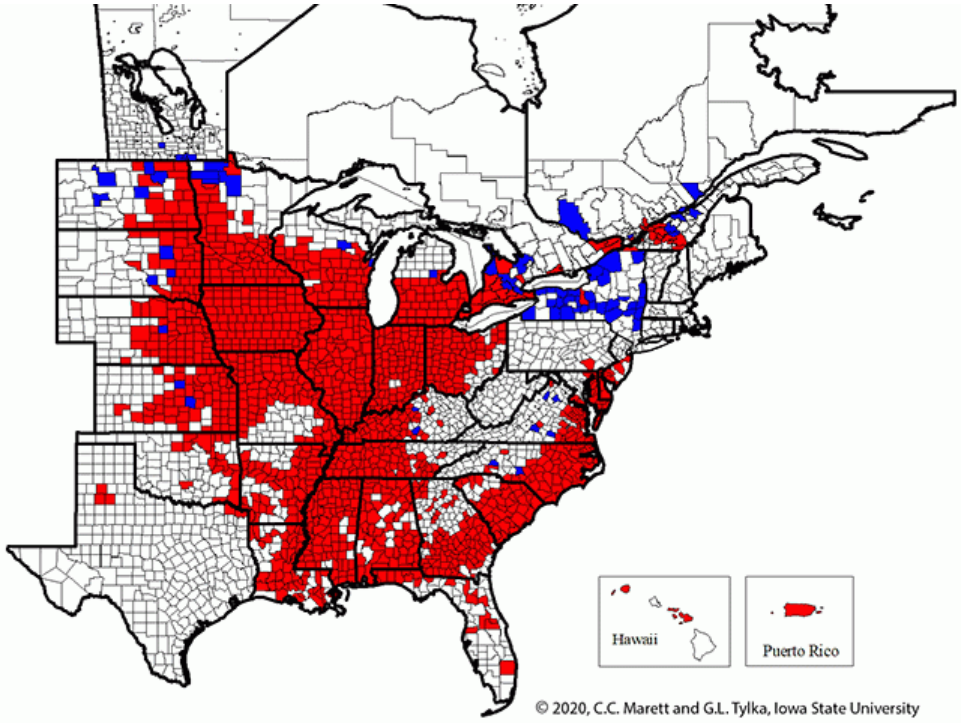
Is PI 88788 Resistance Failing??



- Agvise Seminars
- January 4-6, 2022
- Brent Jaenisch, Ph.D.

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My Background

- Grew up by Maynard, MN
- Family farm
  - Corn, soybeans, and livestock
- University of Nebraska-Lincoln
  - Crop Production
- Kansas State University
  - Winter wheat

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How many scout or sample for SCN?

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Outline

- Soybean production
- Background on SCN
- SCN Project: Update
- Variety Options
- Conclusions

SCN-resistant soybean variety on left and SCN-susceptible variety on right.

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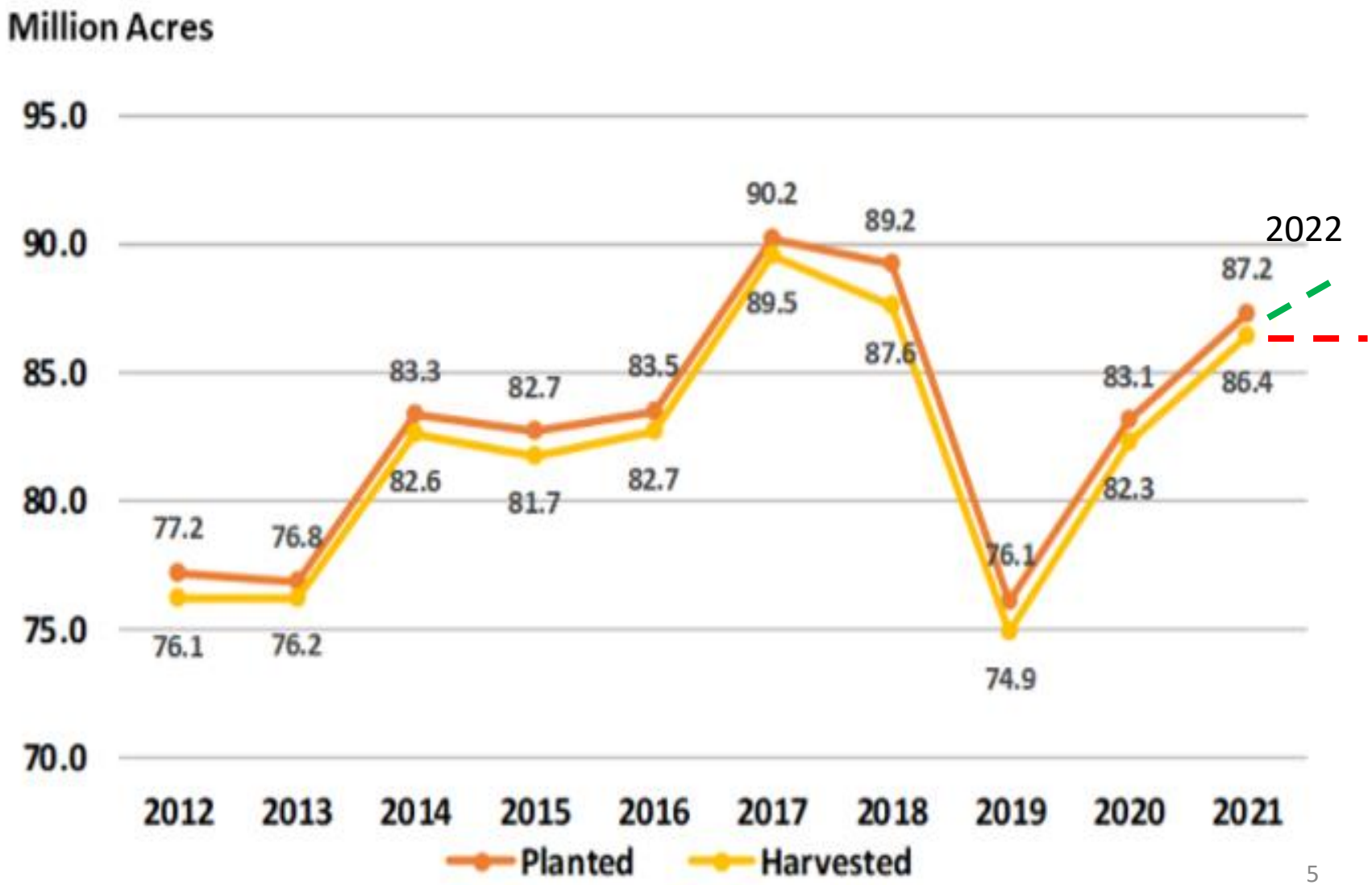
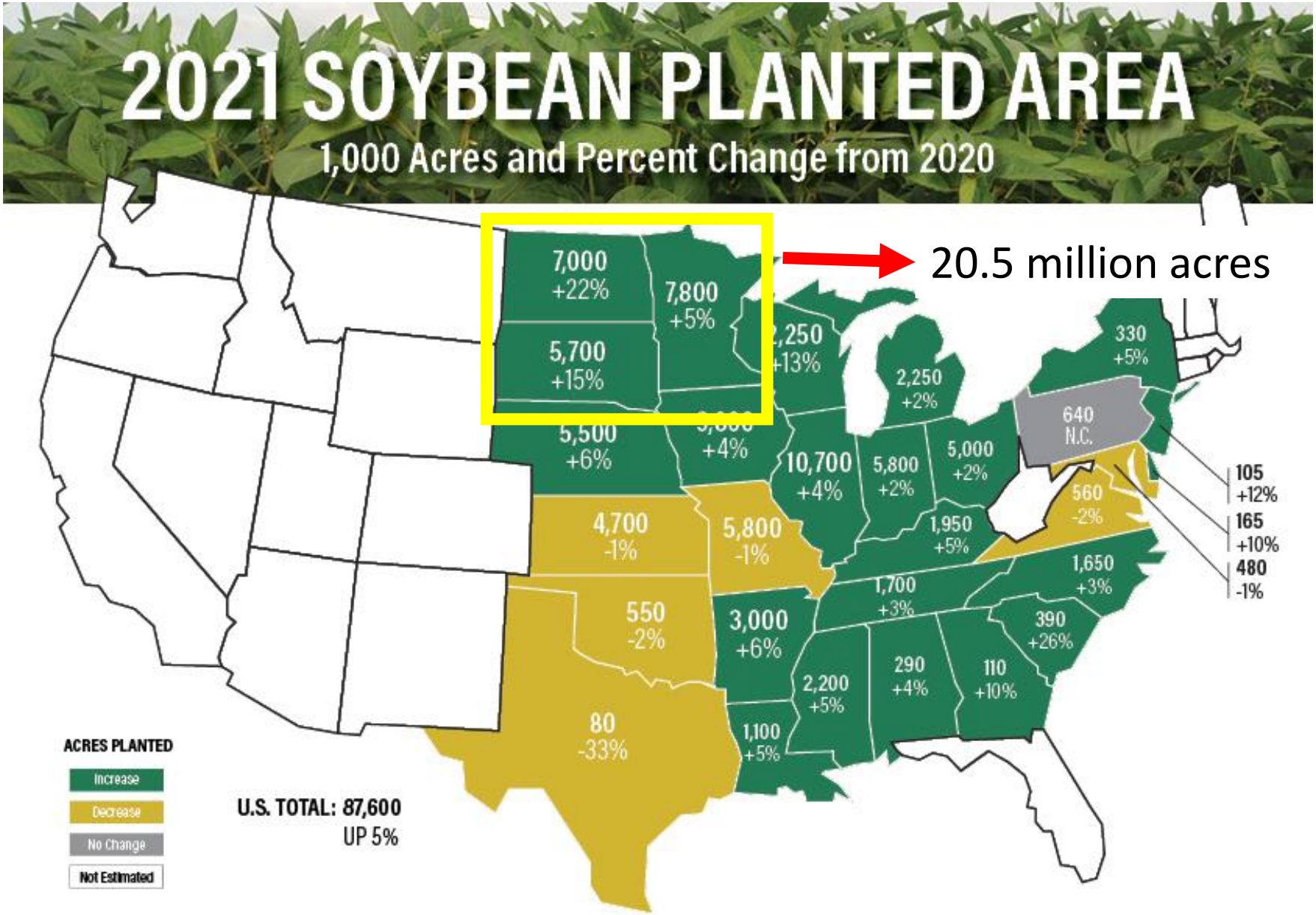
Soybean Acres

