

# 2008 Agronomy Update Meetings

Waunakee, Platteville, Janesville, Sparta, Eau Claire, Wausau,  
Kimberly, and Fond du Lac

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University of Wisconsin

Cooperating with Rock, Fond du Lac, Outagamie, Grant,  
Marathon, Eau Claire, Monroe, and Dane Counties

January 3 – 9, 2008



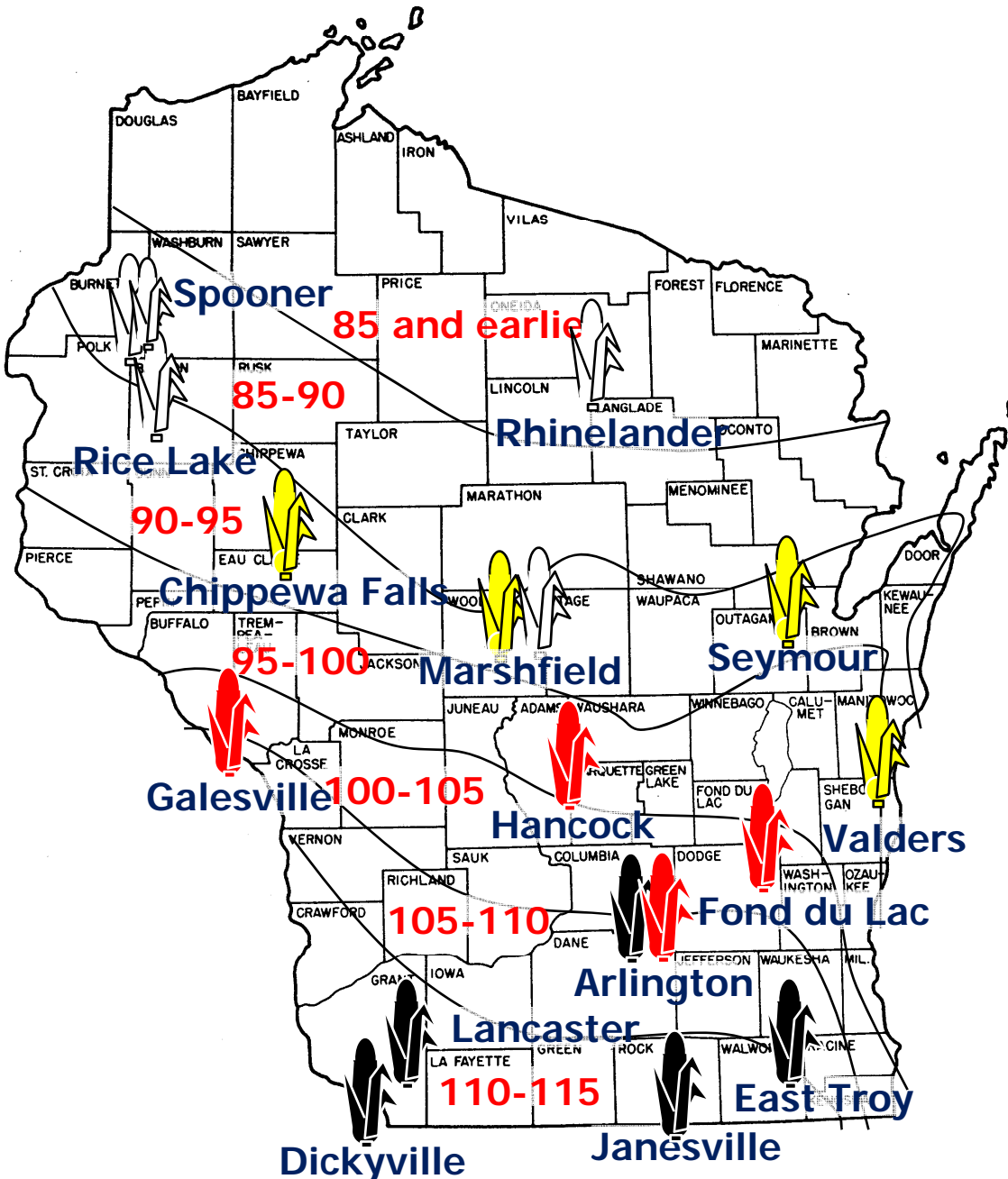


## Rationale and Situation

- A one bushel increase by WI corn farmers increases farm income \$8 to \$16 million dollars annually.
- In 2007, 534 corn hybrids were tested at 15 WI locations.

## Objective

- To provide unbiased performance comparisons of hybrid seed corn available in Wisconsin.



# Highlights for corn production during 2007

- **Records**

- ✓ Four locations had a 10-yr average > 200 bu/A

- **Growing season**

- ✓ Lost grain trials at 1 site
  - Third year of drought in NW WI
- ✓ Significant Anthracnose in southern WI

- **New things in the Hybrid Trials**

- ✓ Expanded organic hybrid testing
- ✓ Maturity based on company ratings
  - MN rating system sunset in 2006



# 2007 Wisconsin Corn Performance Trials

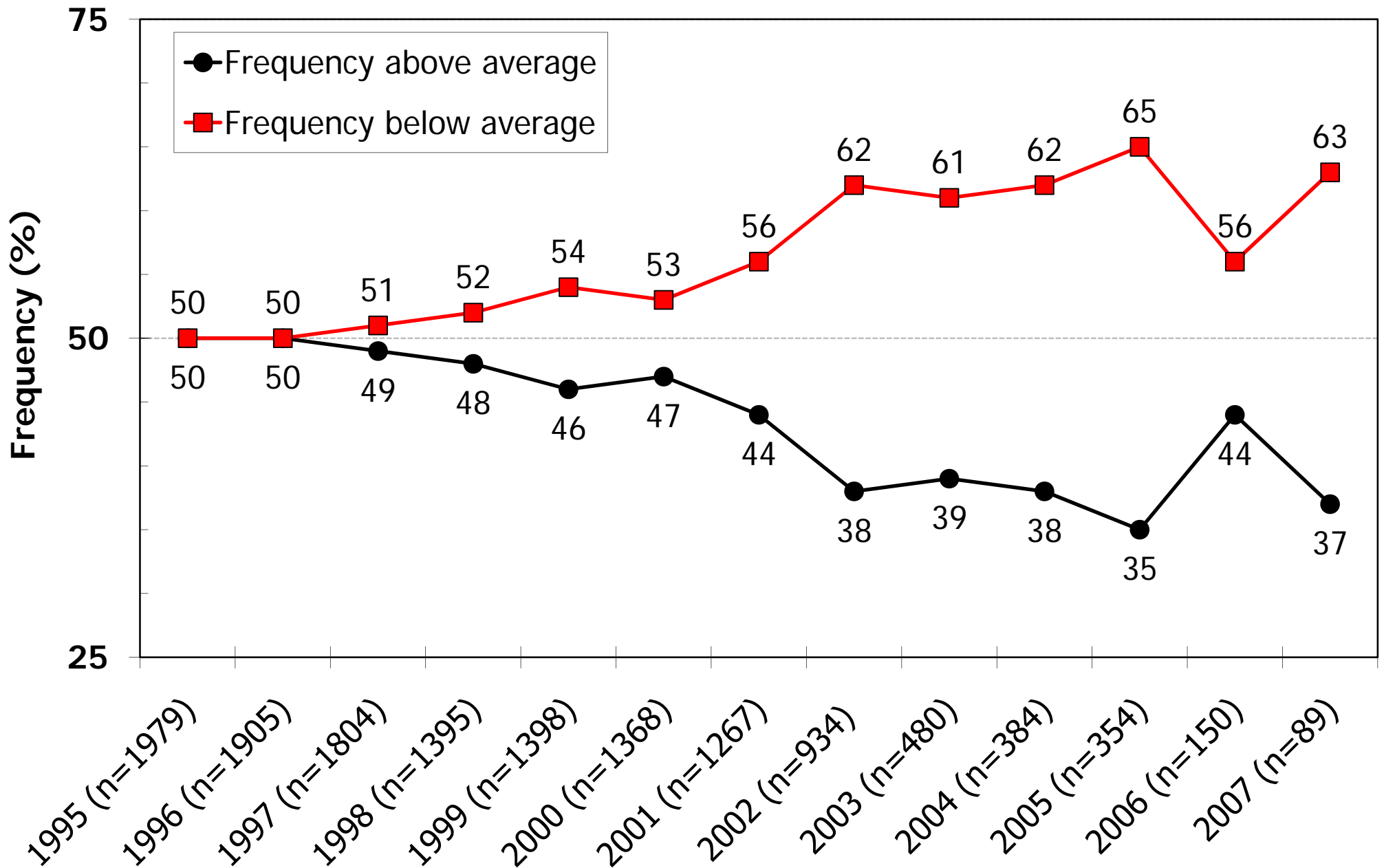
## Grain Summary

Location	<u>1997-2006</u>		<u>2007</u>		Percent change
	N	Yield	N	Yield	
Arlington	1864	210	263	215	2
Janesville	1842	212	238	231	9
Lancaster	1799	205	193	216	5
Fond du Lac	1465	184	181	201	9
Galesville	1598	199	158	197	-1
Hancock	1605	213	168	200	-6
Chippewa Falls	1348	145	--	--	--
Marshfield	1500	164	197	166	1
Seymour	1024	168	197	147	-13
Valders	1508	165	197	156	-5
Rhinelanders/White Lake	478	130	56	137	5
Spooner	1465	140	168	120	-14

