



Corn Development and Yield: Weather, Physiology, & Agronomics

Yield Day – Lamberton, MN

August 20, 2009

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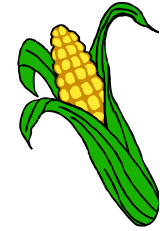


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Minnesota Corn Crop (USDA)

Crop condition	Percent of acreage	
	Aug. 15, 2008	Aug. 17, 2009
Excellent	16	19
Good	51	55
Fair	22	21
Poor	6	4
Very Poor	5	1

Estimating Yield



- Count harvestable ears in $1/1000^{\text{th}}$ acre
- Count # rows and kernels/row
- Calculate kernels/ear = rows x kernels/row
- Yield: ($\# \text{ ears} \times \text{kernels/ear}$) / (1,000 kernels/bu)
- Example: 30 ears in $1/1000^{\text{th}}$ acre; 512 kernels/ear
 $(30 \times 512) / (90) = 171 \text{ bu/A}$ = assumes 90K kernels/bu

Growing Degree Days - Lambertton

GDD from May 1 – Aug. 17

1889 = long-term average

1796 = last year

1696 = this year

193 GDD behind long-term average

= 9.7 days behind avg. (80^o high, 60^o low)

100 GDD behind last year (5 days)

Corn Maturity - Lamberton

101-day hybrid = 2420 GDD to maturity

Expected date of 2420 GDD in 2009

April 25 to Sept. 30

Average frost dates for Lamberton

32° F = Sept. 28

28° F = Oct. 7



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Yield Loss Due to Early Frost

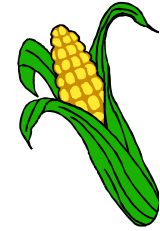
Corn stage	Days to maturity	Yield loss due to frost damage	
		Leaves & stalk	Leaves only
Late dent	10 to 15	15%	8%
Half-milk line	5	8-12%	5%