United States



https://www.nass.usda.gov/Charts_and_Maps/Field_Crops/index.php



https://www.agweb.com/news/crops/planting/where-did-acres-go-state-state-breakdown-usdas-prospective-planting-results

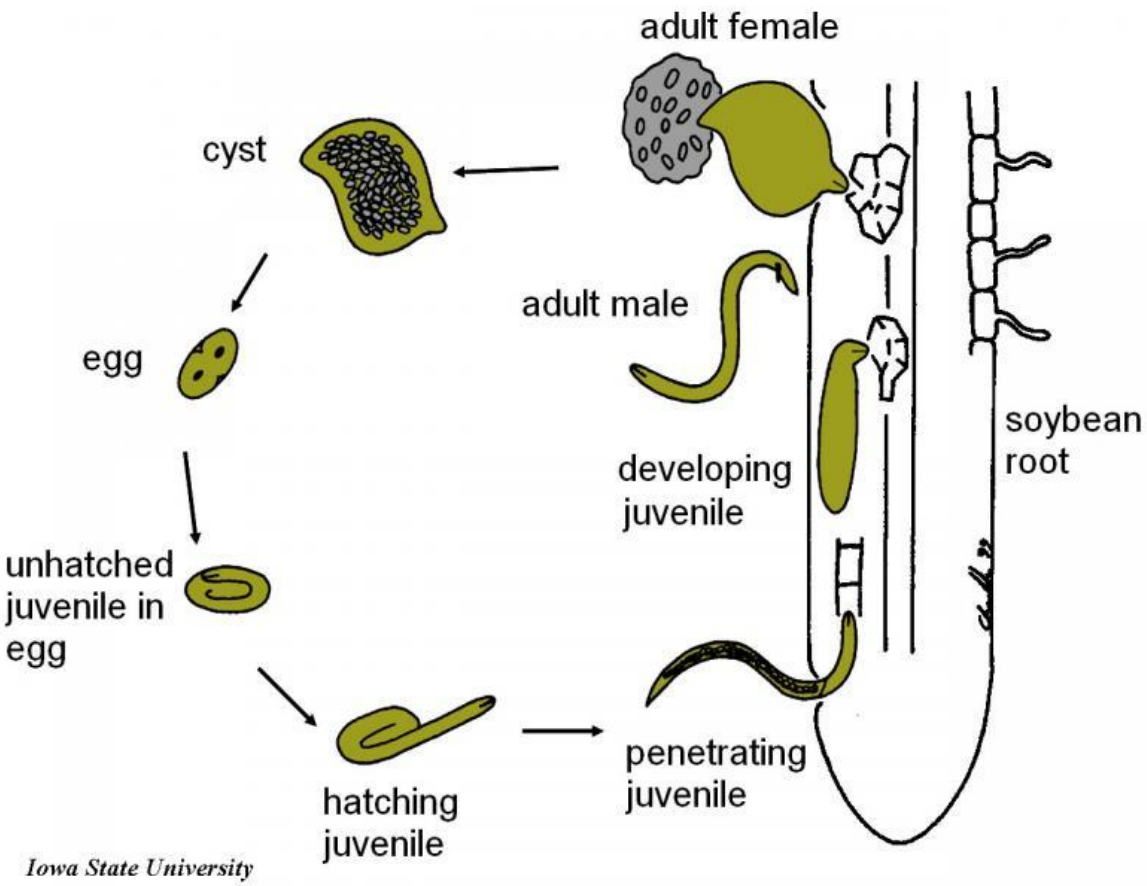
Introduction-SCN

- Annual losses of $1.5 billion
- Main source of resistance is PI 88788
  - 95% contain this resistance
- Capacity to survive long term without soybeans
- First reported
  - MN-1978
  - SD- 1995
  - ND-2003
  - Manitoba-2019

Courtesy: Mike Janssen

Life Cycle

- Complete life cycle in 4 weeks
- Can complete multiple generations during the growing season
- Likes hot and dry conditions



IOWA STATE UNIVERSITY
Extension and Outreach

Integrated Crop Management

Greg Tylka *Professor*

Dr. Greg Tylka is a professor in the Department of Plant Pathology and Microbiology at Iowa State University with extension and research responsibilities for management of plant-parasitic nematodes. The focus of Dr. Tylka's research program at Iowa State University is primarily the soybean cyst n...

