

# Agronomic Practices for Optimizing Corn Silage Production in Central Minnesota

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# Selecting Corn Hybrids for Silage

- Growing conditions can vary greatly from year to year
- Look for hybrids that are consistently top performers in your region
  - Over multiple locations
  - Over multiple years (if data available)
- Also look at data from neighboring regions
- Use any trustworthy data





The Minnesota Hybrid Corn Silage Evaluation Program evaluates the silage potential of corn hybrids in Minnesota. The goal of the program is to provide unbiased forage yield and quality information for educational and marketing programs.

The program is financed in part by entry fees from private seed companies that chose to enter hybrids for testing. These companies are listed in this publication. Results presented are from corn silage performance trials in regions of extensive corn silage use: southeastern, central and west-central Minnesota. The locations are in important dairy regions of Minnesota.

### Test Sites

Silage hybrids entered in the southeast or central region trials were tested at two sites within each region. Hybrids entered in the west-central region were tested at one site. Sites within regions were as follows:

**Southeast Dairy Region:**  
LaCrescent (Houston County)  
Rochester (Olmsted County)

**Central Dairy Region:**  
Paynesville (Stearns County)  
Melrose (Stearns County)

**West-Central Dairy Region:**  
Ottertail (Otter Tail County)

### Test Procedure

**Southeast and Central**  
**Design:** Plots were established at LaCrescent, Rochester, Paynesville and Melrose in randomized complete block designs with four replications. Hybrids were planted at 33,000 seeds per acre with 30-inch row spacing on May 3 at the SE sites (LaCrescent and Rochester) and May 7 at the Central MN sites (Paynesville and Melrose). Plant nutrients as manure or inorganic fertilizer were applied according to University of Minnesota recommendation. Cultivation and herbicides applied by University of Minnesota recommendation were used to control weeds.

**Harvesting:** Plots were harvested and whole-plant herbage sampled for dry matter and forage quality analysis at each site. Each test site was harvested when the average whole-plant moisture across entries was estimated to be 65%. In 2008, harvest dates at LaCrescent, Rochester, Paynesville and Melrose were September 9, September 16, September 23 and September 26, respectively.

### West-Central

**Design:** Plots near Ottertail were established May 8 under center-pivot irrigation in a randomized complete block design with three replications. Hybrids were planted at 35,700 seeds per acre with 30-inch row spacing. Fertilizer was fall-applied liquid manure at 8,000 gallons per acre plus 25 gallons per acre 28% in July. Pre-emergent herbicide was applied to control weeds.

**Harvesting:** Plots were harvested and whole-plant herbage sampled for yield and forage quality analysis on September 24.

### Results Provided

Tables 1-5 summarize hybrid yield and forage quality results from LaCrescent, Rochester, Paynesville, Melrose and Ottertail, respectively.

### Companies participating in 2008 hybrid corn silage performance trials.

Crop Production Services (VIGORO)	220 Bottmiller Dr, Wadena Industrial Park, Wadena, MN 56482	<a href="http://www.cropproductionservices.com">www.cropproductionservices.com</a>
Dairyland Seed Co, Inc.	P O Box 958, West Bend, WI 53095	<a href="http://www.dairylandseed.com">www.dairylandseed.com</a>
Dekalb (Monsanto Co)	800 N Lindberg Blvd., St Louis, MO 63167	<a href="http://www.dekalb.com">www.dekalb.com</a>
Fielder's Choice Direct	306 North Main, P O Box 898, Monticello, IN 47960	<a href="http://www.fielderschoicedirect.com">www.fielderschoicedirect.com</a>
Garst Seed Company	2369 330th St, Slater, IA 50244	<a href="http://www.garst.seed">www.garst.seed</a>
Gold Country Seed Inc.	16506 Hwy 15 North, P O Box 604, Hutchinson, MN 55350	<a href="http://www.goldcountryseed.com">www.goldcountryseed.com</a>
Golden Harvest Seeds, Inc.	100 JC Robinson Blvd, P O Box 307, Waterloo, NE 68069	<a href="http://www.goldenharvestseeds.com">www.goldenharvestseeds.com</a>
Heartland Hybrids	850 1st St North, P O Box J, Dassel, MN 55325	<a href="http://www.heartlandhybrids.com">www.heartlandhybrids.com</a>
Hyland Seeds	2 Hyland Drive, Bienenheim, Ontario, Canada N0P 1A0	<a href="http://www.hylandseeds.com">www.hylandseeds.com</a>
La Coop Federee (ELITE)	9001 Blvd de l' Acadia, Bureau 200, Montreal, Quebec, Canada H4N 3H7	<a href="http://www.coopfed.qc.ca">www.coopfed.qc.ca</a>
Legacy Seeds, Inc.	210 Pine Street, Waupaca, WI 54981	<a href="http://www.legacyseeds.com">www.legacyseeds.com</a>
Mycogen Seeds	9330 Zionsville Rd, Indianapolis, IN 46268	<a href="http://www.mycogen.com">www.mycogen.com</a>
Nu Tech Seed Co.	307 3rd Street, Alice, ND 58031	<a href="http://www.yieldleader.com">www.yieldleader.com</a>
Pioneer Hi-Bred, International	7000 NW 62nd Ave, Johnston, IA 50131	<a href="http://www.pioneer.com">www.pioneer.com</a>
Producers Hybrids	P.O. Box C, Battle Creek, NE 68715	<a href="http://www.producershybrids.com">www.producershybrids.com</a>
Renk Seed Co.	6800 Wilburn Road, Sun Prairie, WI 53590	<a href="http://www.renkseed.com">www.renkseed.com</a>
Trelay Seeds	11623 State Road 80N, Livingston, WI 53554	<a href="http://www.trelay.com">www.trelay.com</a>
Wensman Seed Co.	Box 190, Wadena, MN 56482	<a href="http://www.wensmanseed.com">www.wensmanseed.com</a>



<http://corn.agronomy.wisc.edu/HT/2008/2008HTSTBook.pdf>

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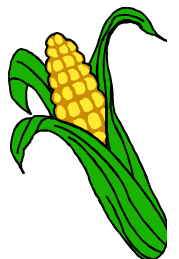
**2008**  
**Wisconsin Corn Hybrid**  
**Performance Trial Results**



**Grain and Silage**

Department of Agronomy  
College of Agricultural and Life Sciences  
University of Wisconsin  
Wisconsin Crop Improvement Association

**UW**  
**Extension**



# Selecting Corn Hybrids for Silage

- 5 to 10 days later in maturity than for grain
  - Greater silage yield
  - With silage, less concern about reaching black layer before frost
- Plant a range in maturity
  - Reduces risk at pollination & widens harvest window
    - 50% of acres: full-season
    - 25% of acres: mid-season
    - 25% of acres: short-season



# Selecting Corn Hybrids for Silage

- Select hybrids with high values for:
  - Milk/acre (indication of both silage yield & quality)
    - Silage dry matter yield x milk/ton
  - Milk/ton (overall indication of silage quality)
    - Calculated using many quality traits
- Fine-tune selection according to agronomic & quality traits



# Agronomic Considerations for Silage Hybrids

- Standability:
  - Improves the option for harvesting as grain
- Stay-green:
  - Hybrids with strong stay-green can be too wet when harvested according to kernel stage
- Herbicide and insect resistance:
  - We need good hybrids first, and traits second



# Variation Among 51 Hybrids

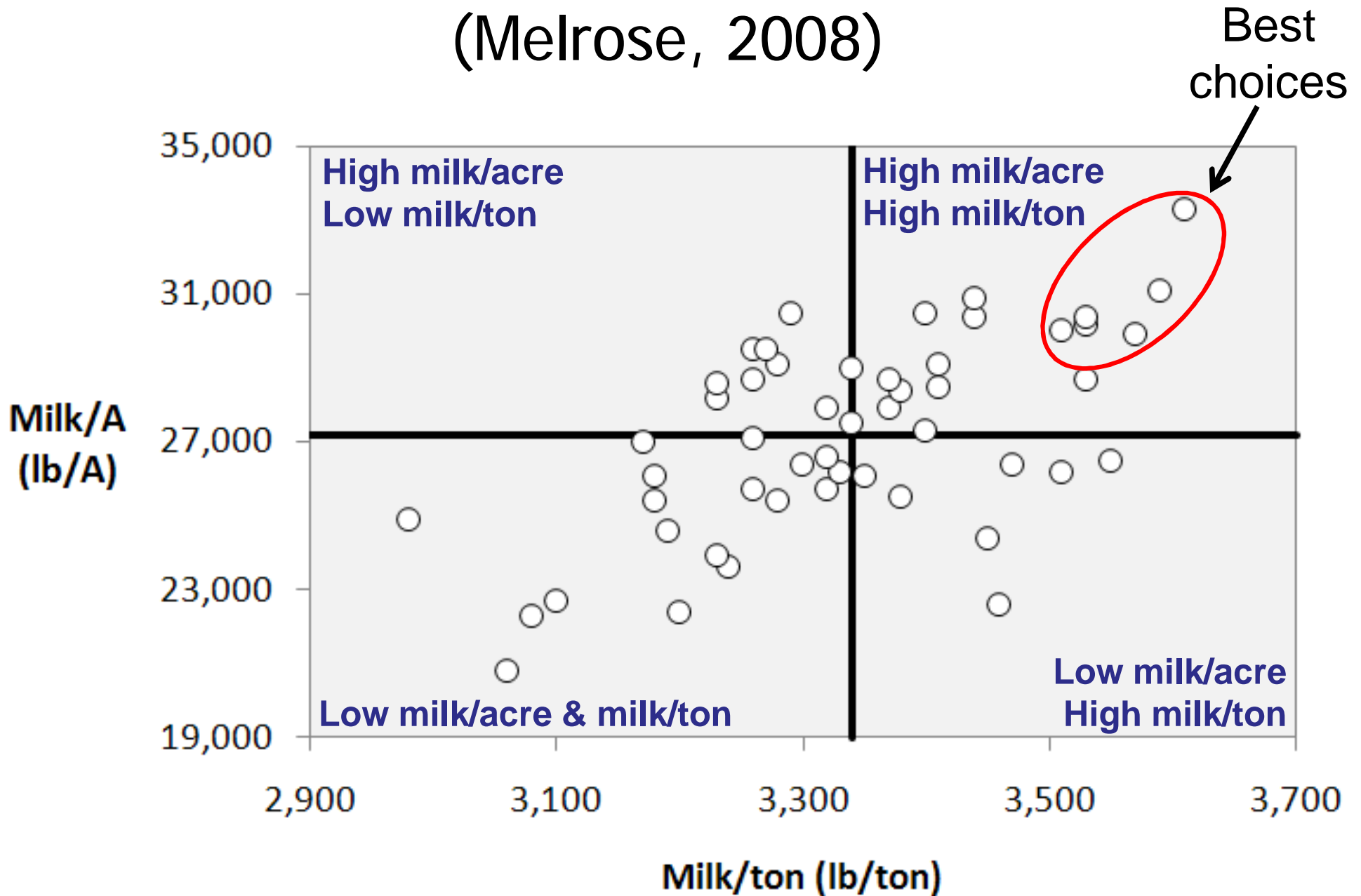
(Melrose, 2008)