# 2007 Wisconsin Corn Performance Trials Silage Summary

<b>Location</b>	<u>1997-2007</u>		<u>2007</u>		Percent change
	N	Yield	N	Yield	
Arlington	574	9.3	62	9.9	6
Lancaster	574	8.5	62	9.8	15
Fond du Lac	632	8.5	60	8.7	2
Galesville	637	8.9	60	9.5	7
Chippewa Falls	260	7.1	67	---	---
Marshfield	542	7.2	67	7.7	7
Valders	542	7.1	67	6.6	-7
Rhineland	111	7.2	33	7.2	0
Spooner	222	7.1	66	6.5	-8

# Frequency of 'Non-Transgenic' Corn Hybrids Yielding Above and Below the Trial Average in UW Trials



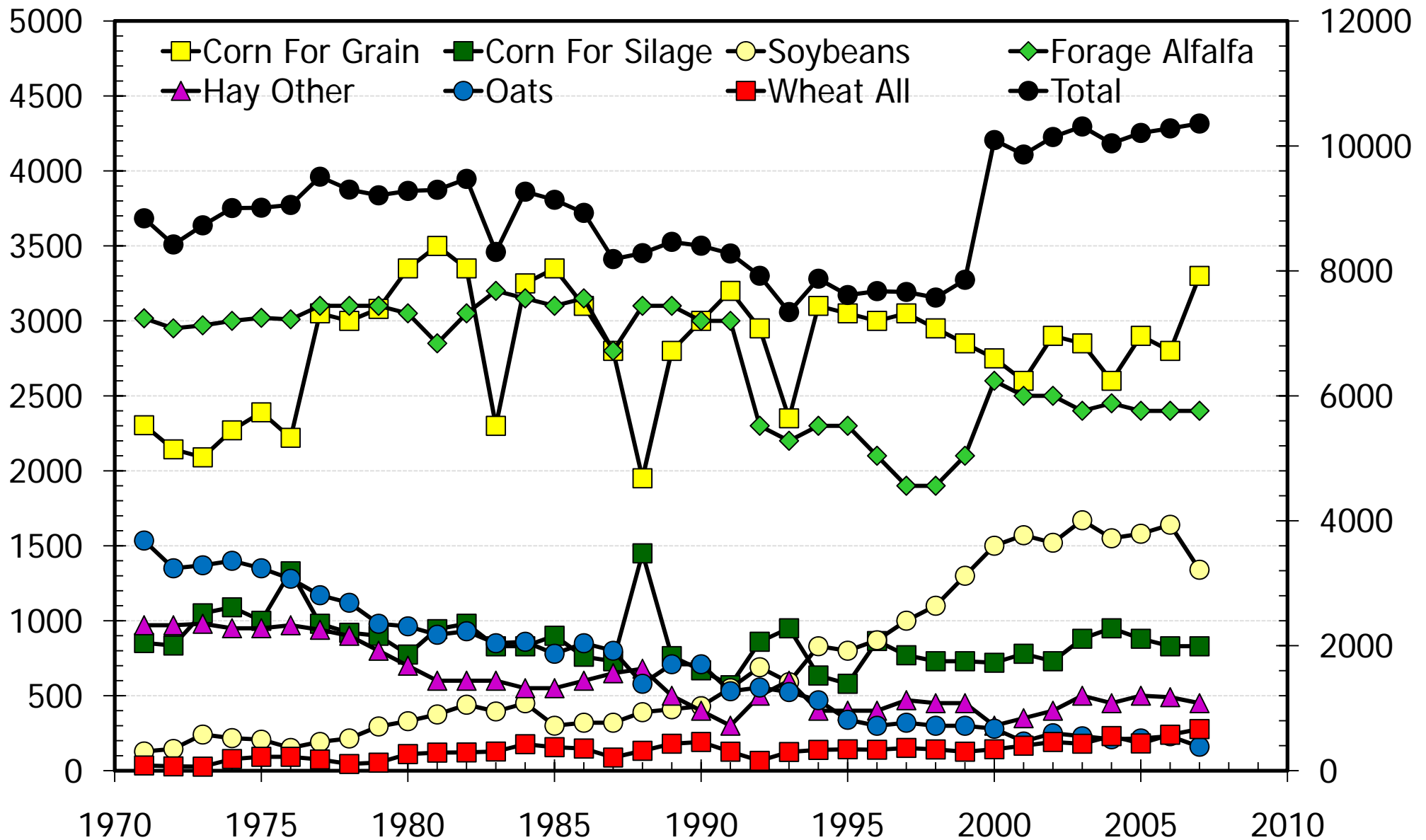
# Continuous corn? Or rotate in 2008?