Income in SCN-infested Fields Can Be $200 Per Acre Less With PI 88788 Than With Peking Resistance

January 9, 2020

The results of a field experiment conducted in 2019 with the soybean cyst nematode (SCN) in southeast Iowa were dramatic and alarming. The data illustrate what likely could occur in SCN-infested fields throughout the state in future years.

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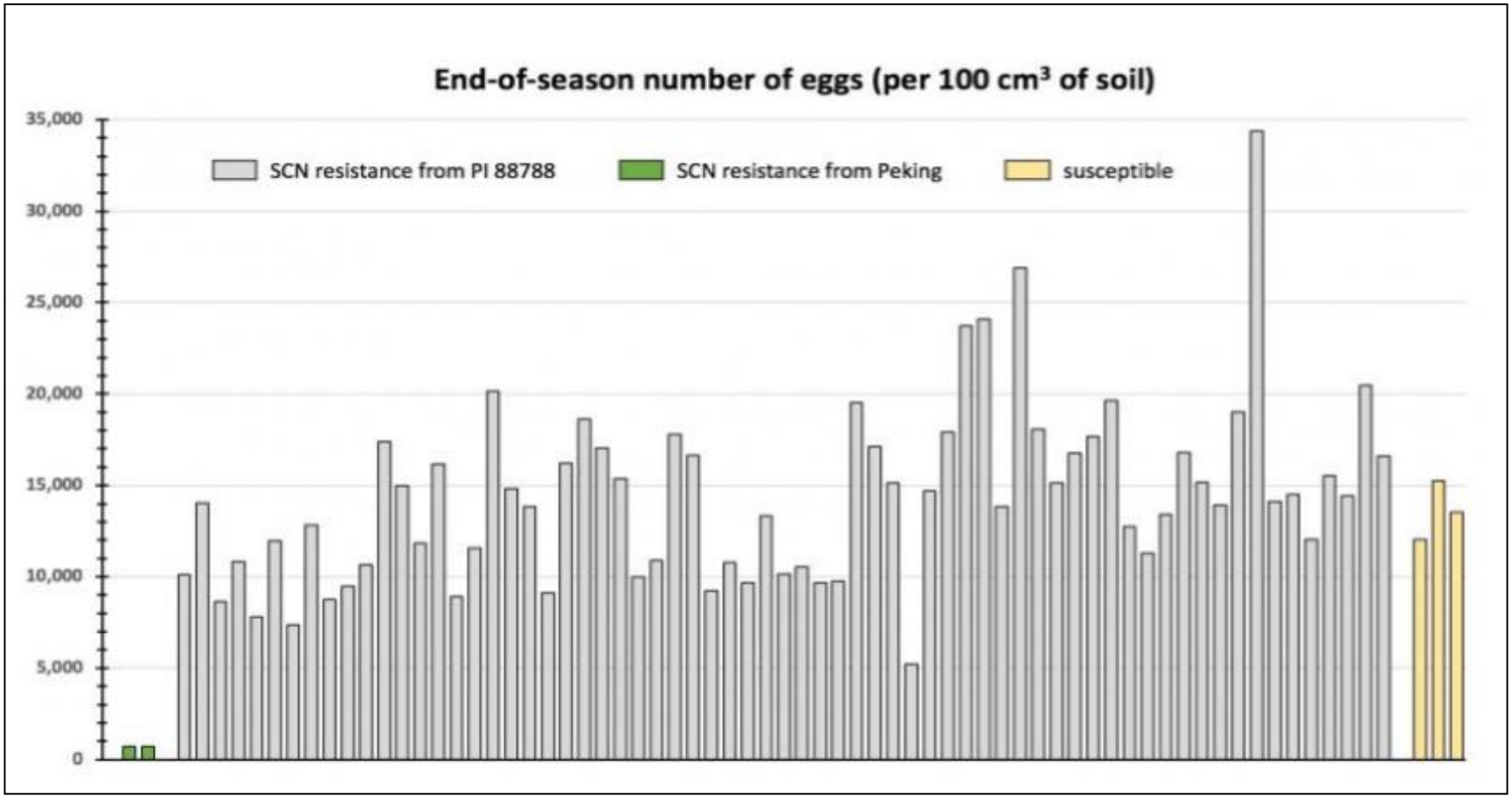
https://crops.extension.iastate.edu/cropnews/2020/01/income-scn-infested-fields-can-be-200-acre-less-pi-88788-peking-resistance

Evaluation of Soybean Varieties Resistant to Soybean Cyst Nematode in Iowa—2019



Gregory L. Tylka, Gregory D. Gebhart, Christopher C. Marett, and Mark P. Mullaney Depart. of Plant Pathology and
Microbiology, Iowa State University

This report is available online at www.isuscntrials.info.

Variety Type	End of Season Egg count (ave.)
3-SCN Susceptible	13,600
67-PI88788	14,432
2-Peking	800

End-of-season SCN egg numbers for 72 soybean varieties in an experiment near Fruitland, IA.