	Dry matter (tons/A)	Milk/ton (lb/ton)	Milk/A (lb/A)
<b>Average</b>	8.2	3,340	27,200
<b>High</b>	9.3	3,610	33,300
<b>Low</b>	6.5	2,980	20,800
<b>Range</b>	2.8	630	12,500

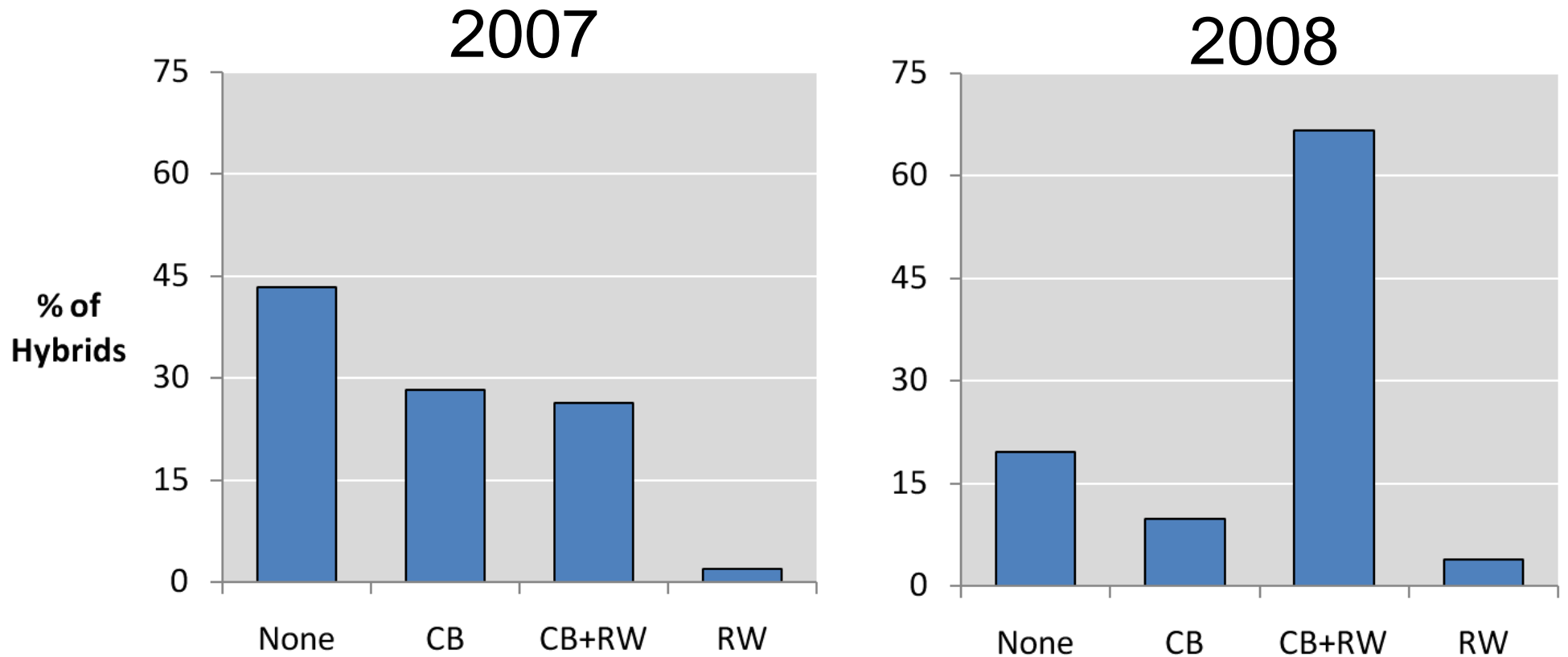


# Variation Among 51 Hybrids

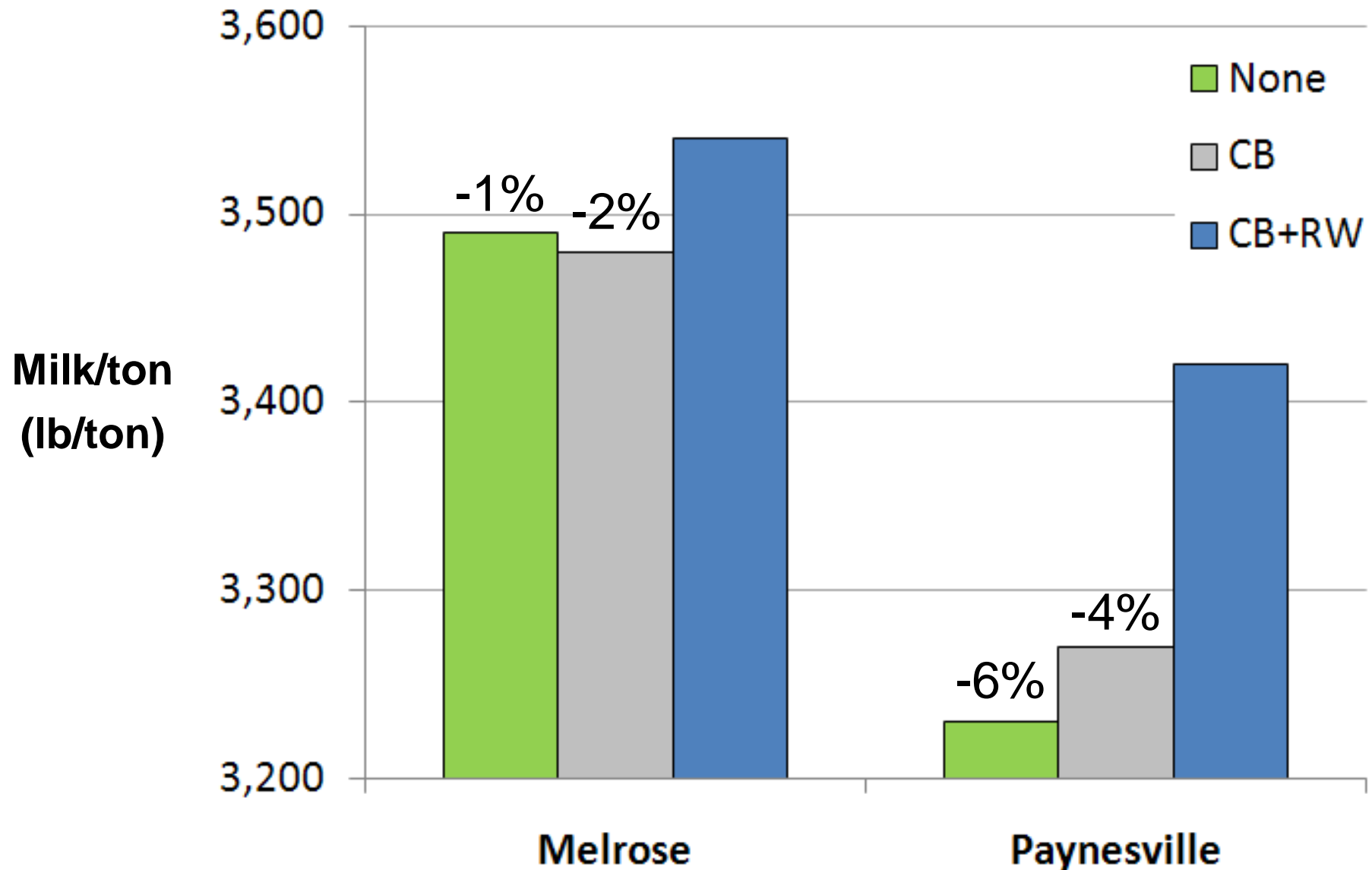
(Melrose, 2008)