## Wisconsin Corn Acreage

Source: USDA-NASS

Crop Acres

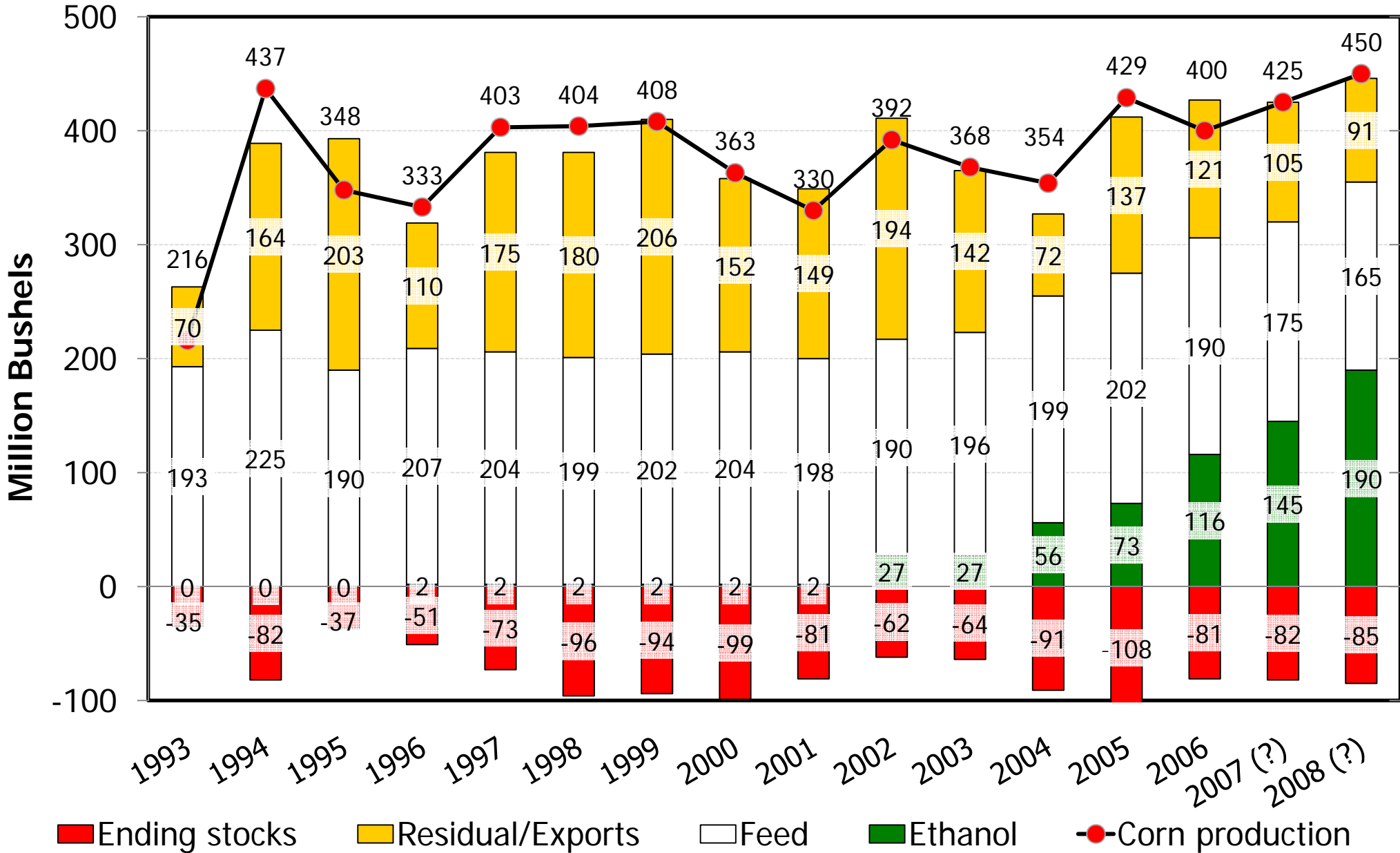
Total Acres



# Continuous corn, or rotate in 2008?

## Wisconsin Corn Use

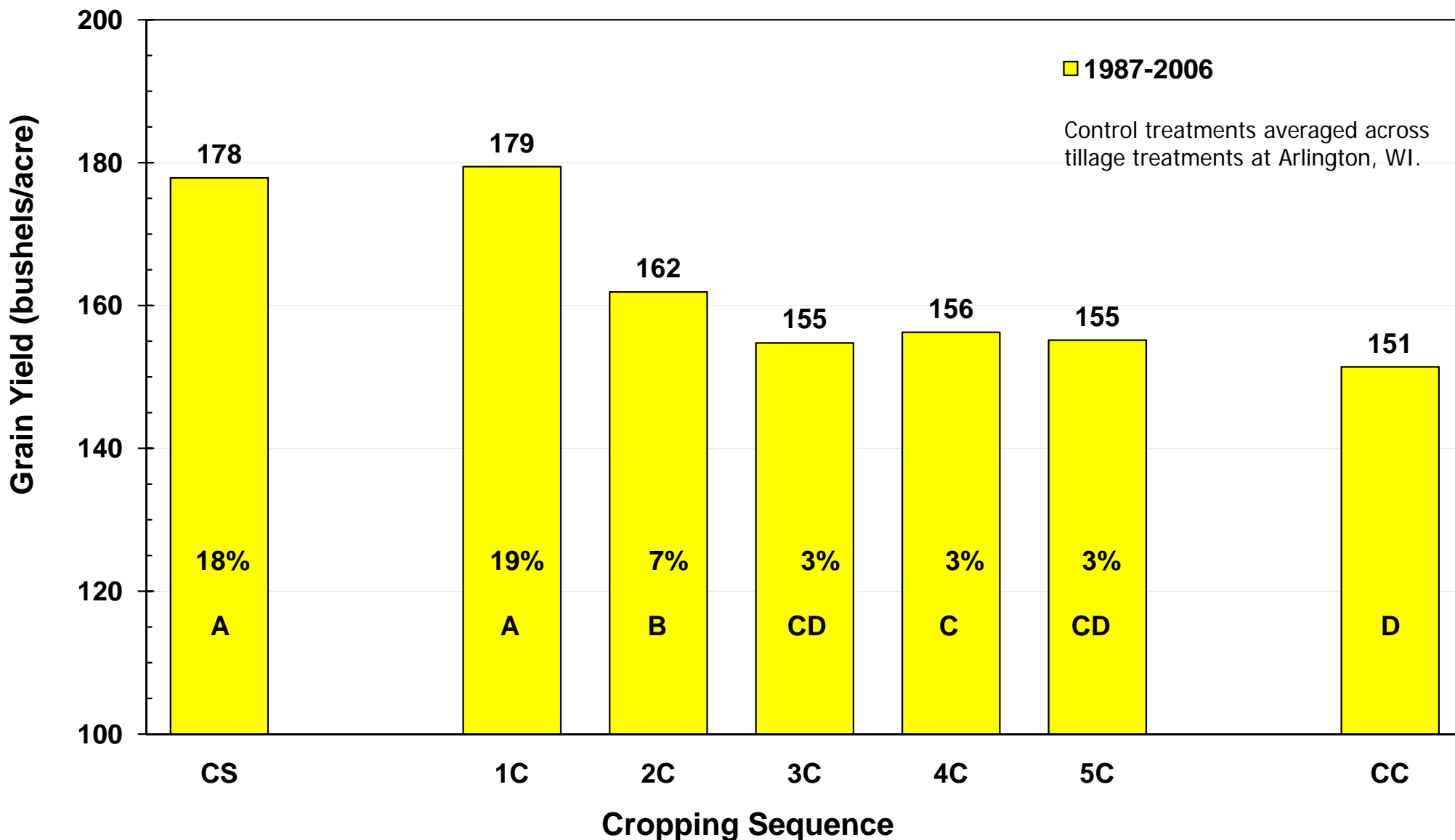
Sources: USDA-NASS  
NCGA: The World of Corn





# The rotation effect lasts two years increasing corn grain yield 10 to 19% for 1C and 0 to 7% for 2C ...

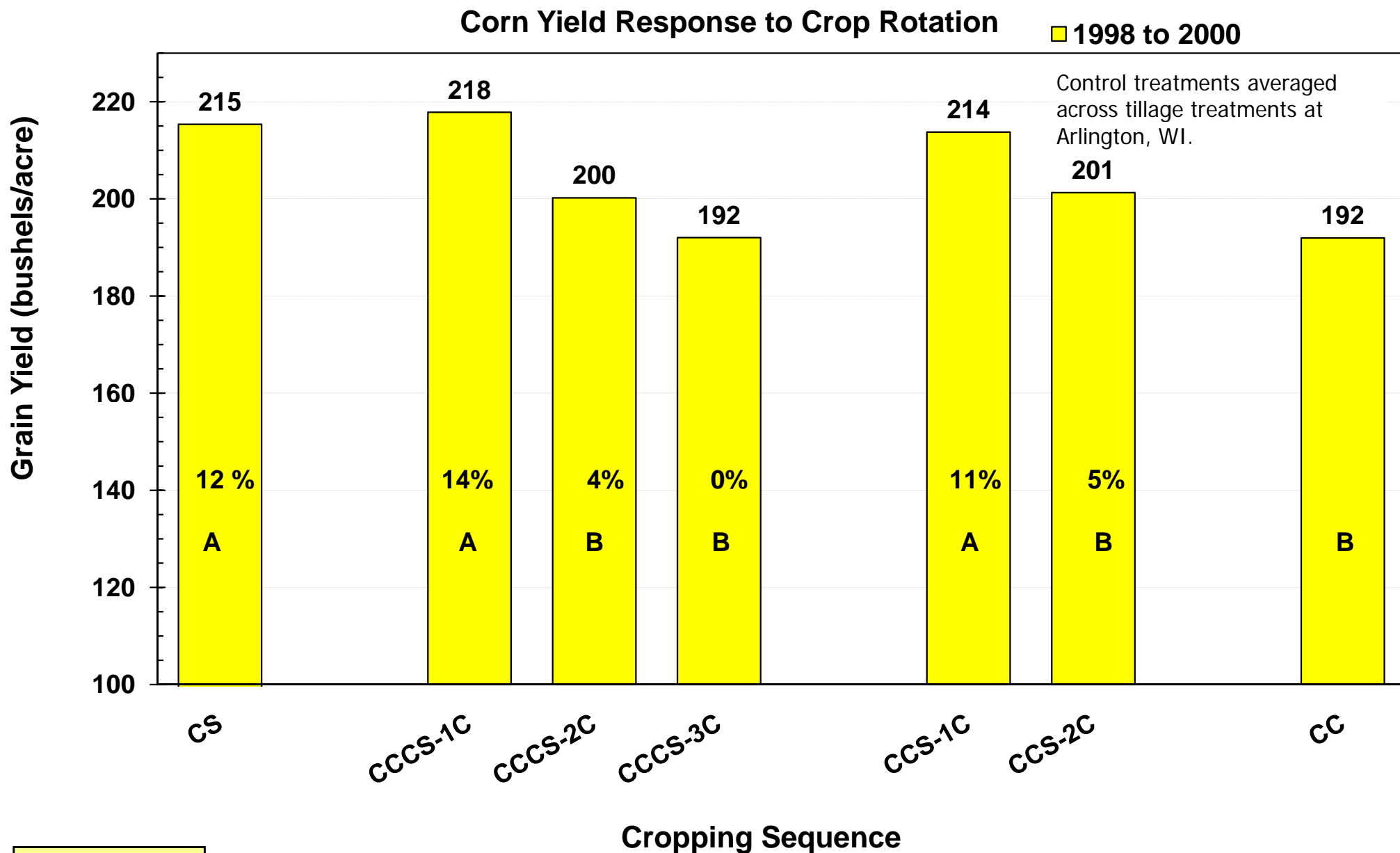
## Corn Yield Response Following Five Years of Soybean



Source: Lauer

C= Corn, S= Soybean, Number = consecutive year of corn

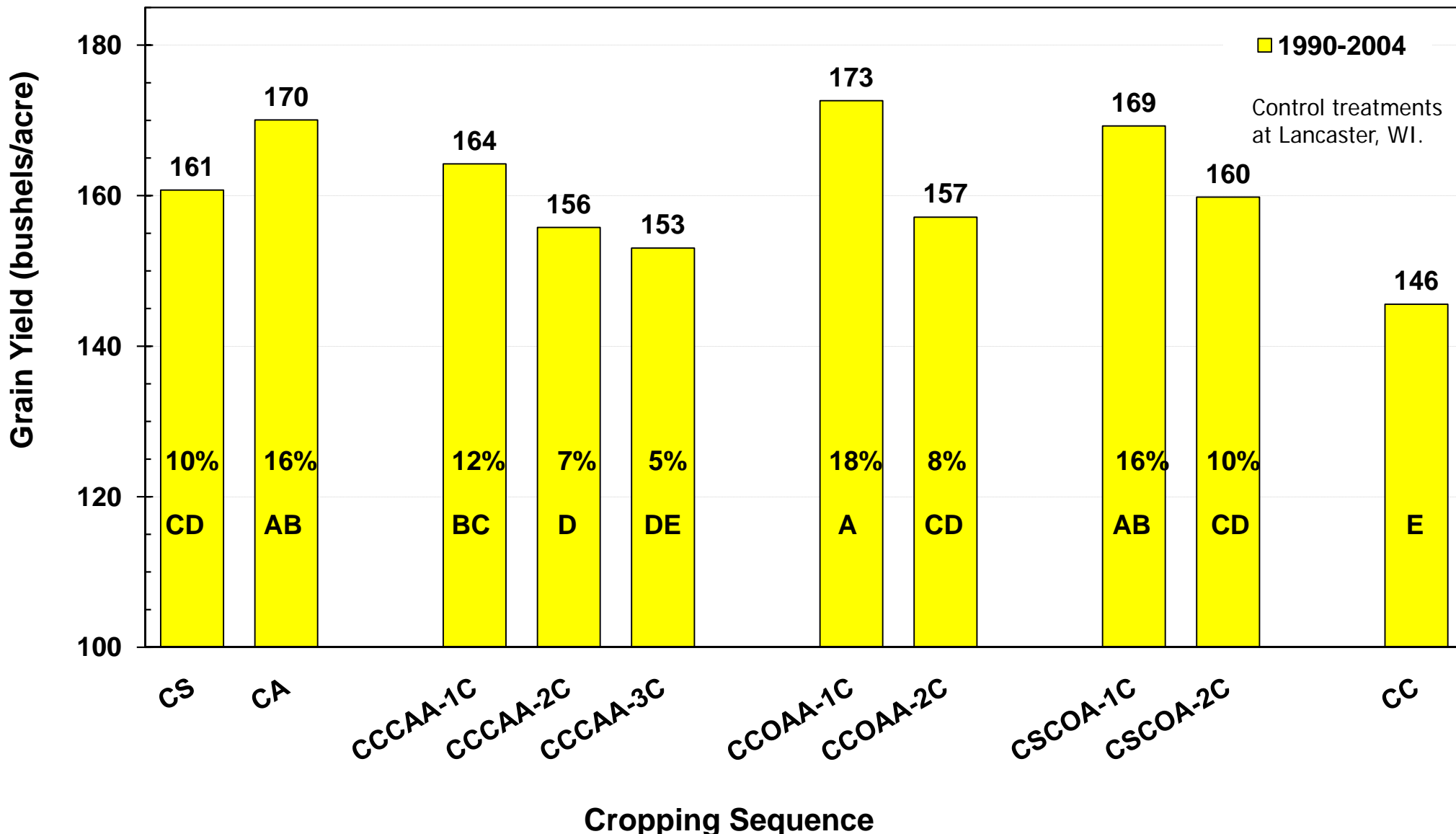
# If there is only a one year break in the rotation, then the second corn phase is equivalent to continuous corn ...