Beginning season SCN egg count = 4,687

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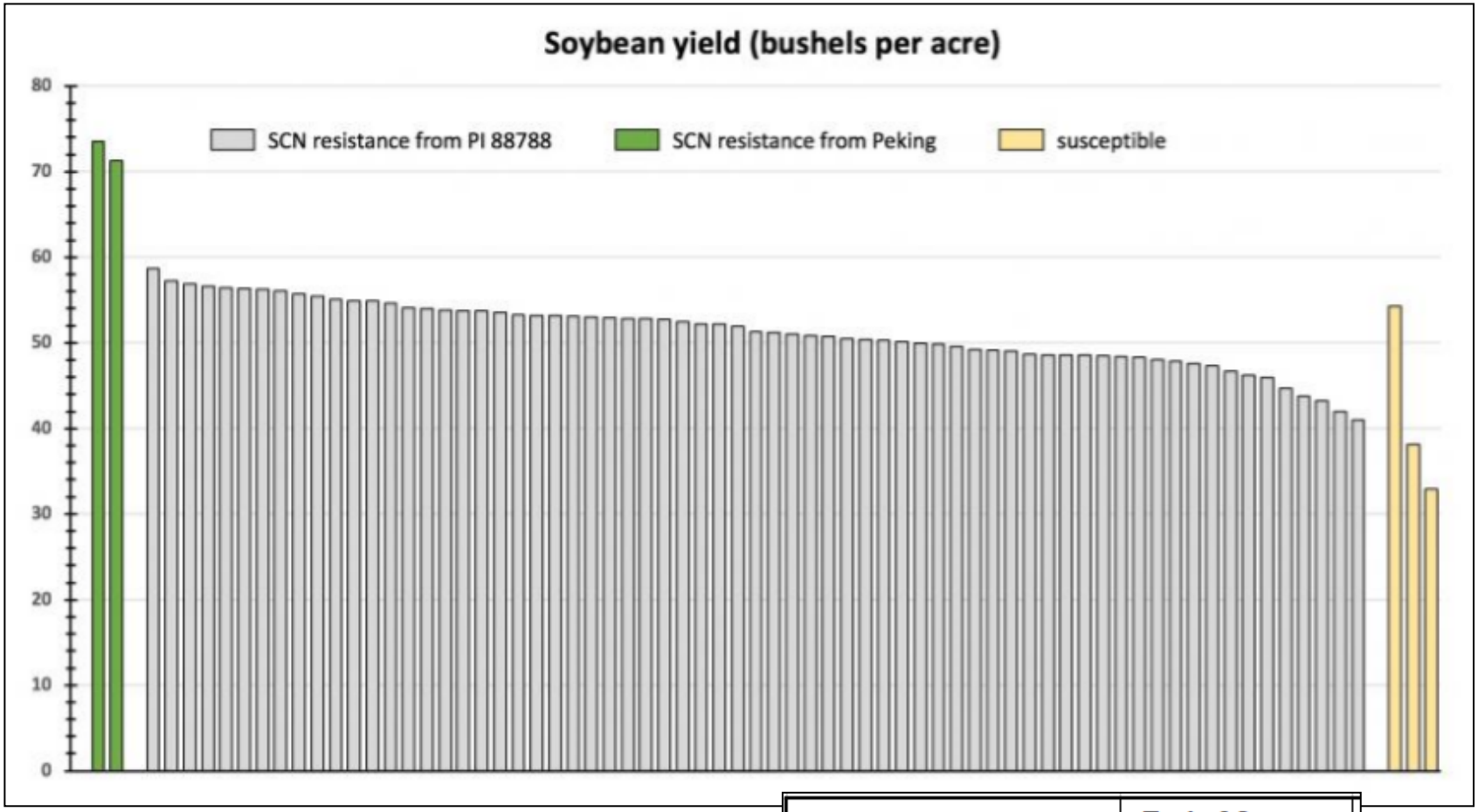
Evaluation of Soybean Varieties Resistant to Soybean Cyst Nematode in Iowa—2019



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Agvise SCN Project with Clyde Tiffany

SCN Project

- Two different sources of resistance
  - PI 88788
  - Peking
- 3 fields south of Benson, MN
- SCN sampled:
  - June
  - July
  - September
- Grain yield

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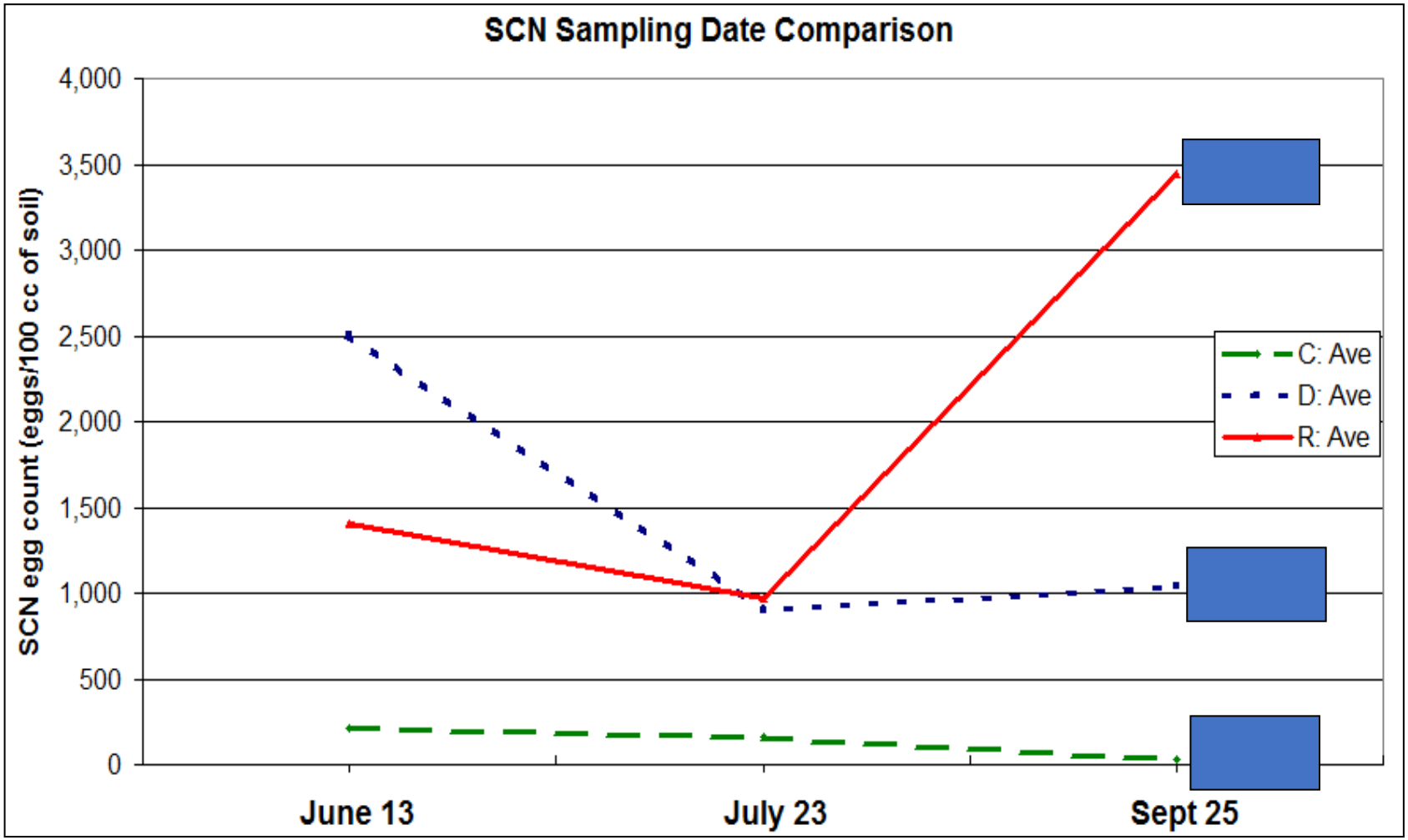
SCN Sampling Project: Time of Sampling