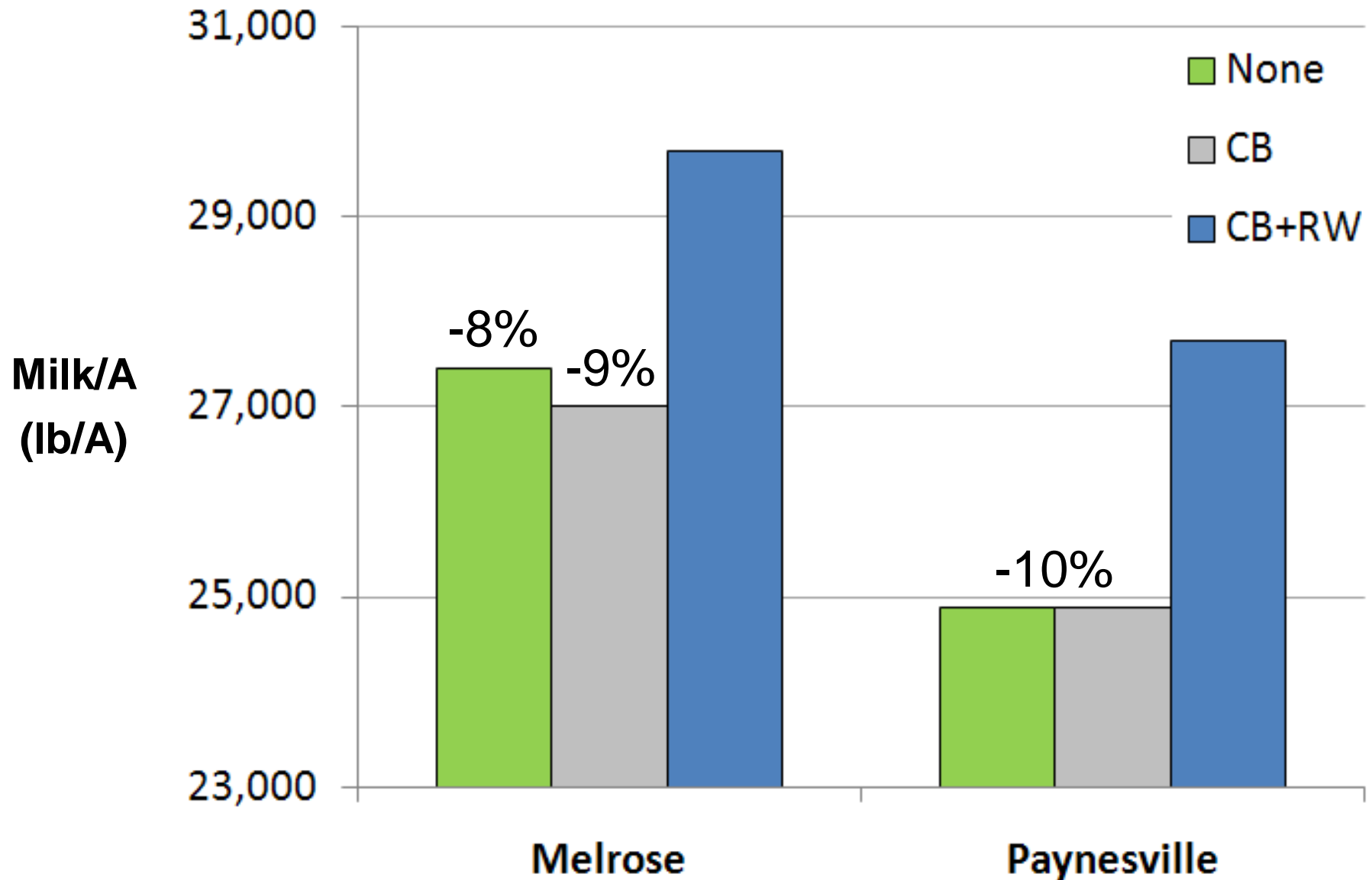
# Insect Resistance of Hybrids Tested in Central MN Silage Trials



# Milk per Ton of Hybrids Tested in 2007 Based on Insect Resistance



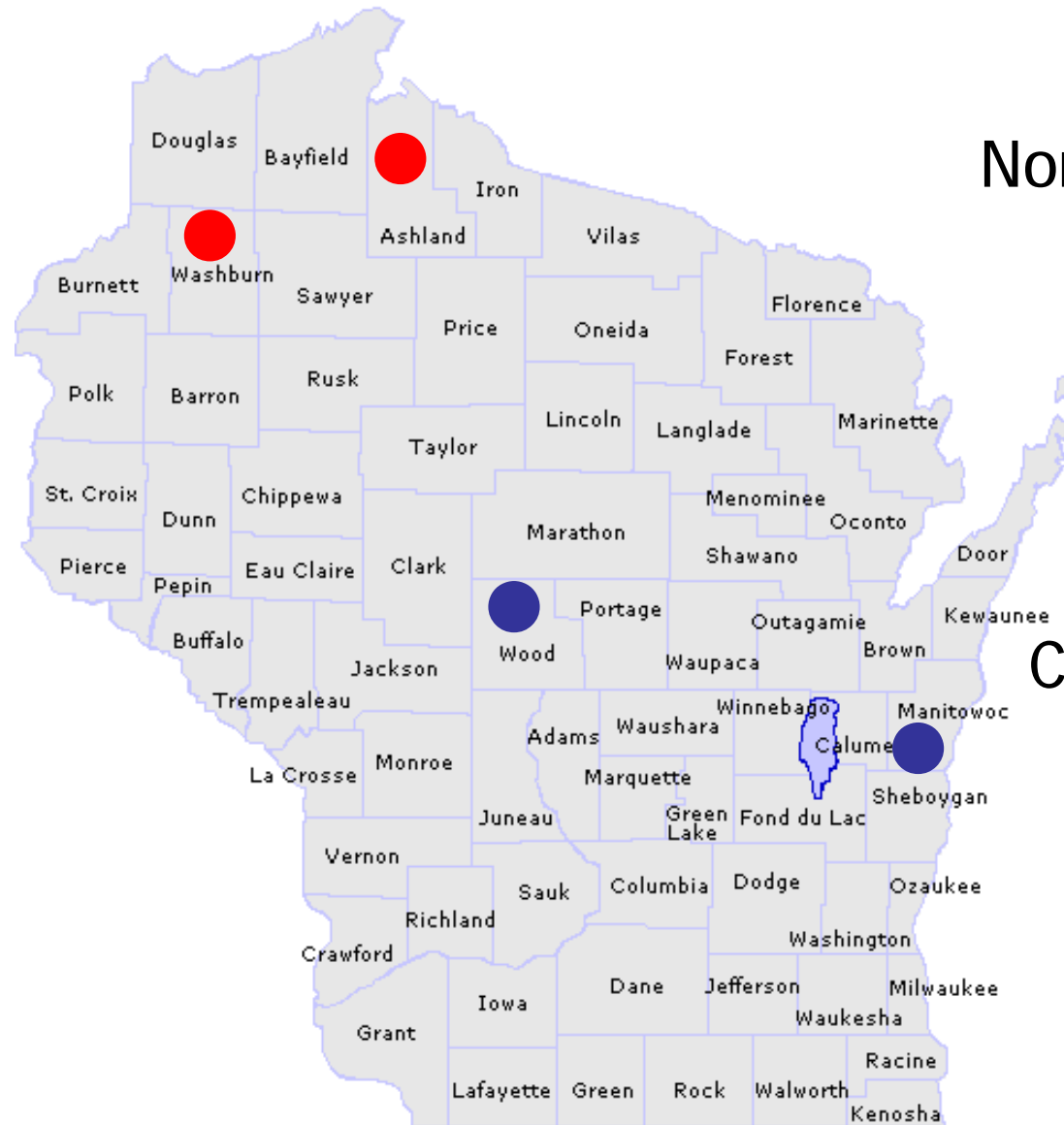
# Milk per Acre of Hybrids Tested in 2007 Based on Insect Resistance