Source: Lauer

# At least two break years are needed to measure a response in the second corn phase (compared to CC) ...

Corn Yield Response to Crop Rotation

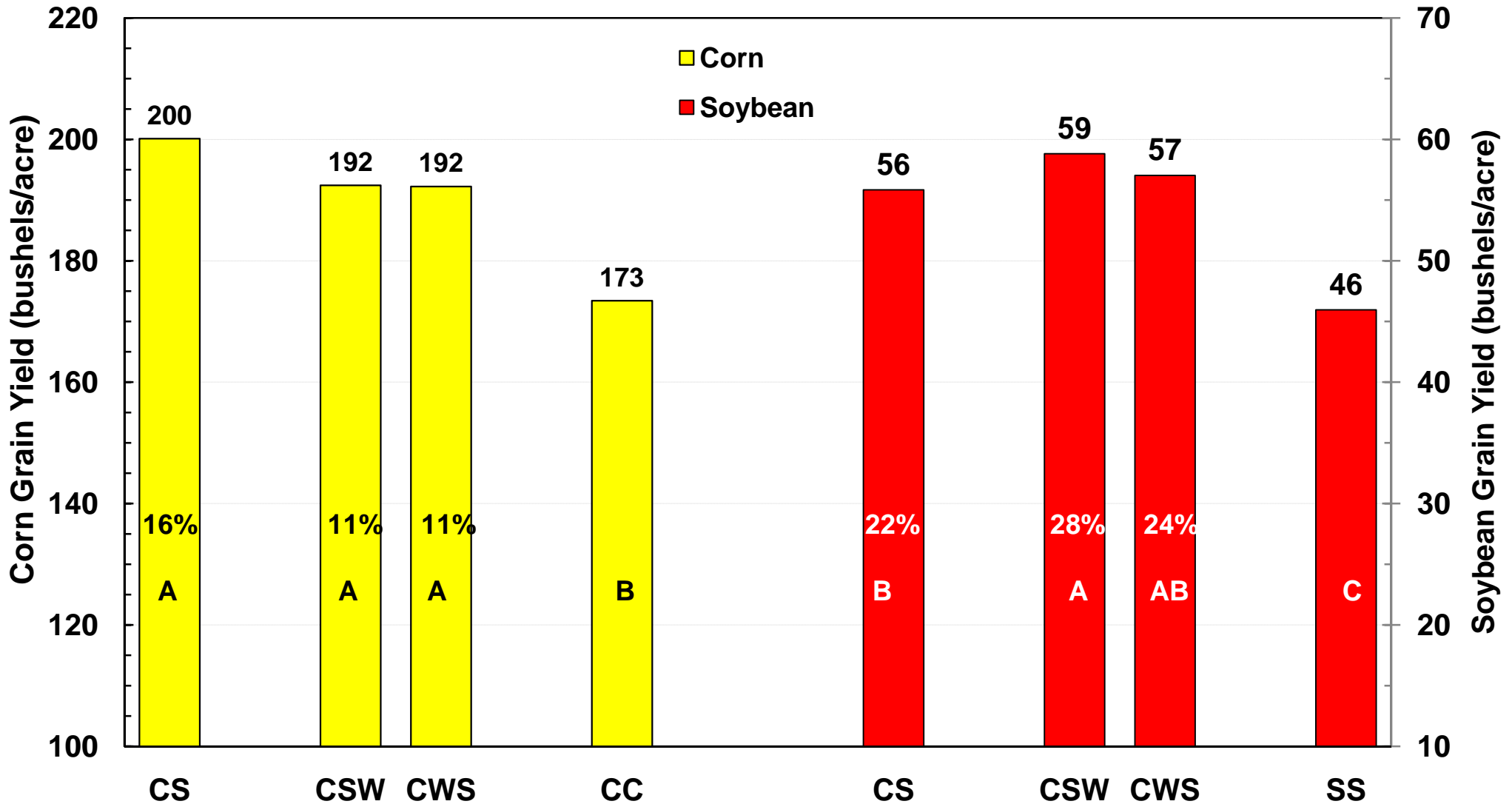


A= Alfalfa, C= Corn, O= Oat, S= Soybean, W=Wheat

Source: Stanger and Lauer, 2008

# Adding a third crop does not increase corn grain yield, but does improve soybean grain yield ...

Corn and Soybean Yield Response to Crop Rotation



## Cropping Sequence

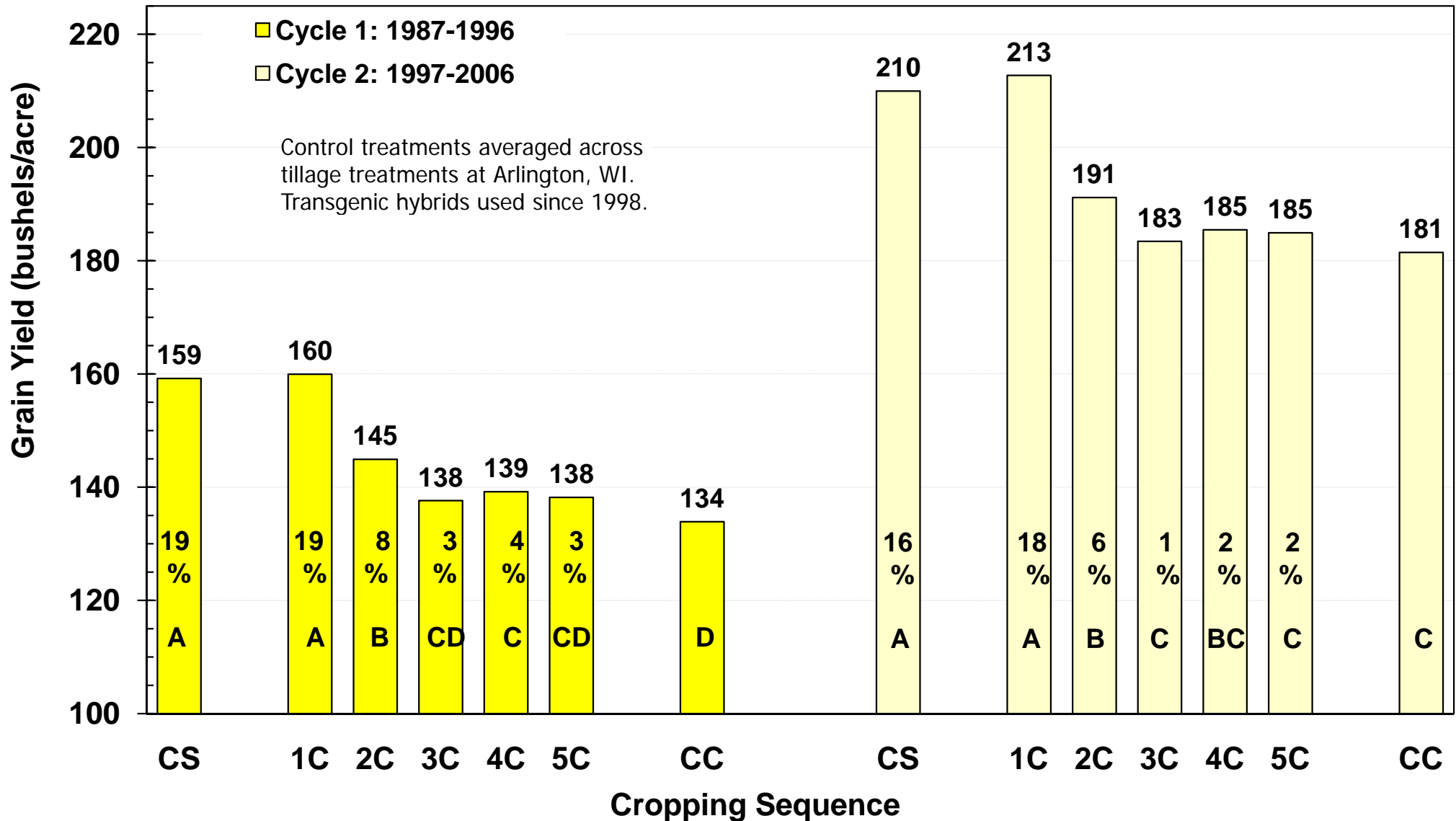
C= Corn, S= Soybean, W=Wheat

2004-2006: Values averaged across seed fungicide treatments at Arlington, WI.