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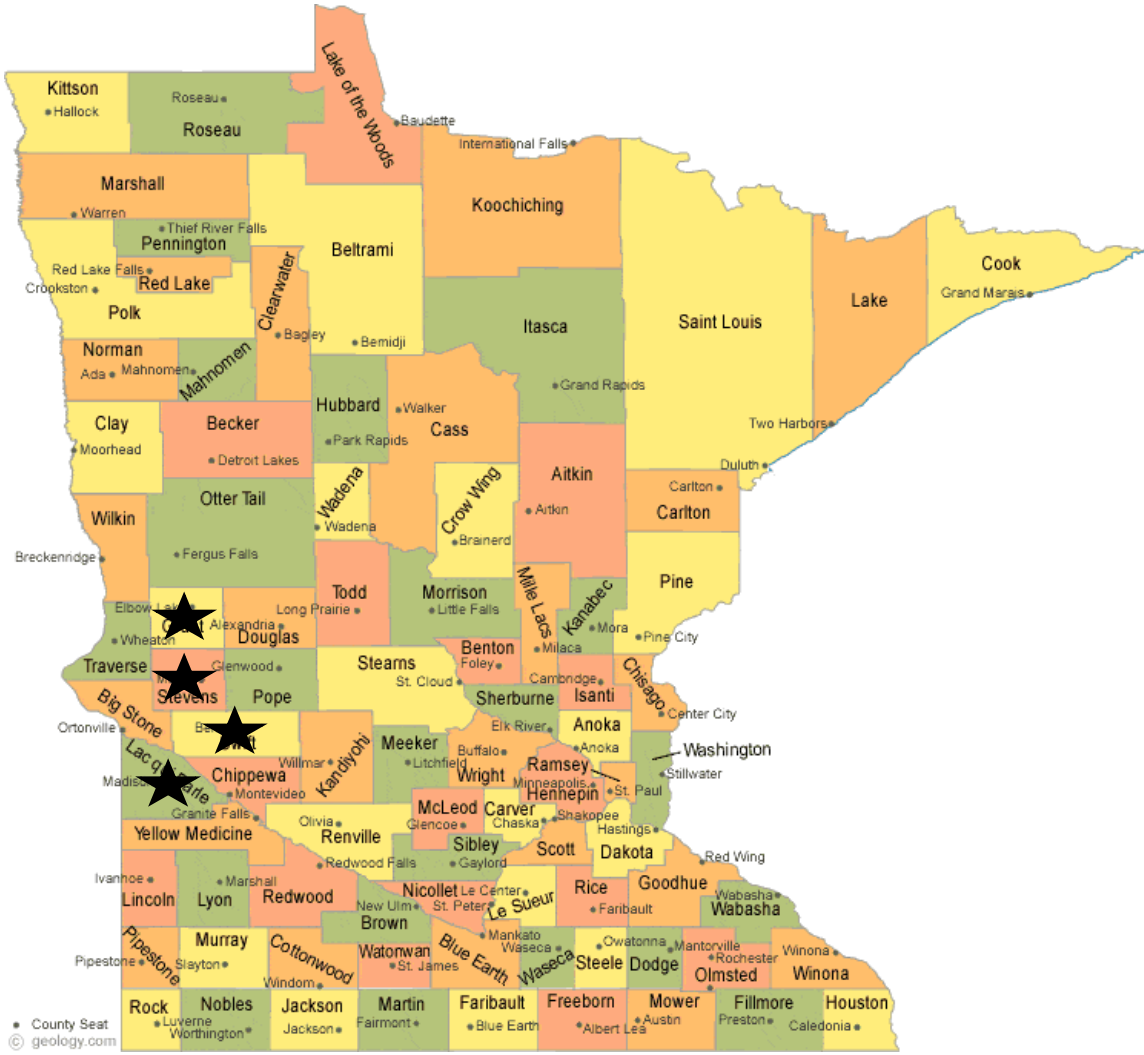
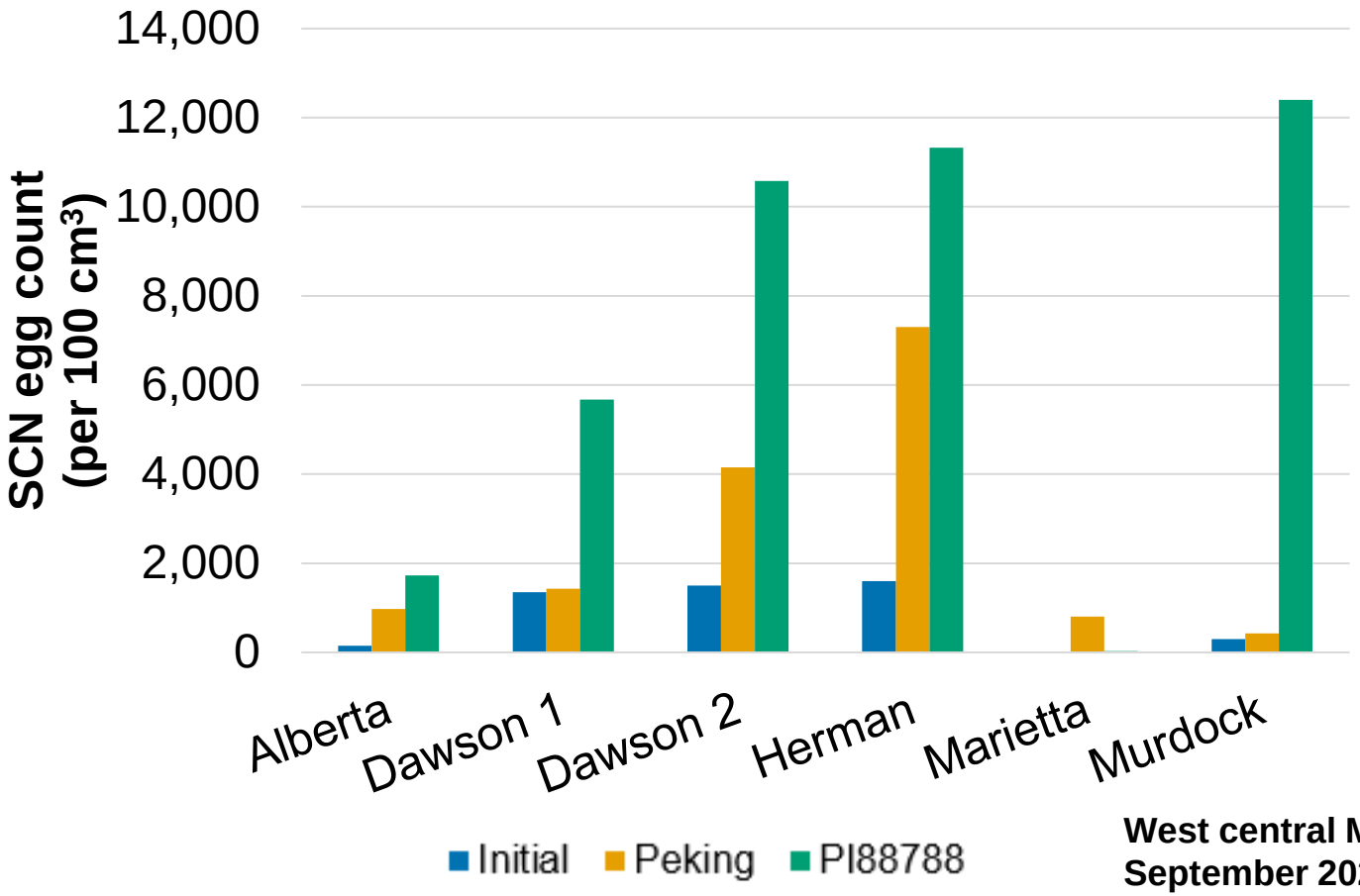
SCN Project

- Two different sources of resistance
  - PI 88788
  - Peking
- Six locations
- SCN sampled:
  - June
  - Harvest
- Grain yield

