**

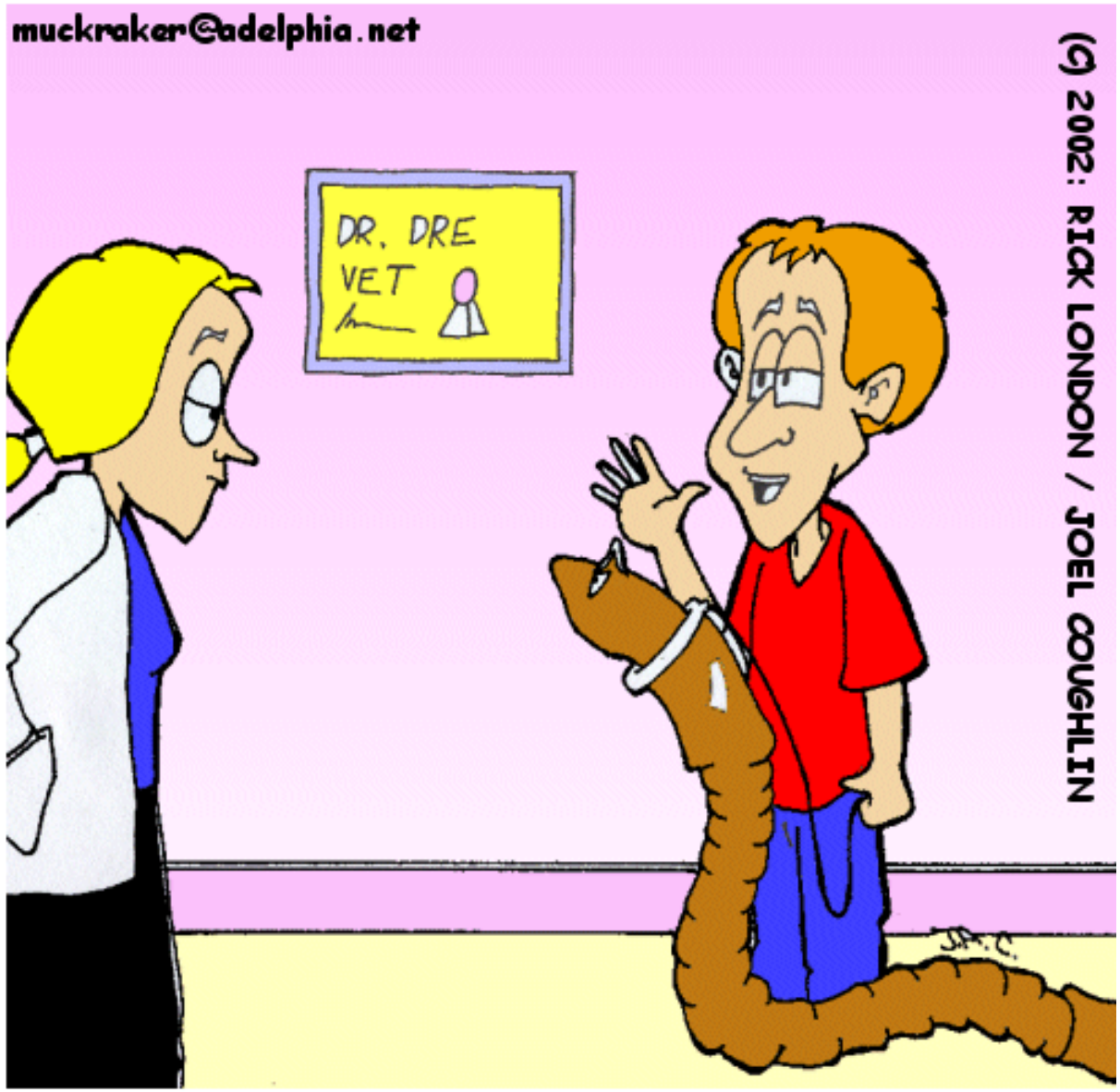
Who Should Test for Hg Type?

1. resistant variety fails to meet expectations or
2. yields for resistant variety decline over time
3. planting a resistant variety for the first time in a field with egg counts > 10,000

Wisconsin producers have 3 sources of resistance to choose from

Source of Resistance	FI	Choose variety with this source of resistance
P.I. 548502	15	X
P.I. 88788	25	X
P.I. 437654	2	X

Source of Resistance	FI	Choose variety with this source of resistance
P.I. 548502	15	X
P.I. 88788	73	
P.I. 437654	2	X



"I'D LIKE MY WORM CHECKED FOR D~~O~~GS.. soybeans"