Source: Lauer

# Modern corn hybrids and management practices have the same rotation response as older hybrids and practices ...

## Corn Yield Response Following Five Years of Soybean



C = Corn, S = Soybean, Number = consecutive year of corn

Source: Lauer

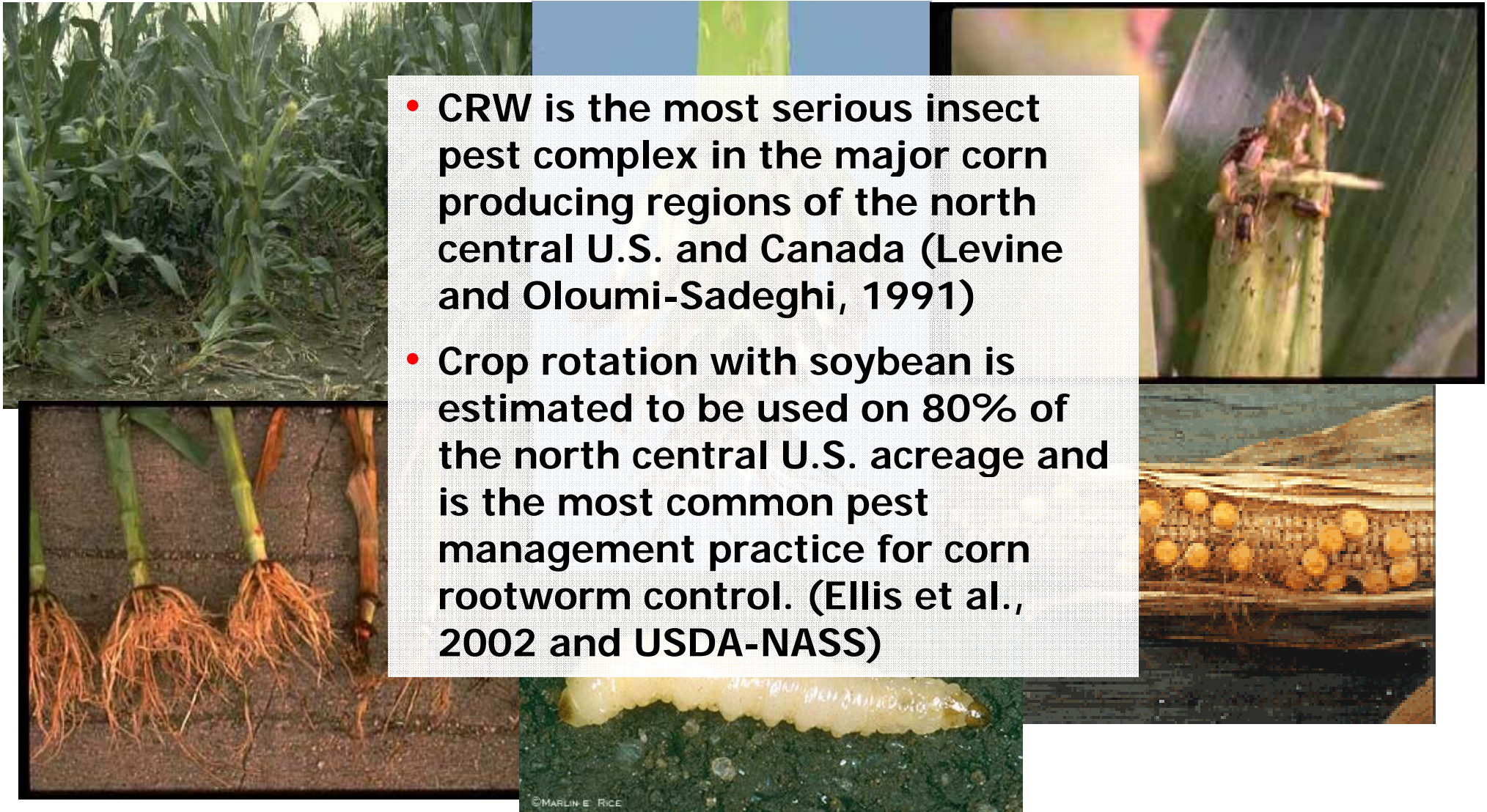
# Conclusions



- **Mechanism for rotation effect is unknown**
  - ✓ Hypothesis #1: One factor causes effect.
  - ✓ Hypothesis #2: Multiple factors cause effect and risk of expression depends upon the environment.
- **The rotation effect lasts at most two years increasing grain yield 10 to 19% for 1C and 0 to 7% for 2C.**
- **At least two break years are needed to measure a response in the second continuous cropping year.**
  - ✓ A one year break using soybean reduces the rotation effect in the second continuous year.
- **Adding a third crop does not improve corn yield, but does improve soybean yield.**
- **Modern corn hybrids and management practices have the same rotation response as older hybrids and practices.**

# Using the Bt-CR Transgene on the Farm

## Field Symptoms of Corn Rootworm (*Diabrotica sp.*)



- CRW is the most serious insect pest complex in the major corn producing regions of the north central U.S. and Canada (Levine and Oloumi-Sadeghi, 1991)
- Crop rotation with soybean is estimated to be used on 80% of the north central U.S. acreage and is the most common pest management practice for corn rootworm control. (Ellis et al., 2002 and USDA-NASS)

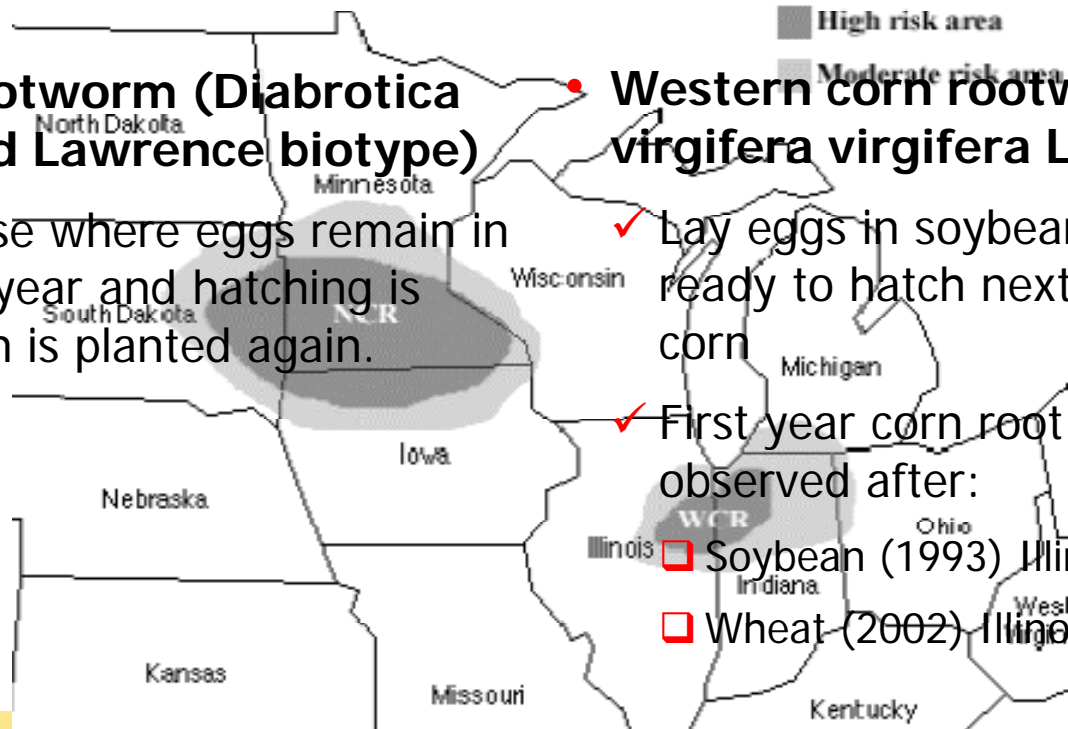
# Corn Rootworm Behavioral Adaptations

- **Northern corn rootworm (*Diabrotica barberi* Smith and Lawrence biotype)**

- ✓ Extended diapause where eggs remain in the soil an extra year and hatching is delayed until corn is planted again.

- **Western corn rootworm (*Diabrotica virgifera virgifera* LeConte)**

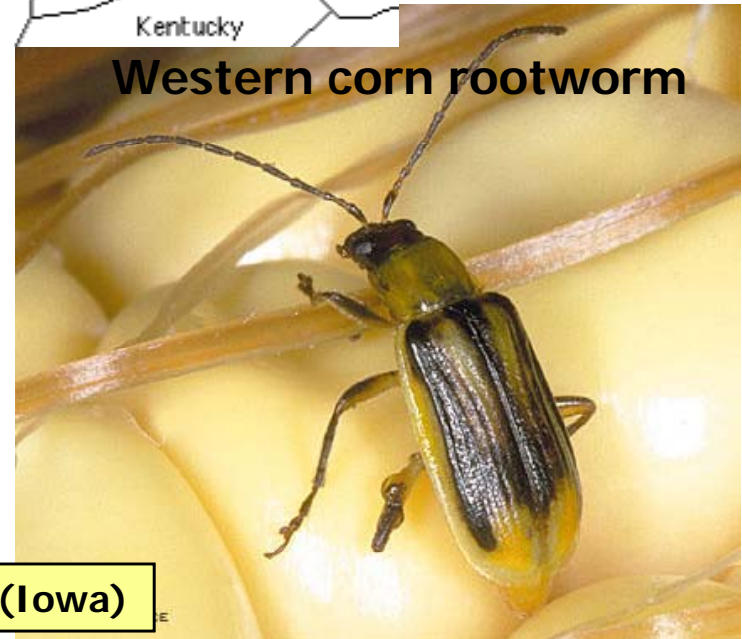
- ✓ Lay eggs in soybean fields. Eggs are ready to hatch next year when planted to corn
- ✓ First year corn root worm damage observed after:
  - ☐ Soybean (1993) Illinois - Gray et al., 1996
  - ☐ Wheat (2002) Illinois