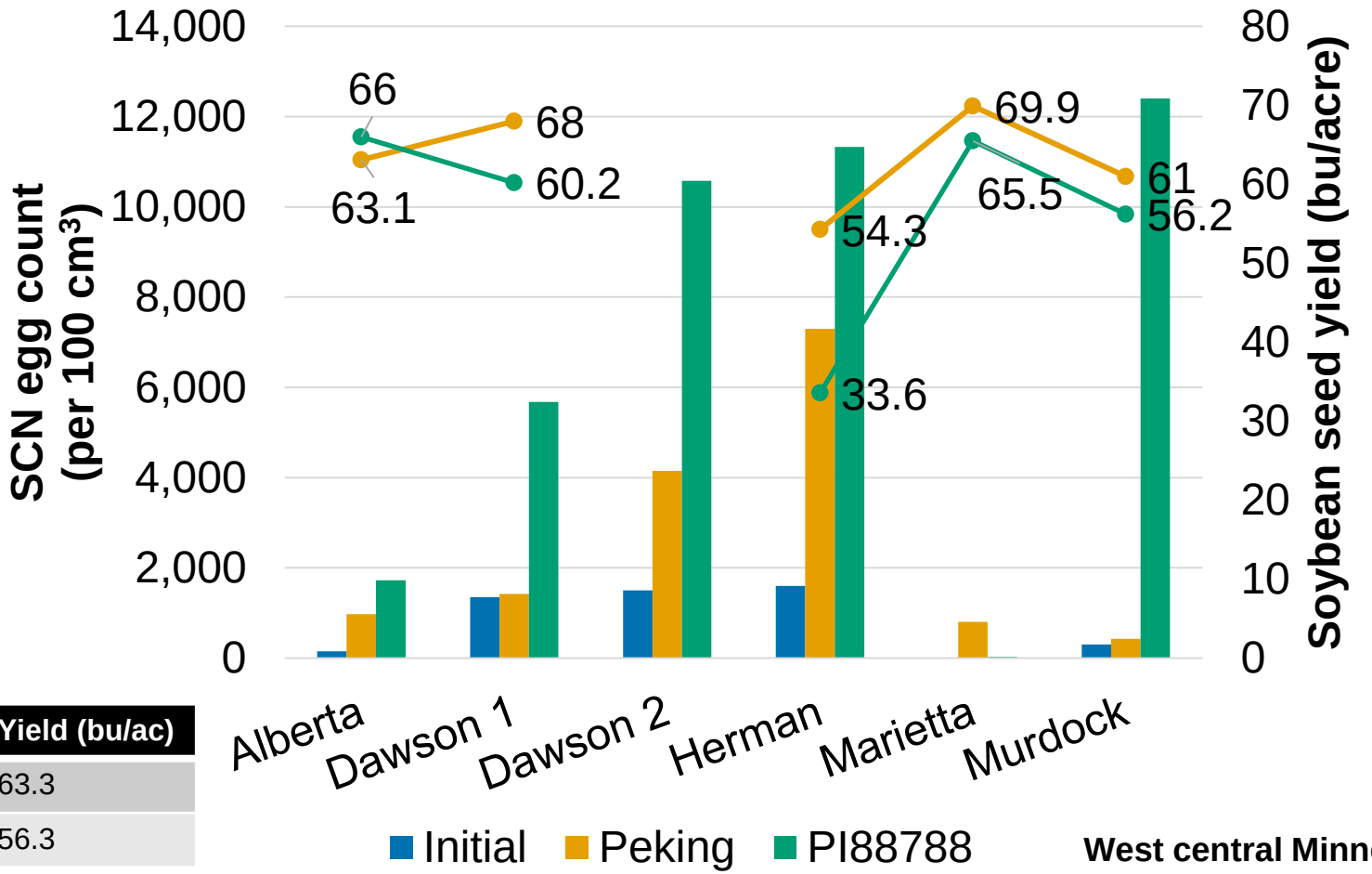


SCN Control with Peking vs. PI88788



West central Minnesota
September 2021

SCN Control with Peking vs. PI88788



Trait	Yield (bu/ac)
Peking	63.3
PI 88788	56.3

West central Minnesota
September 2021

Variety Selection

MN adapted 2020 private soybean varieties with Peking resistance

Company	Peking variety and maturity	Herbicide trait
AgVenture	12V4X (1.2)	RR2Xtend
	20V6R (2.0), 21M7R (2.1), 2.5W2R(2.5)	RR
	22E1RR (2.2), 23K23RR (2.3)	RR2
Asgrow	AG23X9 (2.3)	RR2Xtend
Becks	-	
Channel	2020R2XN(2.0)	RR2EXtend
Croplan	-	
Dairyland	DSR-1429L (1.4)	LL
Gold County	1326X (1.3)	RR2Xtend
Golden Harvest	-	
Hefty	Z2400E (2.4)	Enlist E3
Latham	L2597 E3 (2.5)	Enlist E3
Legend	-	
LG	LGS1452RX (1.4)	RR2Xtend
Mycogen	M140L5 (1.4))	LL
	M262L5 (2.6)	LL
Mustang	1029RR2Y (1.0)	RR2
	C-220N (2.2)	conv
Nutech	24N04E (2.4)	Enlist E3
Pioneer	P005A83X (0.05), P14A78X (1.4)	RR2Xtend
	P15A88X (1.5), P17A42X (1.7)	RR2Xtend
	P19A14X (1.7), P21A28X (2.1)	RR2Xtend
	P25A04X (2.5), P27A30X (2.7)	RR2Xtend
	P007A90R, 21A47PR (2.1)	RR2
	P25A70R (2.5)	RR2
	P24T35E (2.4)	Enlist E3
	P14A23L (1.4), P25A96L (2.5)	LL
Renk	-	
Prairie Brand	-	
Peterson	-	
Rob-See-Co/Stine	25EB32 (2.5)	Enlist E3
Stine	12BB22 (1.2)	GT27
	22133 (2.2)	conv
Titan Pro	25E8(2.5)	Enlist E3
Viking	2340KN (2.3)	conv
	1940KN (1.4)	conv

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https://www2.dtn.com/ag/assets/Peking_Soybean_Varieties_UMN.pdf__Bruce Potter

2021 SCN resistance evaluation

Provider	Variety	Source of resistance	Relative maturity	Herbicide trait	Female index	Rating
Control*	Peking				0.3	R
Control	PI 88788				35.8	MS
Syngenta / NK	S23-G5X	PI 89772	2.3	Xtend	27.1	MR
Syngenta / NK	S26-E3	Peking	2.6	Enlist E3	18.3	MR
Mustang Seeds	C-220N	Peking	2.2	Conv.	2.5	R
Albert Lea Seed	2340KN	Peking	2.3	Conv.	2.0	R
Legend Seed	LGS1452RX	Peking	1.4	Xtend	1.5	R
Cornelius Seed	CB26X78	Peking	2.6	Xtend	9.0	R
Federal Hybrids	F2290N R2X	Peking	2.2	Xtend	0.2	R
Stine	25EB32	Peking	2.5	Enlist E3	15.1	MR

Female Index (%) = (# of cysts on entry/ # of cysts on Williams 82) *100

Female Index	Source of Resistance
<10%	Resistant
10-30%	Moderately Resistant
30-60%	Moderately Susceptible
>60%	Susceptible