# Corn Silage Plant Population Trials

University of Wisconsin, 1994-1996

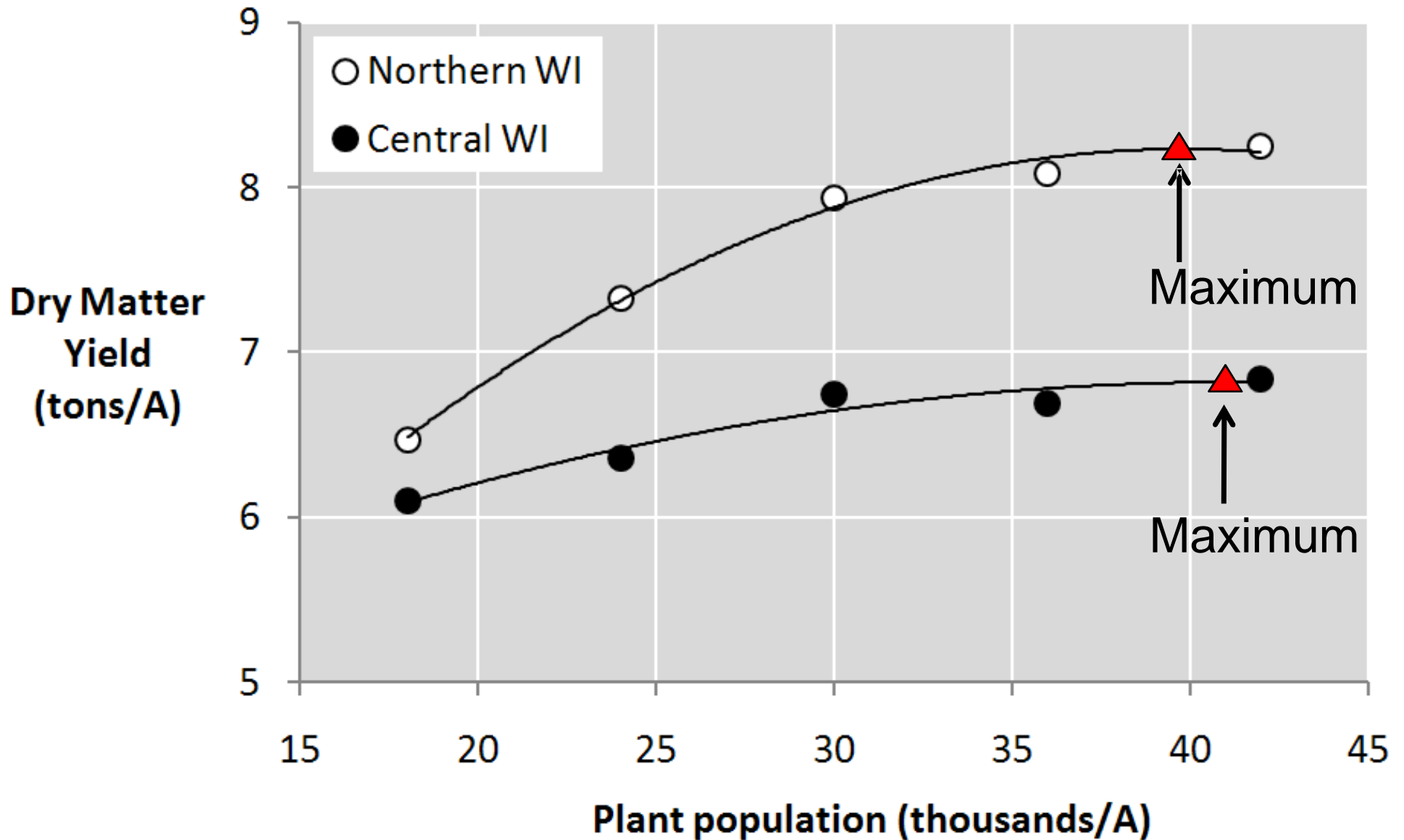
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Royalton, MN



Northern WI  
trials

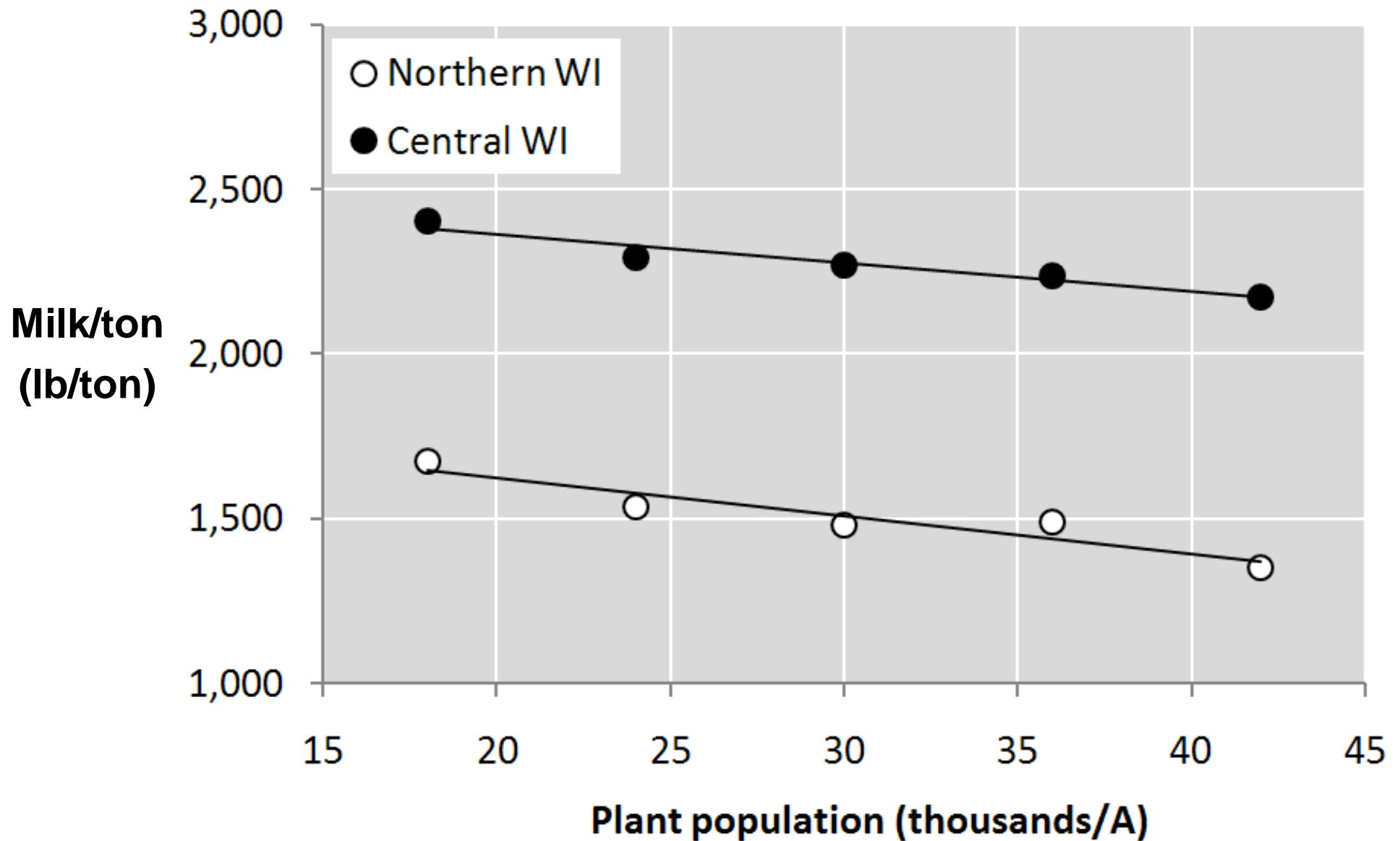
Central WI  
trials

# Wisconsin Corn Silage Trials, 1994-1996 (data averaged over 2 hybrids)

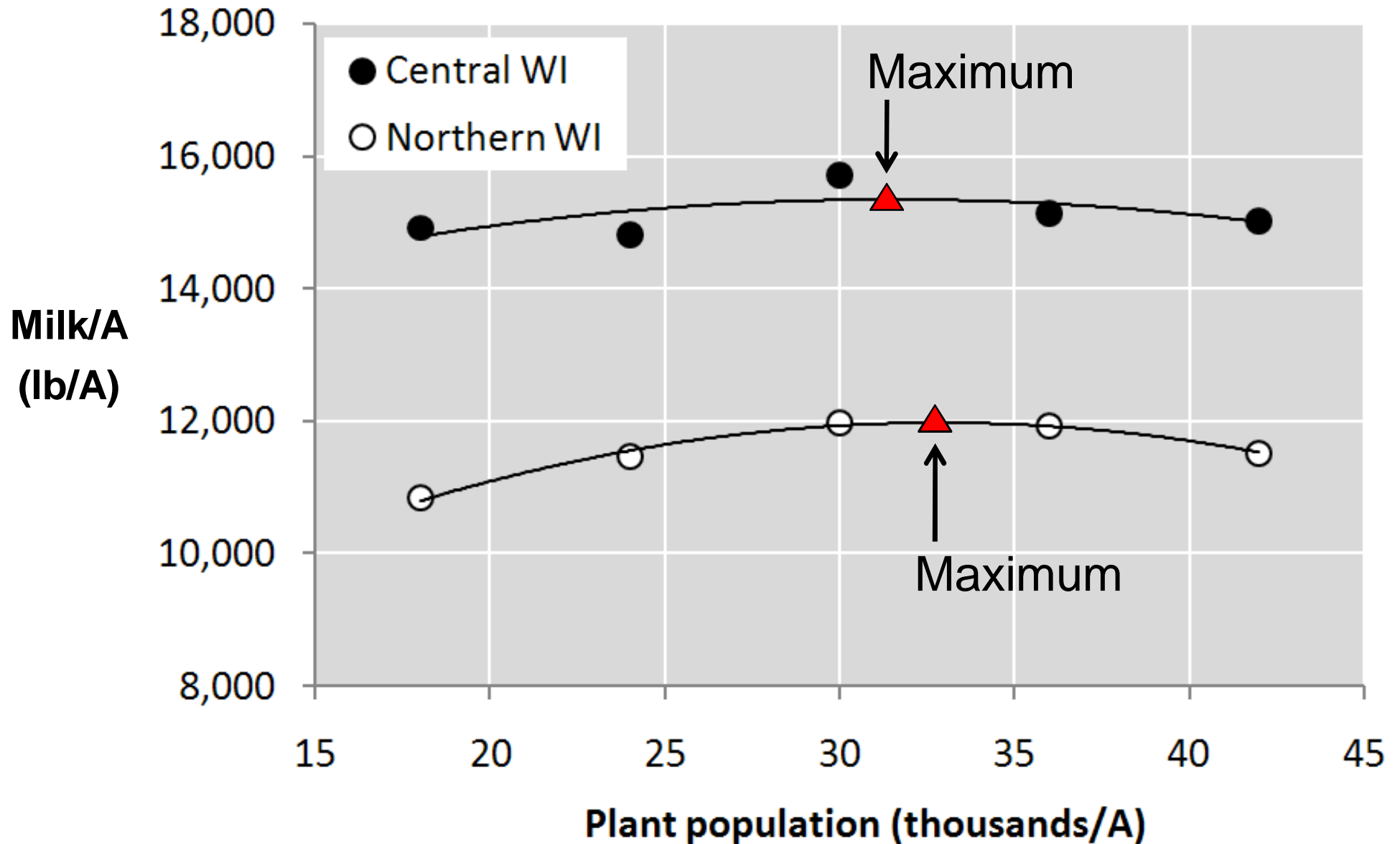


# Wisconsin Corn Silage Trials, 1994-1996

(data averaged over 2 hybrids)