Field Drying Rates for Corn in MN

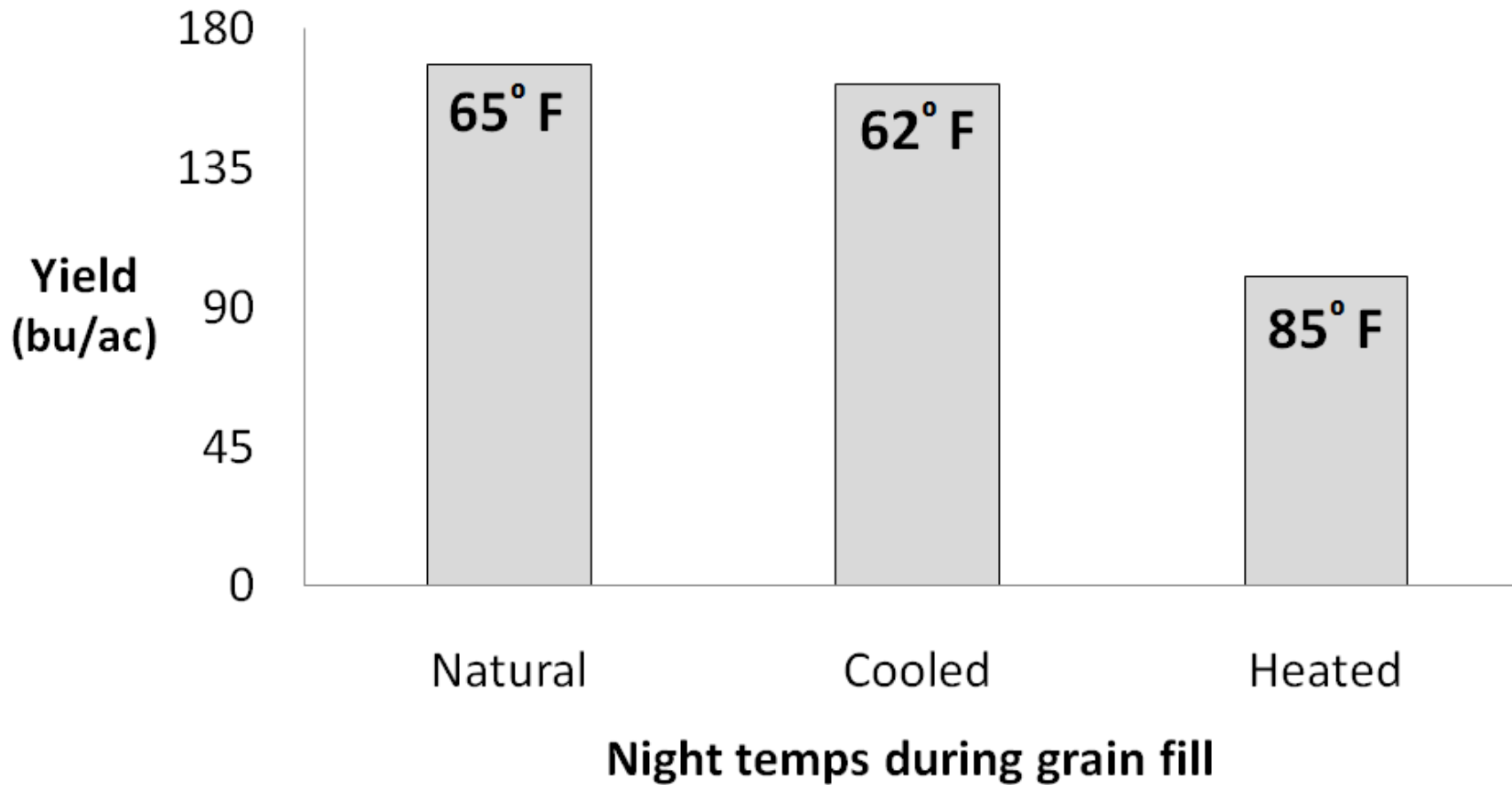
Date	Grain moisture loss (% per day)
Sept. 15 to 25	0.75 to 1
Sept. 26 to Oct. 5	0.5 to 0.75
Oct. 6 to 15	0.25 to 0.50
Oct. 16 to 31	0 to 0.33
After Oct. 31	very little

Wet Corn is Expensive!



- Example:
 - 175 bu/acre
 - Moisture at harvest = 20%
 - Drying to 15%
 - Drying cost = \$0.045/point/bu
= \$39.38/acre or \$39,380/1,000 acres

Warm nights during grain fill reduce yield



Hoefl et al., 2000

Crop Progress at Lamberton, 2009

Planting date	Days to emergence	GDD lost for late planting	Crop progress on July 2
April 22	21	0	V9, 55"
May 2	14	58	V8, 53"
May 12	10	138	V8, 45"
May 22	8	259	V7, 33"
June 1	10	384	V5, 26"
June 11	6	478	V4, 17"

Crop Progress at Morris, 2009

Planting date	Days to emergence	GDD lost for late planting	Crop progress on July 8
April 22	22	0	V11, 60"
May 1	15	40	V10, 58"
May 11	11	102	V9, 55"
May 18	10	180	V9, 52"
May 26	9	271	V7, 40"
June 5	12	378	V6, 33"