Northern corn rootworm



Western corn rootworm

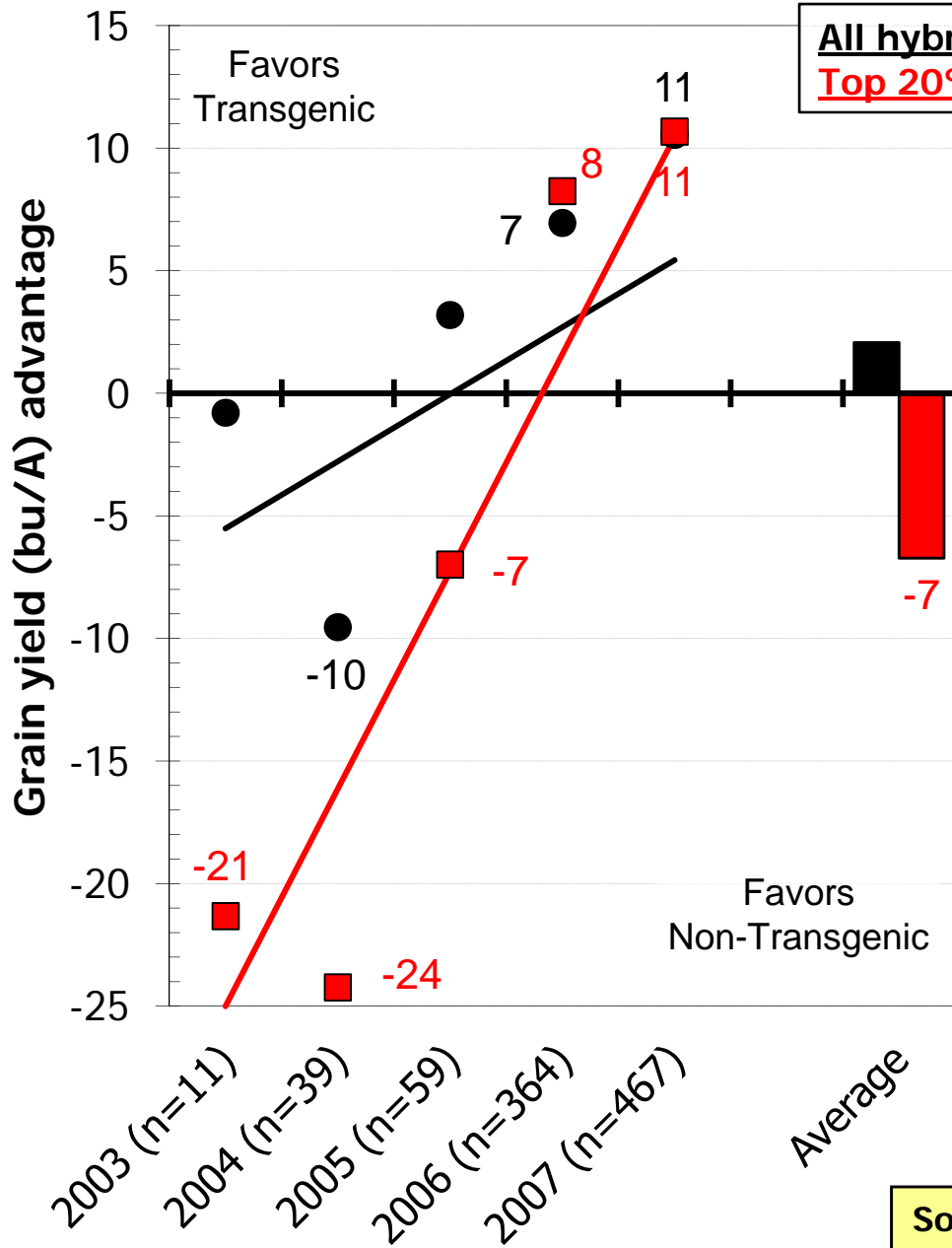


Photos by Rice (Iowa)





# Mon863 (n=940) advantage to non-transgenic (n=1116) corn hybrids

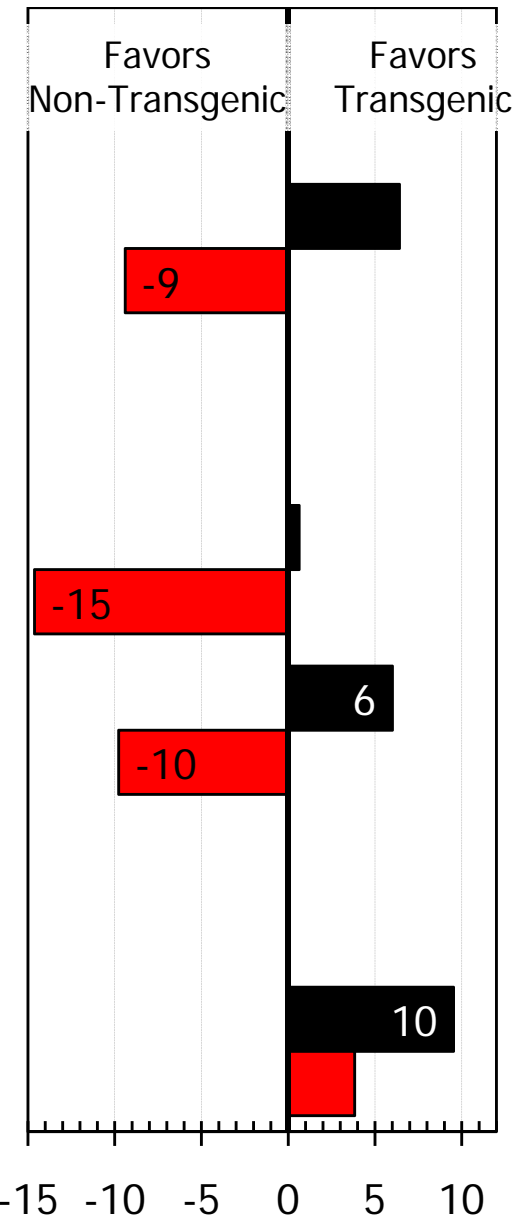


Mon863 (n=36)

Mon863+ Mon810 (n=81)

Mon863+ Nk603 (n=165)

Mon863+ Mon810+ Nk603 (n=655)