# Wisconsin Corn Silage Trials, 1994-1996 (data averaged over 2 hybrids)



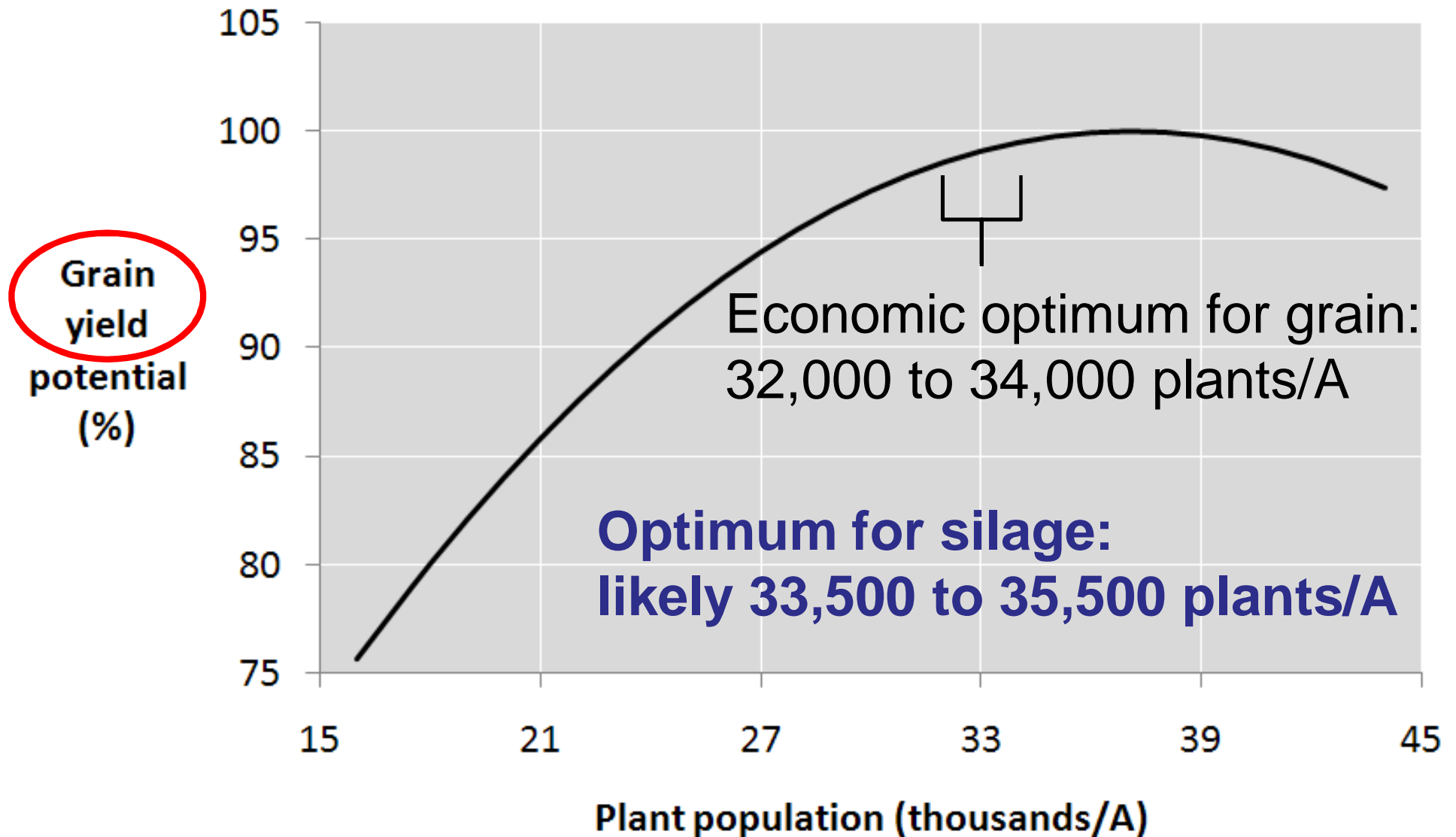
# Corn Grain Plant Population Trials

## University of Minnesota

- 34 trials from 2005-2008
- University of Wisconsin:
  - For silage, target populations that are 1,000 to 2,000 plants/A higher than those for grain



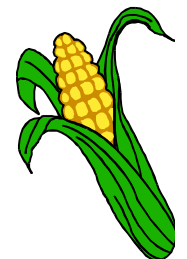
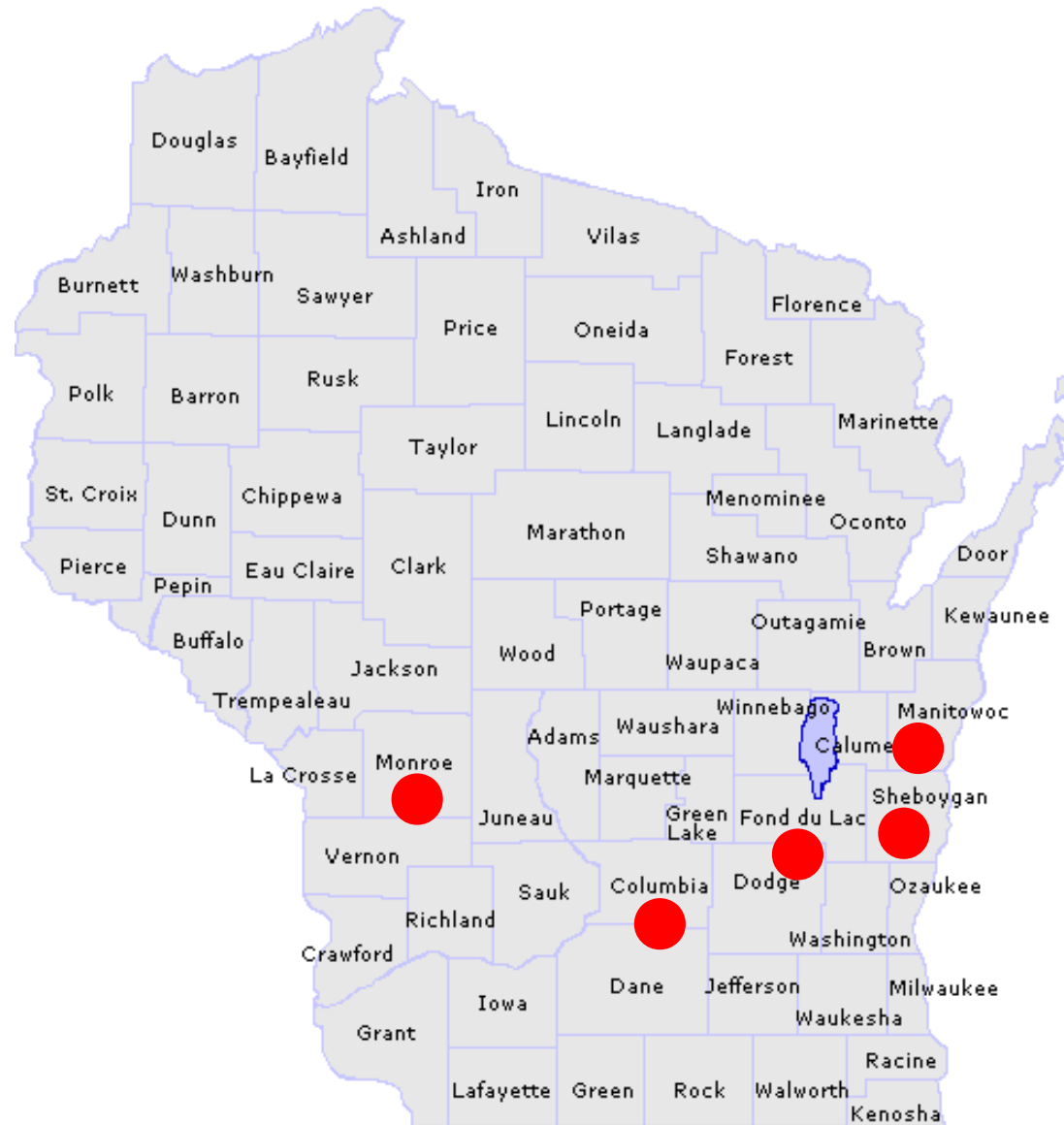
# Average of 34 population trials from 2005-2008 at Lamberton & Waseca, MN