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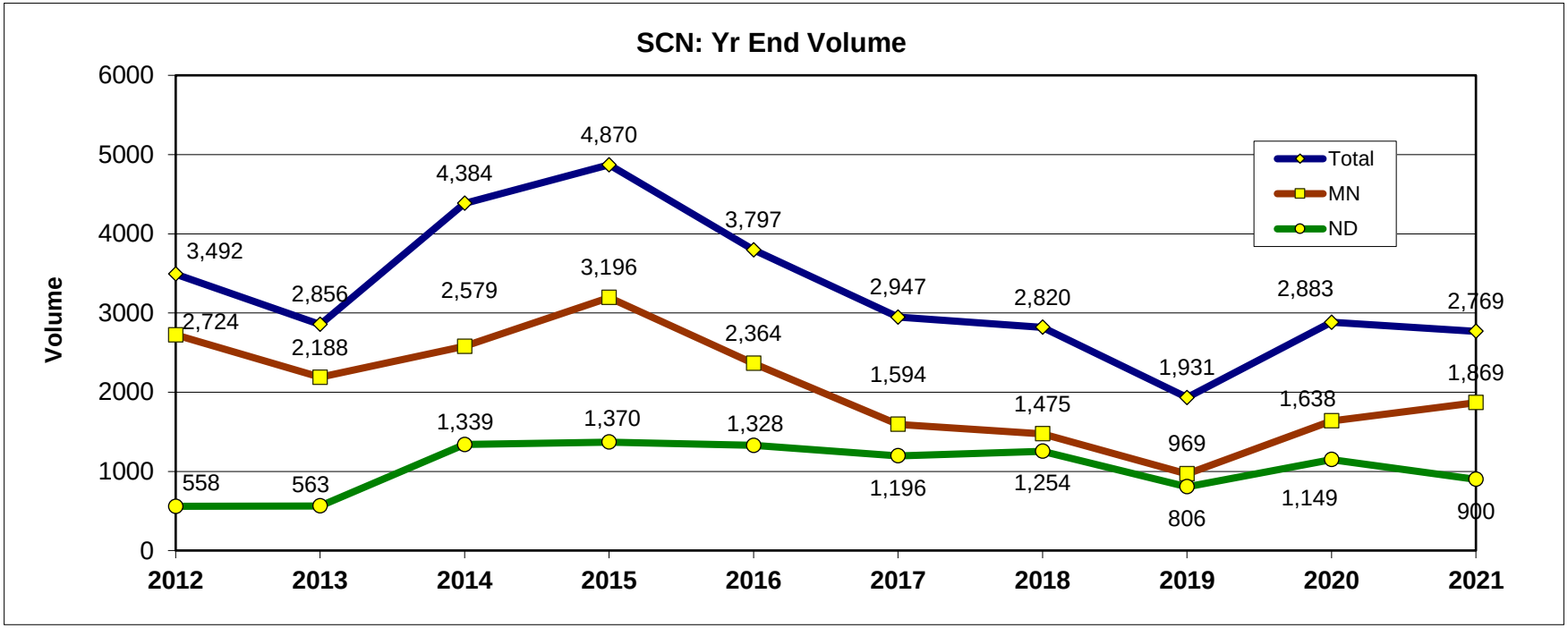
https://blog-crop-news.extension.umn.edu/2021/09/soybean-varieties-with-non-88788-scn.html__ Dr. Aaron Lorenz

SCN samples analyzed in Benson, MN

SCN samples analyzed at Benson, MN

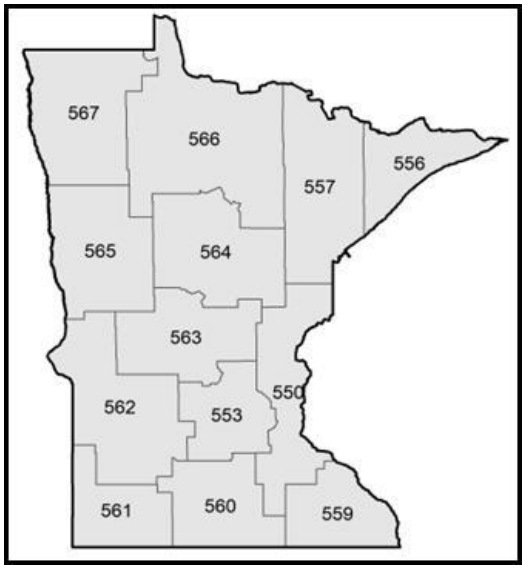


Soybean Cyst Nematode Counts: MN: 2021
Separated out by Zip Code regions

				SCN egg count (eggs/100 cc soil)				
Year	State	Zip	Samples	Zero	1 - 200	201 - 2,000	2,001 - 10,000	> 10,000
2021	MN	550	4	0	0	1	2	1
		553	35	0	1	12	16	6
		560	0	0	0	0	0	0
		561	10	0	2	7	1	0
		562	963	62	85	239	423	154
		563	148	6	12	46	73	11
		564	9	5	1	2	1	0
		565	522	63	48	150	184	77
		566	0	0	0	0	0	0
		567	178	47	27	41	55	8
		Totals	1869	10%	9%	27%	40%	14%

University SCN Guidelines

Soil test category	SCN Population	University Guideline
	eggs/100 g soil	
Very low	< 200	Susceptible soybean variety may be planted
Low	201 – 2,000	Resistant soybean variety should be planted
Medium	2,001 – 10,000	Resistant soybean variety may be planted, some yield loss expected
High	> 10,000	Soybean should not be planted



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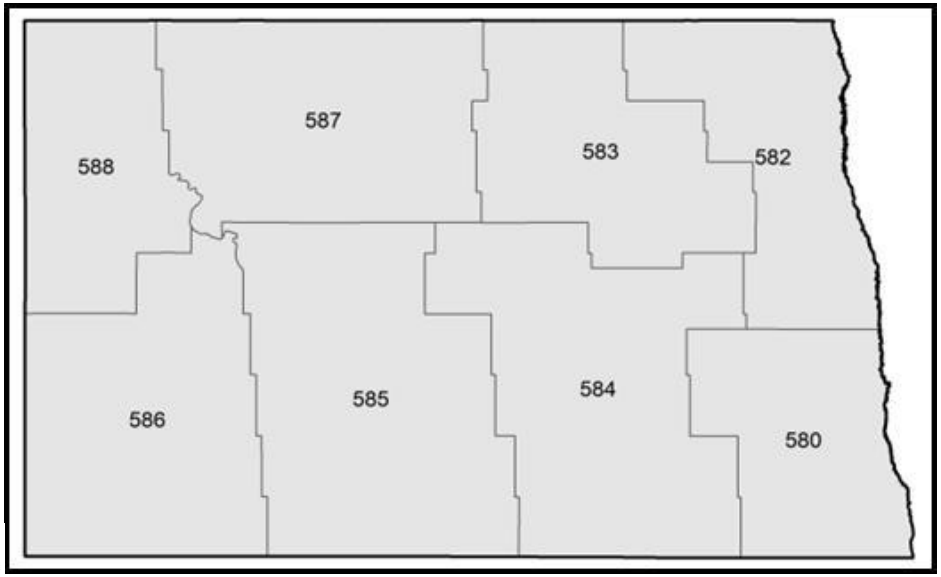
Soybean Cyst Nematode Counts: ND: 2021
Separated out by Zip Code regions

				SCN egg count (eggs/100 cc soil)				
Year	State	Zip	Samples	Zero	1 - 200	201 - 2,000	2,001 - 10,000	> 10,000
2021	ND	580	439	75	52	122	151	39
		581*	452	190	77	83	57	45
		582	8	4	4	0	0	0
		583	0	0	0	0	0	0
		584	1	1	0	0	0	0
		585	0	0	0	0	0	0
		587	0	0	0	0	0	0
		Total	900	30%	15%	23%	23%	9%



*Zip Code 581 may represent SCN Samples throughout ND in the ND SCN Survey Project.