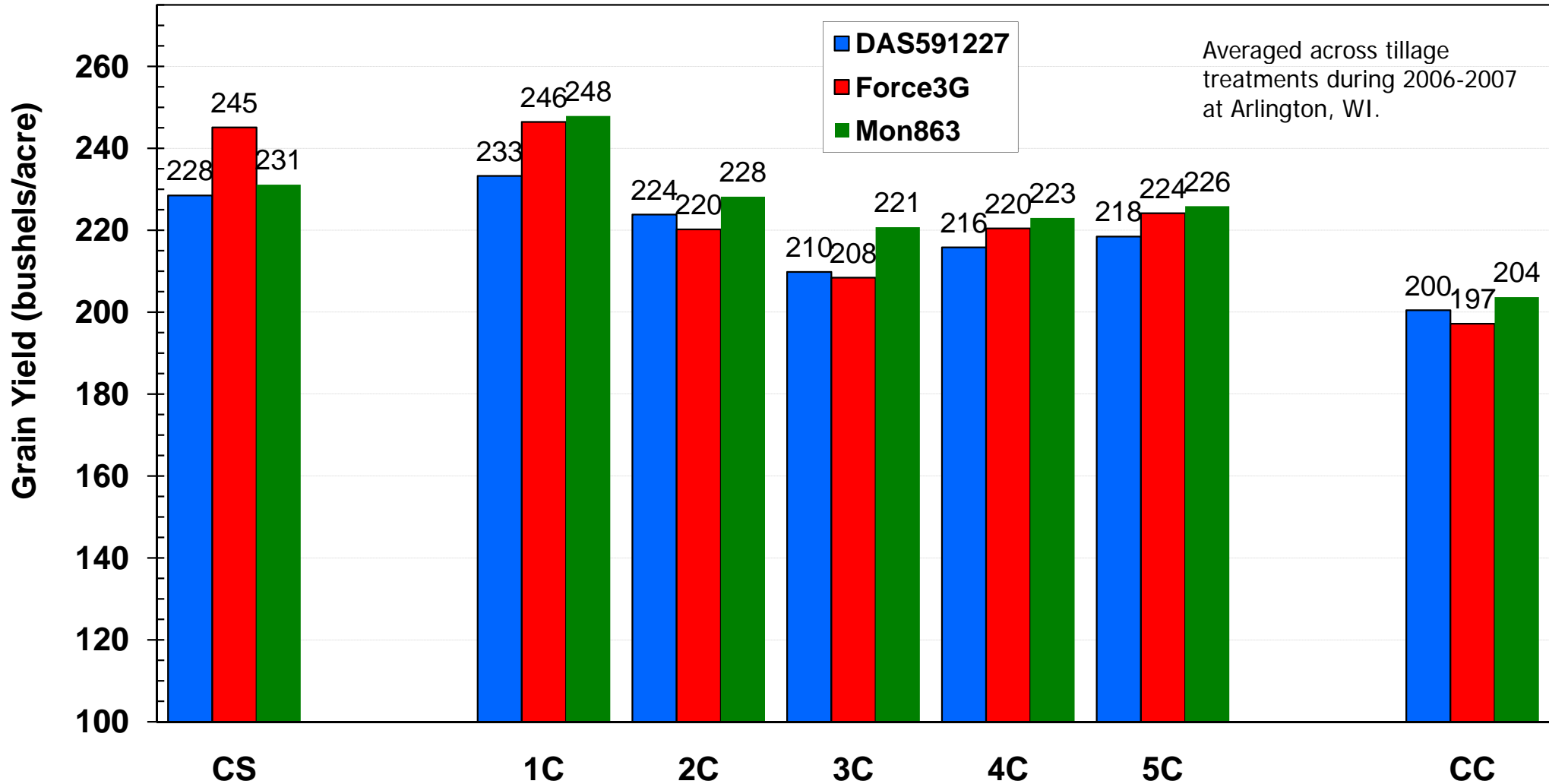


Source: Lauer

Grain yield (bu/A) advantage

# Corn rootworm control method is not affected by rotation phase ...

Corn Yield Response Following Five Years of Soybean



## Cropping Sequence

C= Corn, S= Soybean, Number = consecutive year of corn

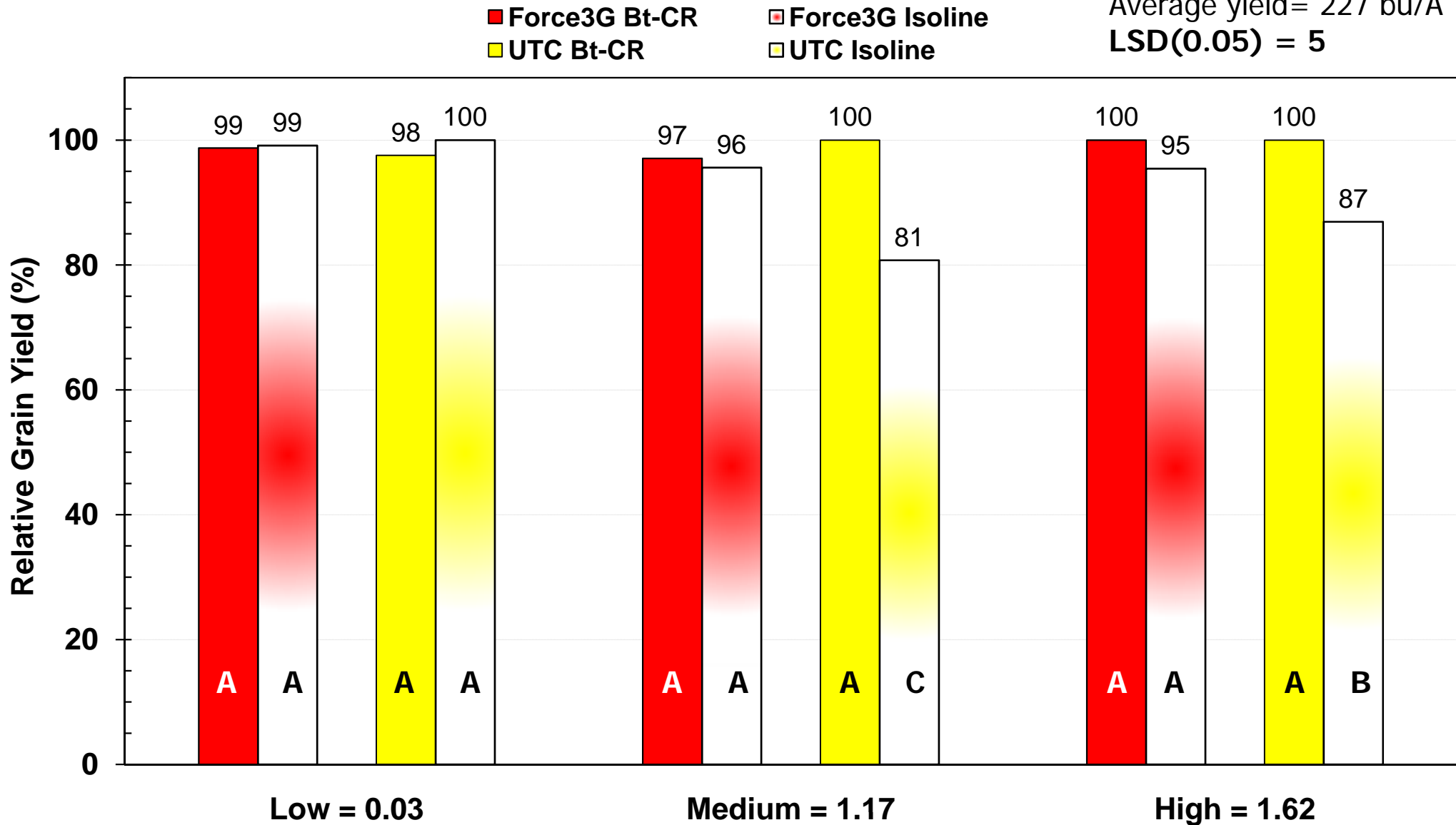
Source: Lauer

# Corn rootworm control method is affected by corn rootworm pressure ...

2004-2006

Average yield = 227 bu/A

LSD(0.05) = 5



Source: Lauer and Cullen

Corn Rootworm Pressure on UTC Isoline = Iowa Root Rating (0-3)

# Guidelines



## Controlling Corn Rootworm

- **Transgenic hybrids**
  - ✓ Early reports indicate equivalent control to chemical methods
- **Chemical control**
  - ✓ Numerous products are labeled.
- **Resistant hybrids**
  - ✓ No hybrids are resistant. Some are tolerant and have the ability to outgrow rootworm damage and regenerate roots better than other hybrids.
- **Crop rotation**
  - ✓ Need good weed control to prevent CRW adult attraction to weed flowers.
- **Management**
  - ✓ Plant late to starve larvae, but not practical due to yield penalty.
- **Natural control**
  - ✓ Ground beetles and predacious mites feed on corn rootworm eggs, larvae and pupae

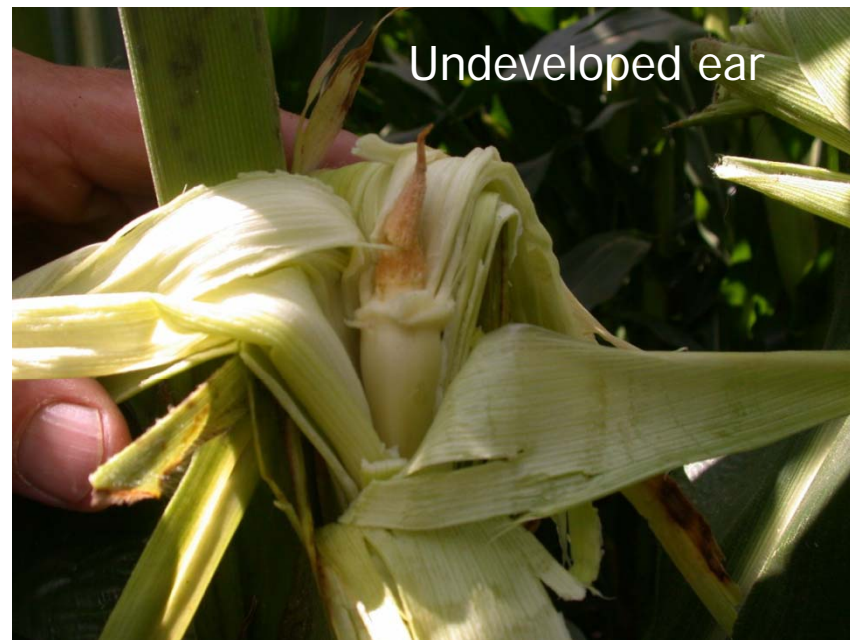
## Advantages of Bt-CR

- **Reduces reliance on insecticide applications**
- **Consistent performance under variable field conditions**
- **Excellent safety profile**
  - ✓ Human health
  - ✓ Non-target organisms
  - ✓ Environmental
- **Laboratory and field studies demonstrate high level of control**
- **One generation of selection per year**
  - ✓ Not active against adult rootworm or other root / seed feeding insects. No acute toxicity to adult WCR observed
  - ✓ No long term effects observed on beetle survival or fecundity



# To spray or not to spray - Will foliar fungicides be routine in the new corn production economics?

- Fungicide use on corn in 2007
  - ✓ IA & IL: > 6 million acres sprayed
- Most acres applied had little or no disease at the time of application
- Results of trials mixed
- Some damage reported, some of it severe. NO confirmed correlation between damage and fungicide.



Photos by Nafziger, 2007

# Corn and Fungicide in Wisconsin

Year	Previous Crop	Tillage	No Fungicide	With Fungicide	Fungicide Increase	Did it pay?
			----- bushels per acre -----			
2007	Corn	No-till	216	222	6	?
	Soybean	No-till	203	230	27*	Yes
	Wheat	No-till	205	210	5	No
	Soybean	No-till	206	208	2	No
2006	Soybean	Chisel	226	229	3	No
	Corn	Chisel	214	217	3	No
	Corn	Chisel	227	227	0	No
2005	Corn	Chisel	181	186	5	No
	Soybean	Chisel	199	211	12	?
	Soybean	Chisel	212	213	1	No
2004	Soybean	Chisel	200	211	11*	Yes