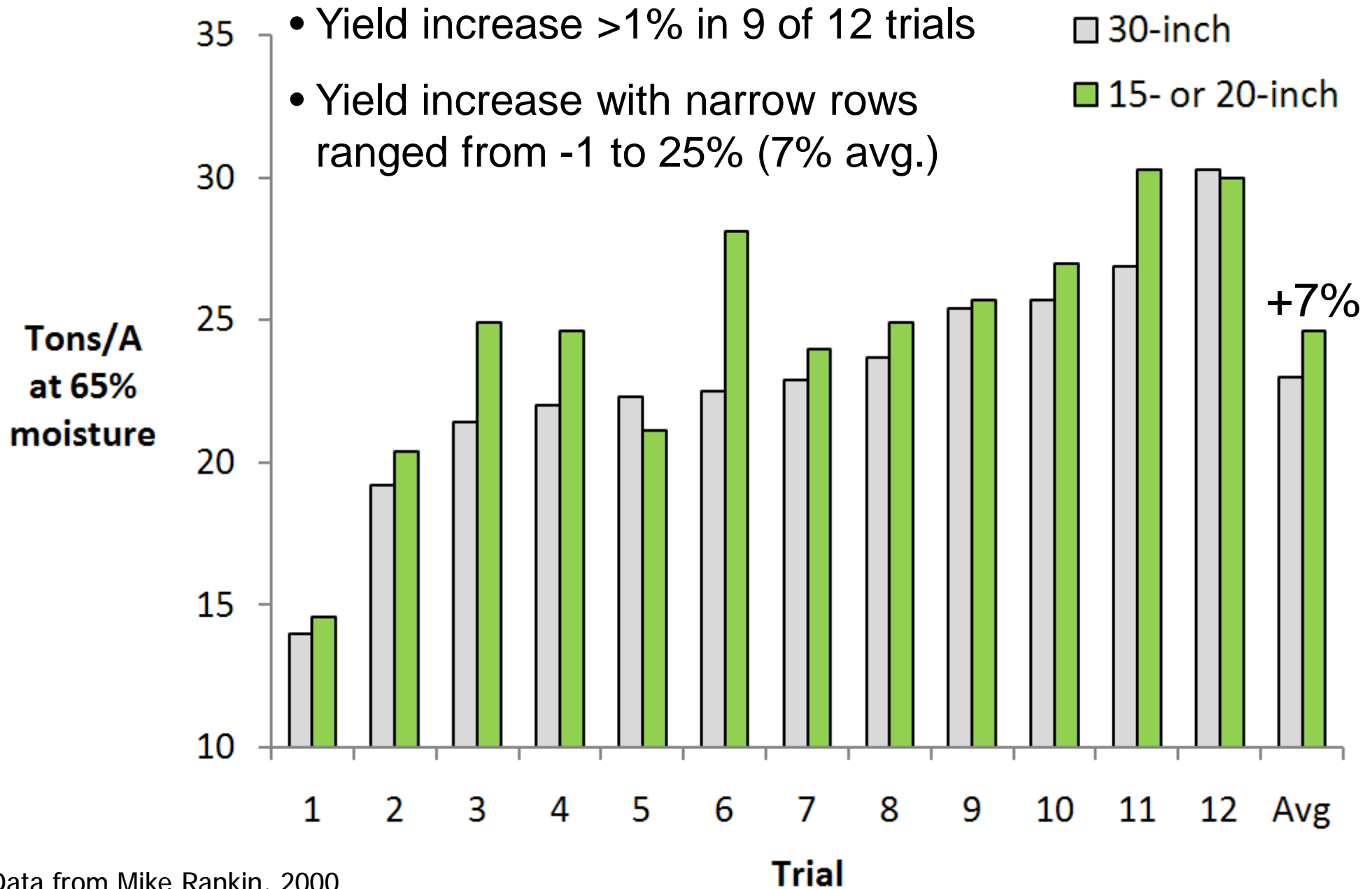
# Corn Silage Row Spacing Trials

## University of Wisconsin, 1997-1999

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Royalton, MN



# University of Wisconsin, 1997-1999



# Additional Findings From the Wisconsin Row Spacing Study

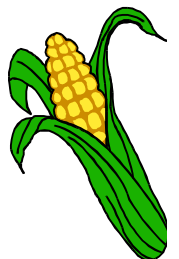
- Optimum plant population was similar for both row widths
- No benefit to populations above 35,000 plants/A
- These findings are consistent with those from trials in the northeastern U.S.



# Additional Silage Trials Comparing 15- and 30-inch rows (1994-2000)

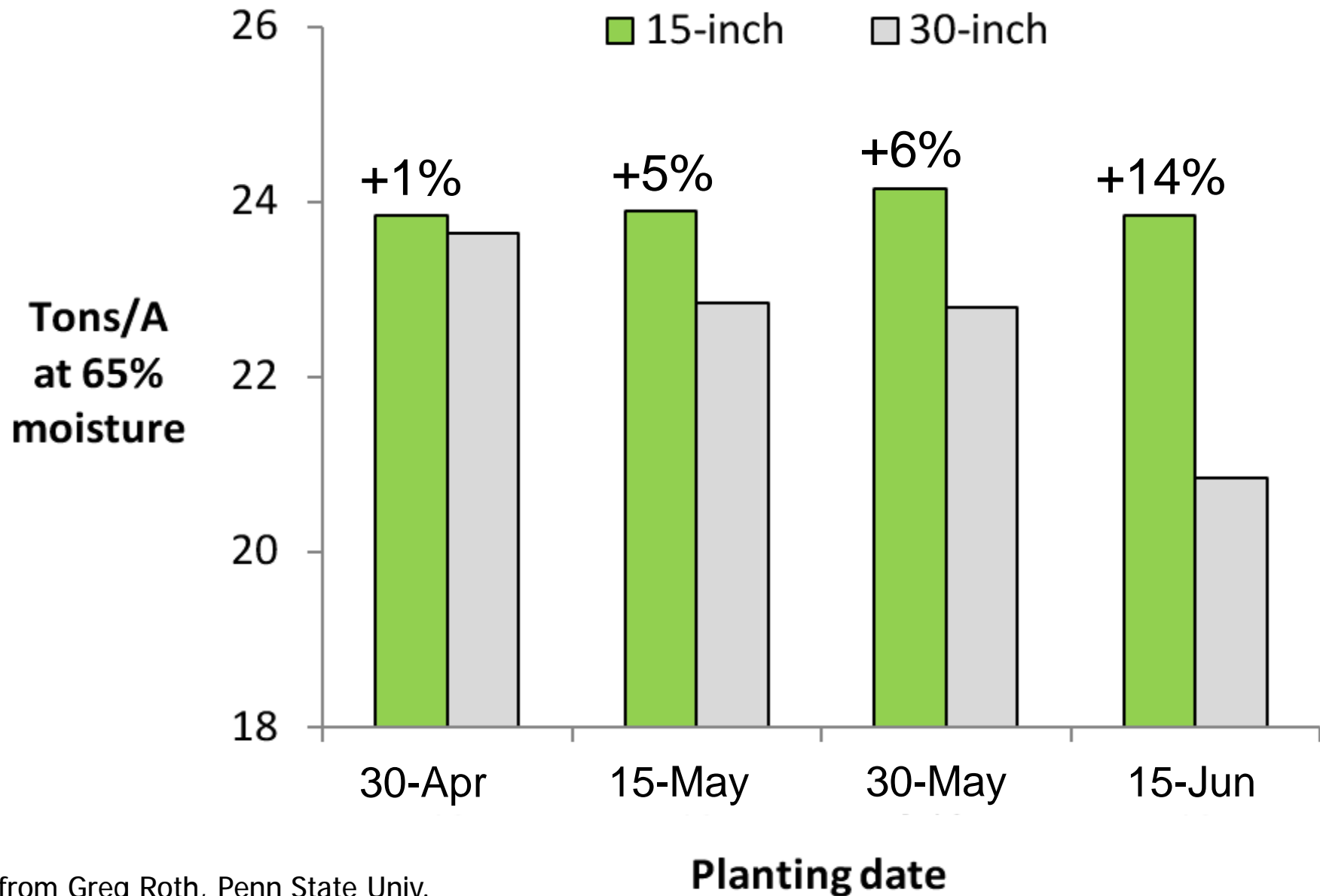
Location	# comparisons	Avg. increase in silage yield with 15" rows	Was forage quality impacted by row spacing?
New York	2	7%	No
New York	9	3%	No
Pennsylvania	4	5%	No
Pennsylvania	11	6%	No

**Average = 5%**



# Lancaster, Pennsylvania: 1997-1998

(narrow rows had no impact on silage quality)



# Additional Considerations for Narrow Rows

- Increased corn rootworm insecticide costs?
  - Not if using rootworm resistant hybrids
- Damage from wheel traffic with POST herbicide applications



30" rows



Twin-rows  
7.5" / 22.5"