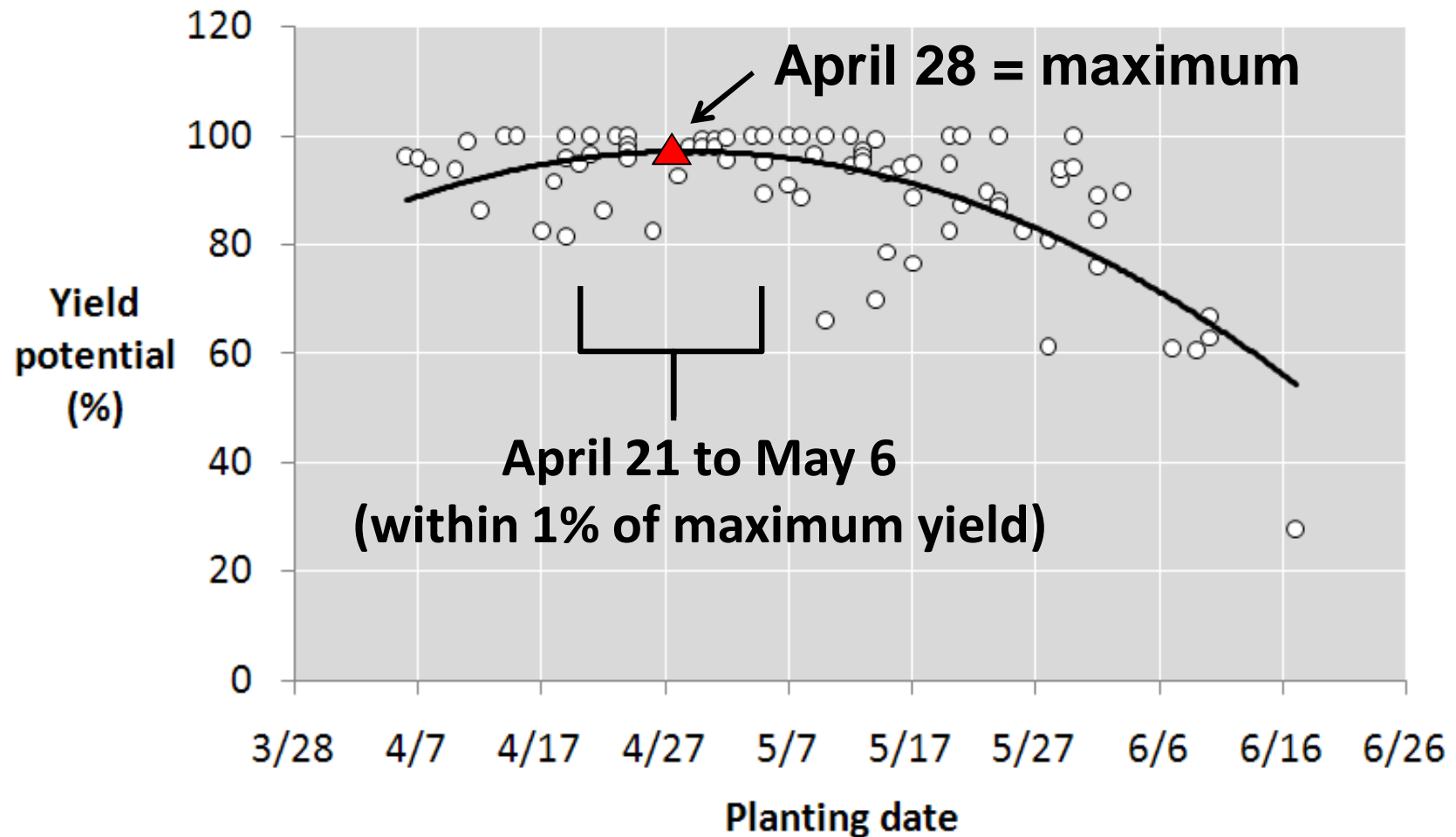
Morris, MN: July 8, 2009

April 22
V11, 60"

May 18
V9, 52"