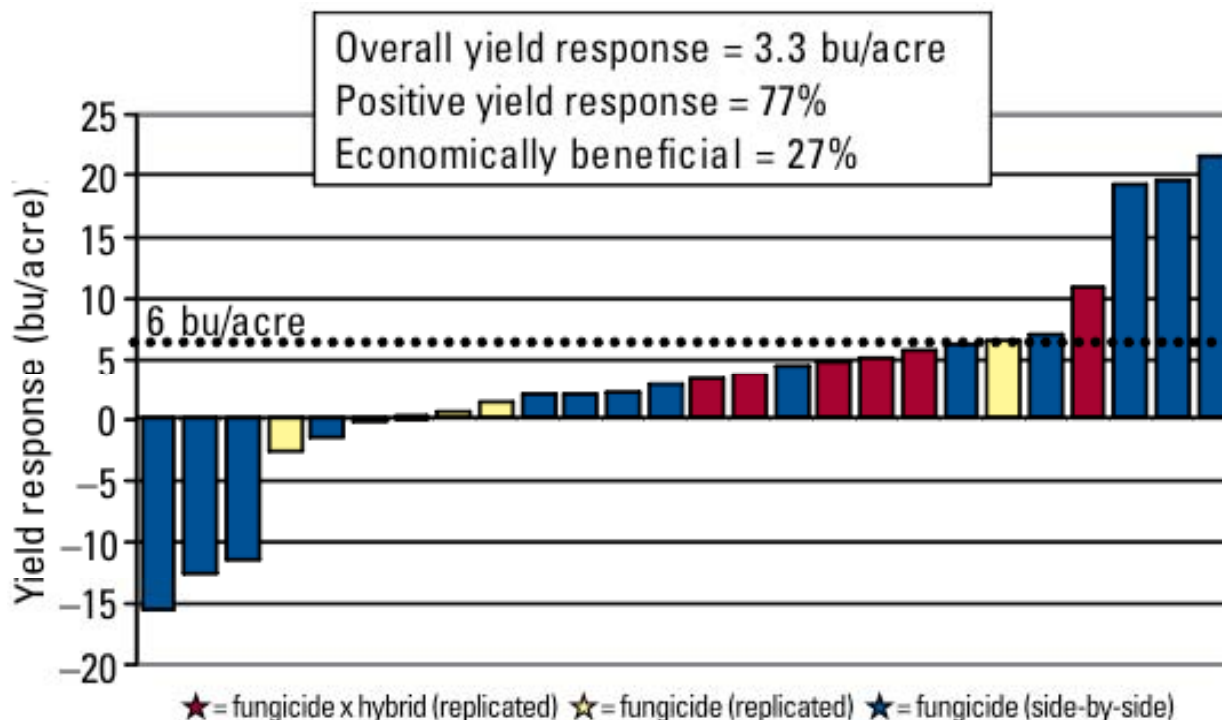
**Source:** Lauer  
Headline @ VT - Arlington

# Corn and Fungicide in Illinois (Nafziger, 2007)

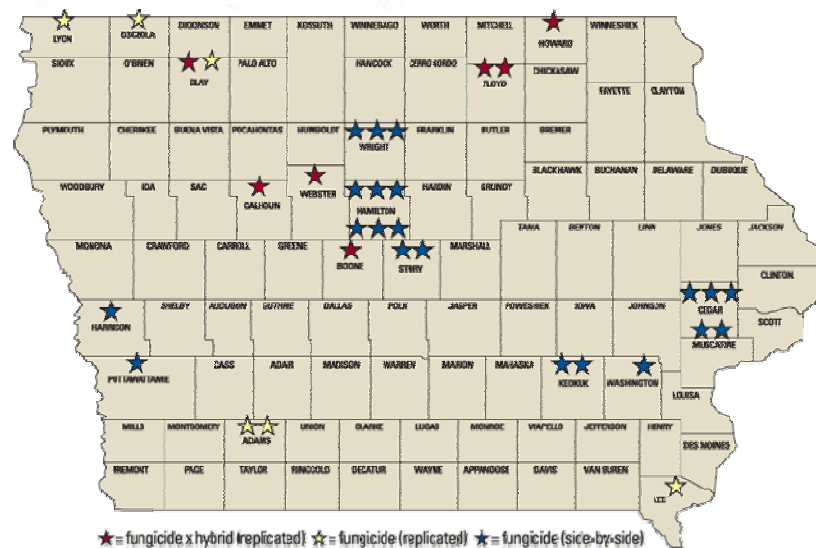
Location	Previous crop	Grain yield			Did it pay?
		No fung	With fung	Increase from fung	
-----bushels per acre-----					
DeKalb	Soybean	218	228	9*	Yes
Monmouth	Soybean	237	238	2	No
	Corn	203	206	3	No
Monmouth	Soybean	185	188	3*	No
Urbana	Corn	194	207	13*	Yes
Urbana	Soybean	203	198	-4	No
Urbana	Soybean	219	218	-1	No
Perry	Corn	193	195	1	No
Perry	Soybean	133	135	3	No
	Corn	142	141	-1	No

\*Statistically significant at  $P=0.1$ .

# Corn and Fungicide in Iowa (Elmore, 2007)



- A 3.3 bu/acre advantage is below the yield necessary to cover fungicide and application costs.
- Fungicides decreased foliar disease severity and stalk rot severity but did not always result in a positive or profitable yield response.





# Fungicides on Corn in 2008?

- Fungicide damage was related to weather and crop conditions in 2007, but it could happen again – may not want to apply pre-tassel
- The 2008 growing season is several months away, but decisions are already being made regarding purchase of fungicides.
  - ✓ Fungicides should be used as a “tool” (along with other IPM practices) – to control diseases that are present and/or almost certain to be a problem.
- Consider the following factors before spraying in 2008:
  - ✓ hybrid susceptibility,
  - ✓ disease pressure at VT,
  - ✓ weather conditions at VT and during grain fill,
  - ✓ previous crop,
  - ✓ the amount of crop residue present in the field,
  - ✓ fungicide and application cost ,
  - ✓ grain price, and
  - ✓ directions and restrictions on product label
- There’s no real evidence that CC (no-and strip-till), routinely needs fungicide more often, but Anthracnose and Gray Leaf Spot inoculant potential is higher



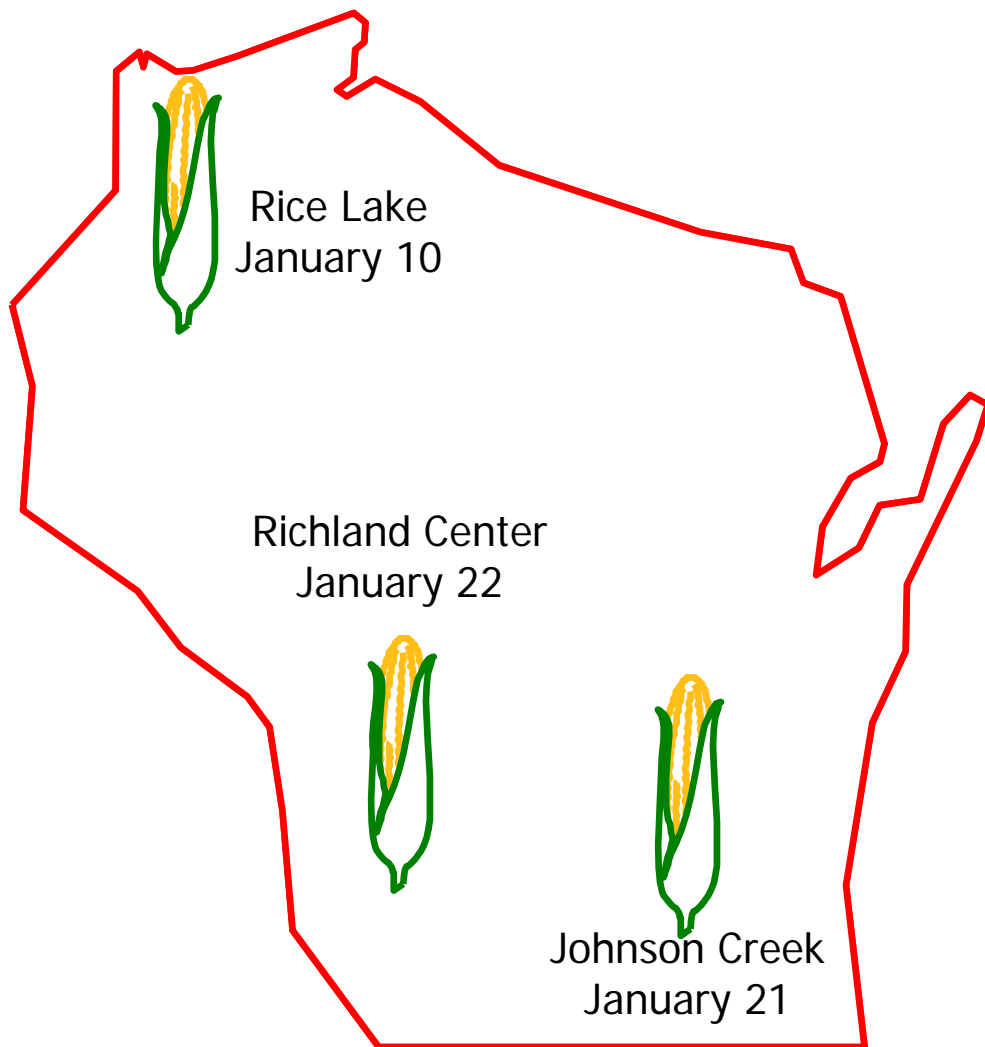
# Guidelines for Using a Fungicide on Hybrid Corn

- In general, a fungicide application is not recommended on resistant hybrids.
- On susceptible hybrids, a fungicide application may be warranted if disease is present on the third leaf below the ear leaf or higher on 50 percent of the plants at tasseling.
- With intermediate hybrids, a fungicide need only be applied if conditions are favorable for disease development
  - ✓ Spray if disease is present on the third leaf below the ear leaf or higher on 50 percent of the plants at tasseling, **and**
  - ✓ the weather is warm and humid, **and**
  - ✓ the field has a history of Gray Leaf Spot and/or Anthracnose, **and**
  - ✓ >35 percent corn residue is present.

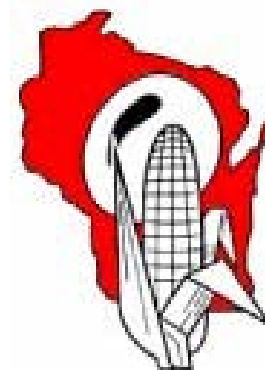


# Thanks for your attention! Questions?

## 2008 Corn Conferences



WISCONSIN  
**Corn/Soy**  
EXPO



**PEPS**

**January 24-25, 2008  
Kalahari Resort  
Wisconsin Dells, WI**