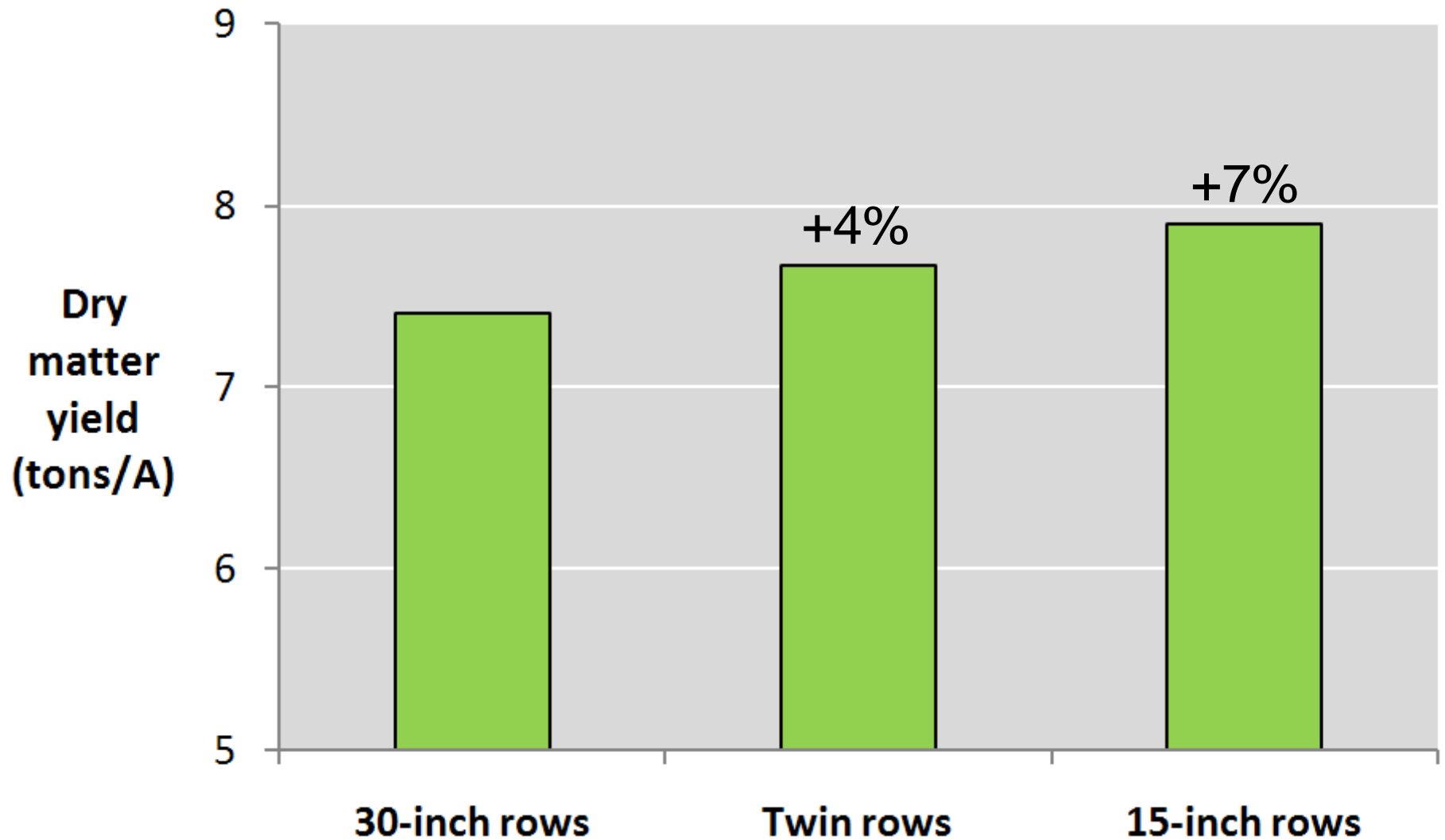


15" rows



# Western New York: 2003-2004

(data averaged over 2 hybrids)



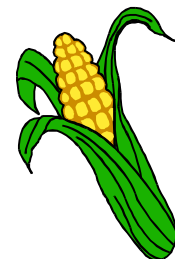
Data from Bill Cox et al., Cornell Univ.

And... no differences in silage quality.

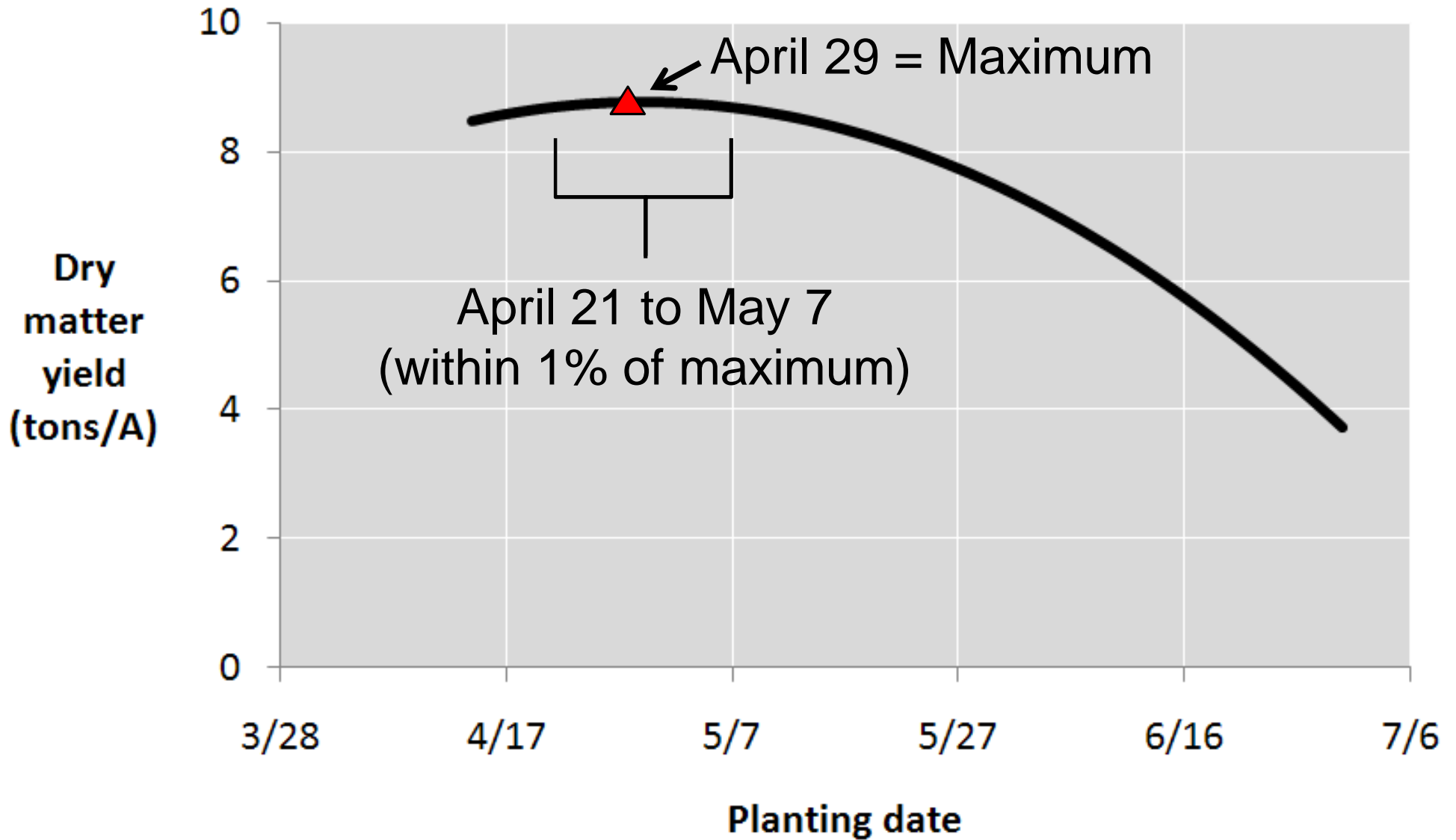
# Corn Silage Planting Date Trials

## University of Wisconsin, 1997-2002

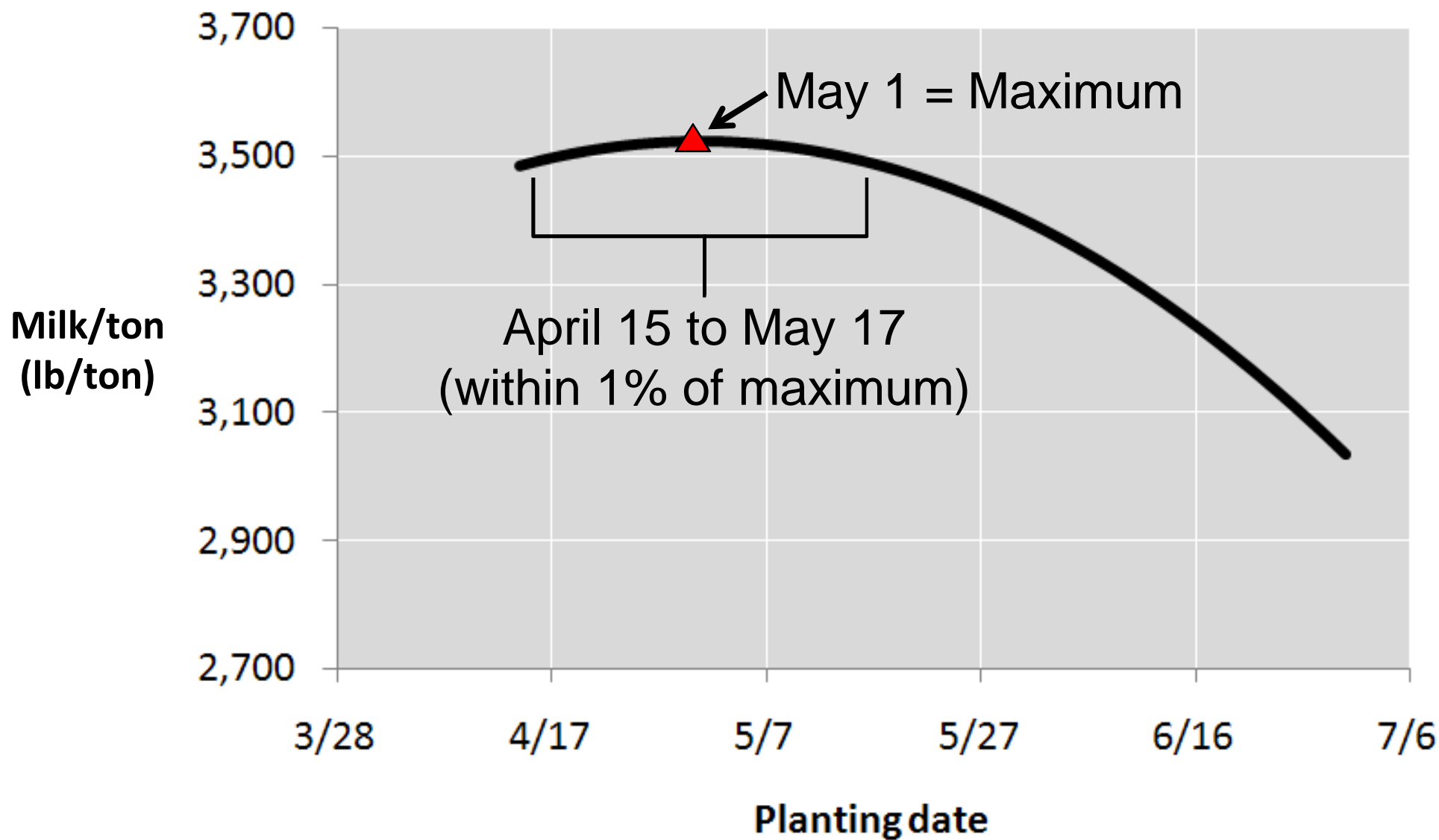
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Royalton, MN