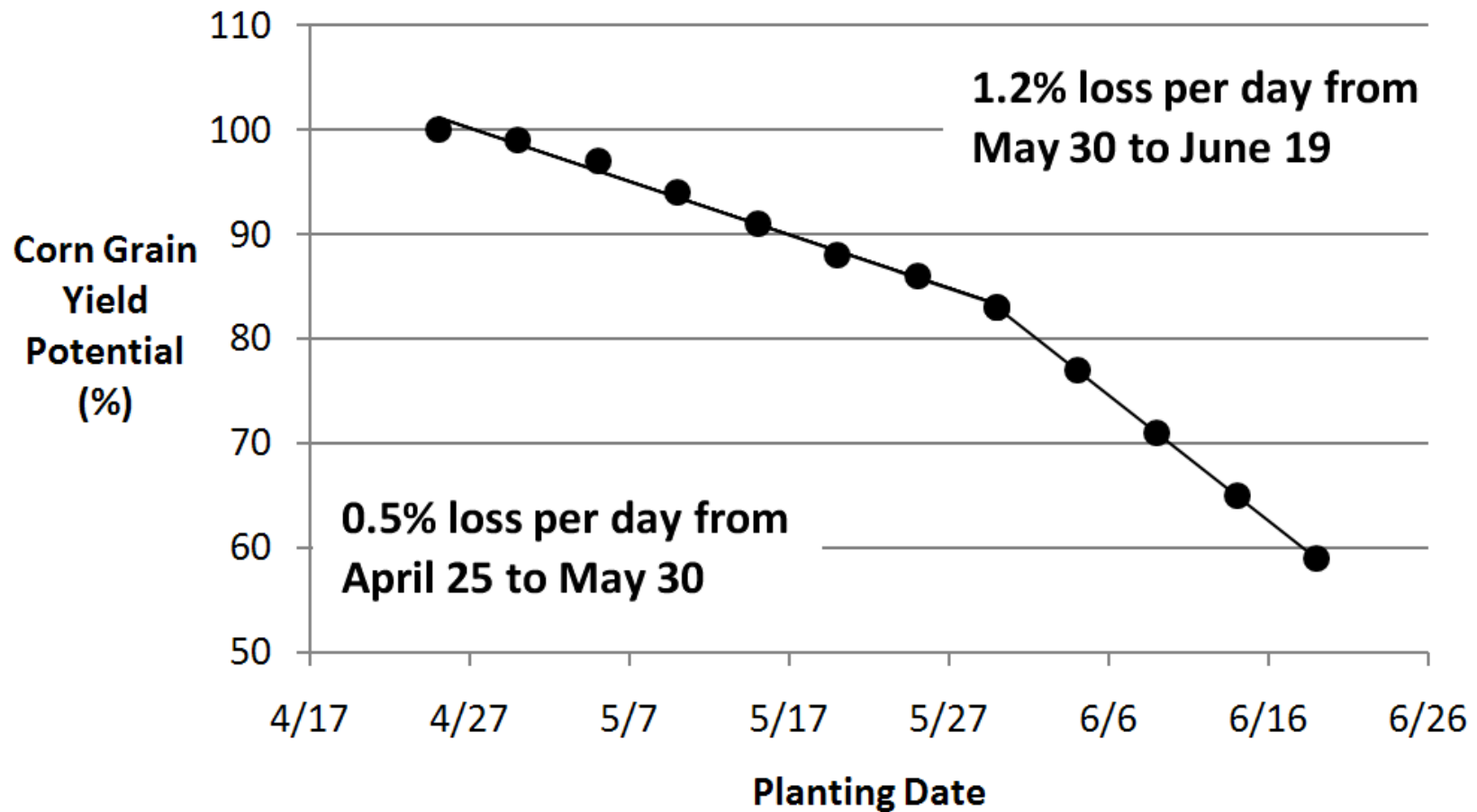


Lamberton, MN (1988-2003)



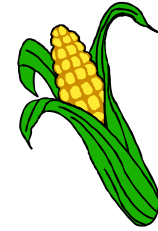
Data from Potter & Quiring

Response to Planting Date in MN



Adopted from Hicks et al., 1999

Latest “safe” planting dates for corn in southern MN:



Grain: June 15

Silage: June 25

Corn maturity guidelines for late planting:

Planting date	RM units (days) earlier than full-season
Prior to May 25	Plant normal seed choices
May 25 to 31	5 to 7
June 1 to 10	8 to 15
June 11 to 15	15 or more

Data from Hicks et al., 1999

Corn Response to Planting Date Waseca, 2008 (32,400 plants/A)

Planting date	Date of silking in 2008	Yield (bu/A)	Kernel weight (grams)
April 30	July 26	213	260
May 14	July 30	205 (-4%)	249 (-4%)
May 28	Aug. 5	189 (-11%)	250 (-4%)



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Corn Response to Planting Date Waseca, 2008 (32,400 plants/A)