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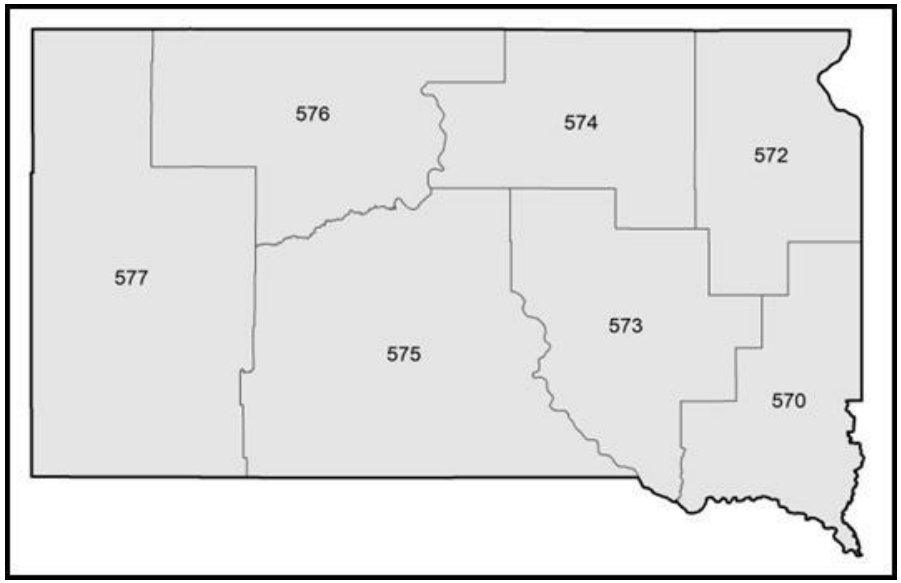
*(None in 2019)

Soybean Cyst Nematode Counts: SD: 2021
Separated out by Zip Code regions

				SCN egg count (eggs/100 cc soil)				
Year	State	Zip	Samples	Zero	1 - 200	201 - 2,000	2,001 - 10,000	> 10,000
2021	SD	570	0	0	0	0	0	0
		572	0	0	0	0	0	0
		574	0	0	0	0	0	0
Year	State	Zip	Samples	Zero	1 - 200	201 - 2,000	2,001 - 10,000	> 10,000
2020	SD	570	0	0	0	0	0	0
		572	2	1	0	1	1	0
		574	6	0	0	0	0	0
Year	State	Zip	Samples	Zero	1 - 200	201 - 2,000	2,001 - 10,000	> 10,000
2018	SD	570	6	4	1	0	0	0
		572	2	1	0	1	0	0
		574	0	0	0	0	0	0



SDSU ~ 500 samples

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Final Thoughts

- Is PI 88788 Resistance Failing? → YES!!
- SCN egg counts are high in some fields
- Variety selection is key
  - Limited varieties
- Very risky to plant S-S rotation without testing for SCN

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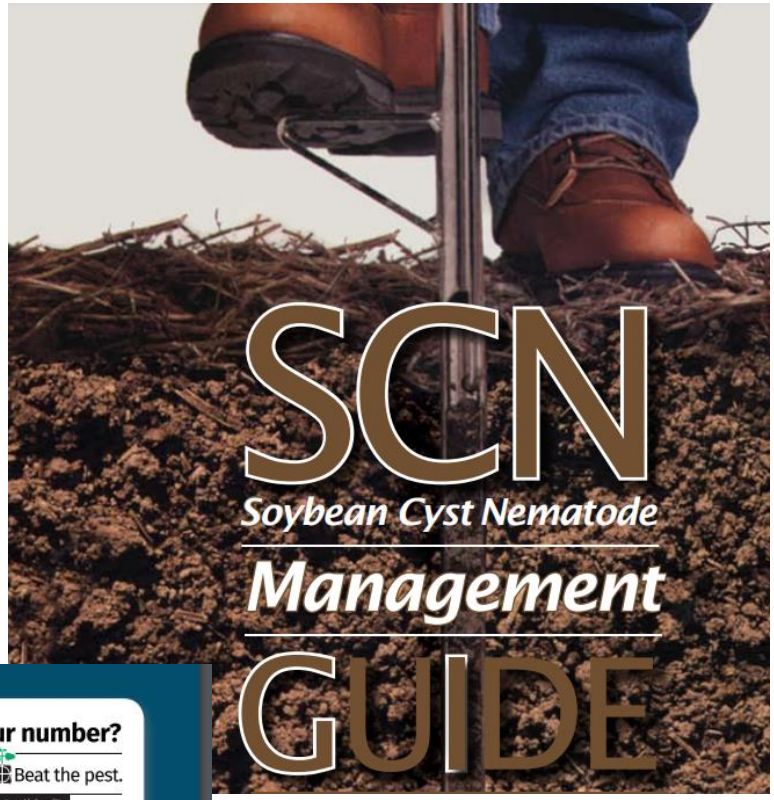
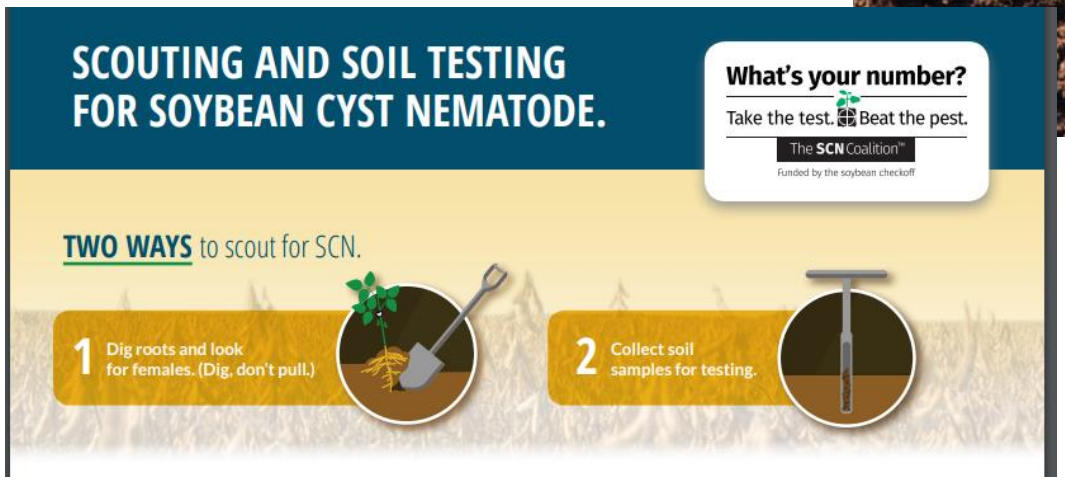
Going Forward: Start Sampling for SCN





Questions

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