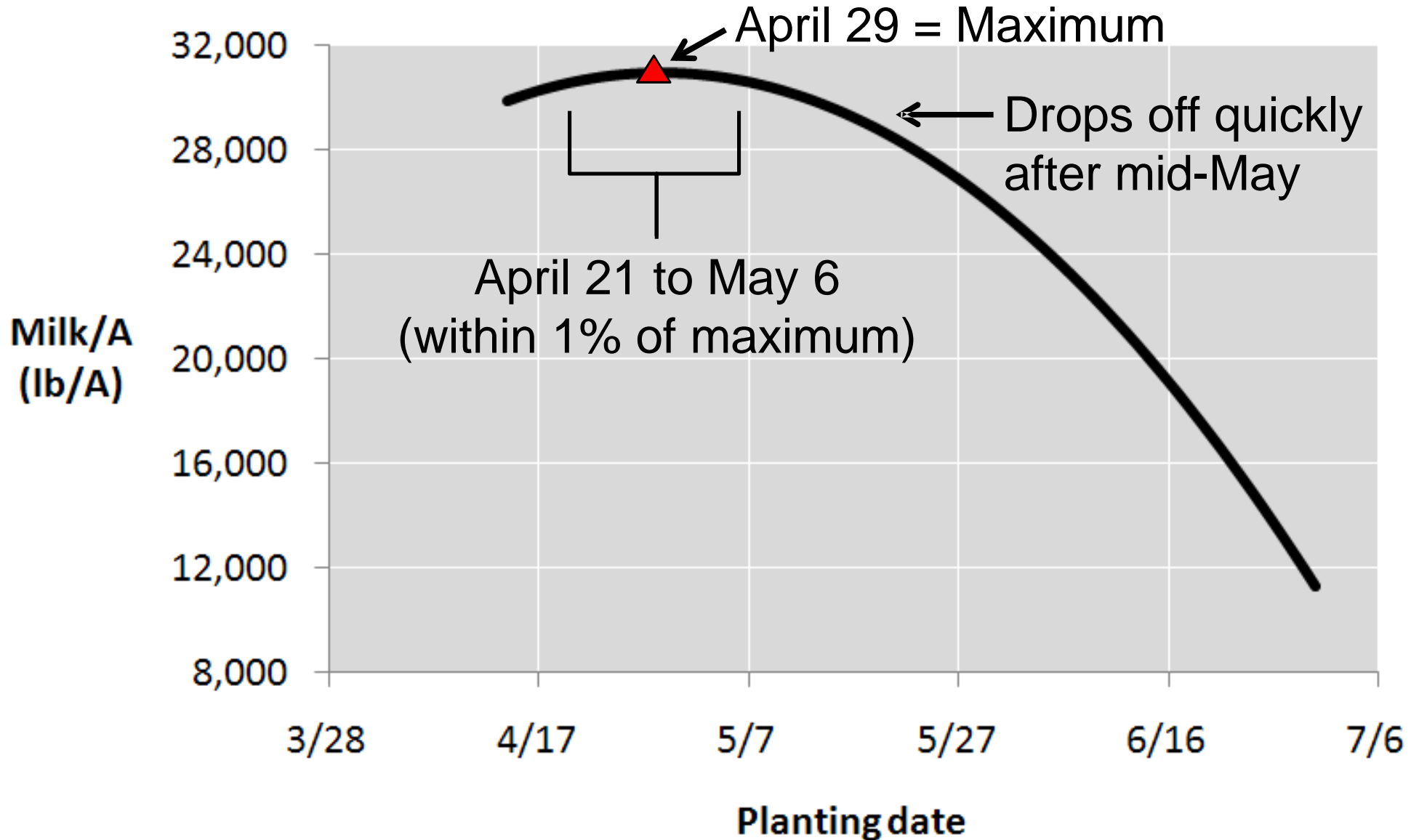
# Arlington, WI: 1997-2002



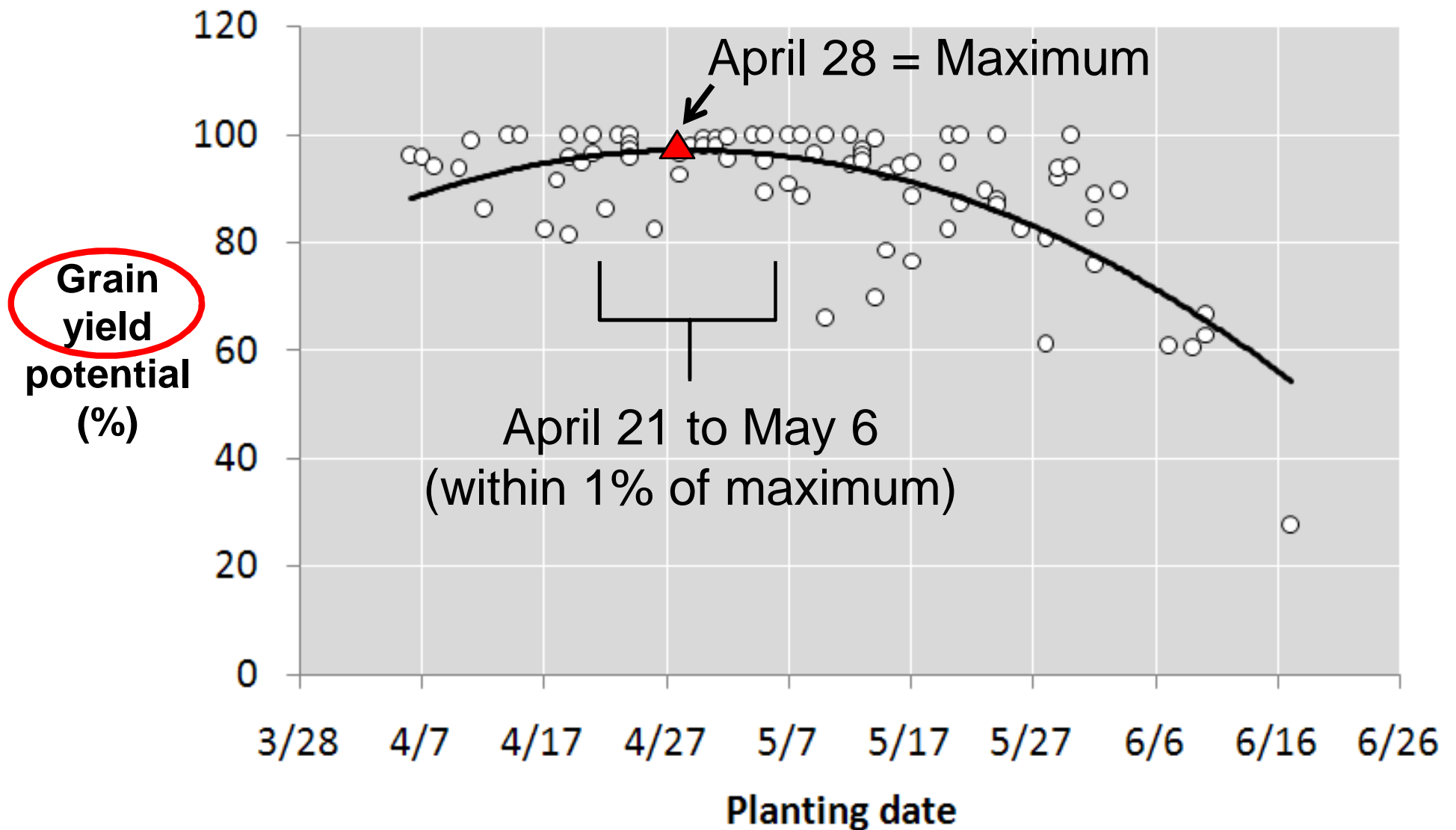
# Arlington, WI: 1997-2002



# Arlington, WI: 1997-2002



# Lamberton, MN (1988-2003)



Data from Bruce Potter & Steve Quiring

# Optimizing Corn Silage Production

- Hybrid selection (milk/ac & milk/ton)
- 1,000 to 2,000 more plants/ac than for grain
- Narrow rows?
- Management (same as for grain)
  - Plant early (late April or early May)
  - Control weeds and insects
  - Crop rotation
  - Adequate soil fertility
  - Avoid soil compaction during harvest and manure application

# Questions or Comments?

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