Planting date	Stalk diameter (mm)	Plant height (inches)	Greensnap above ear (%)
April 30	21	94	1
May 14	21	98	2
May 28	21	100	13



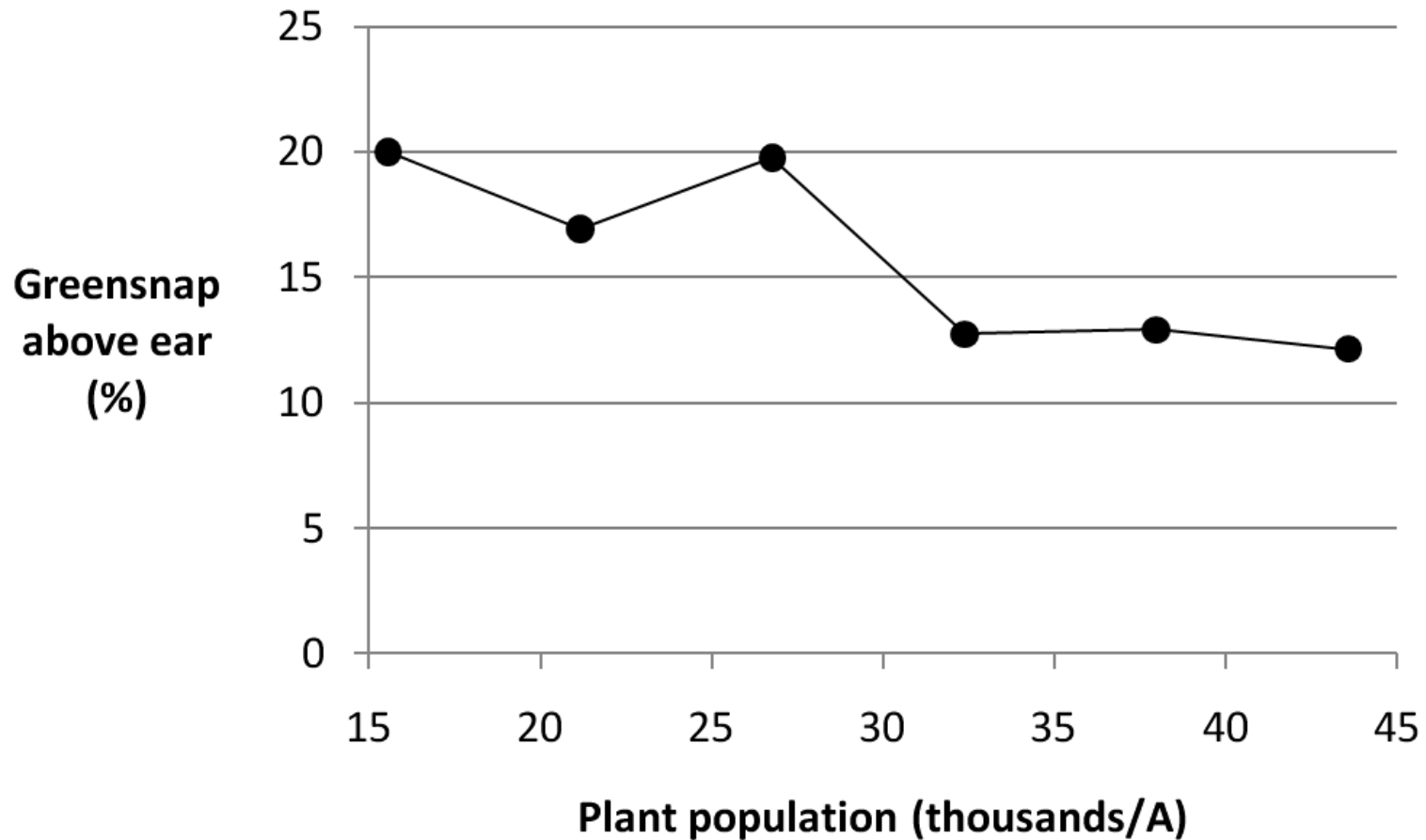
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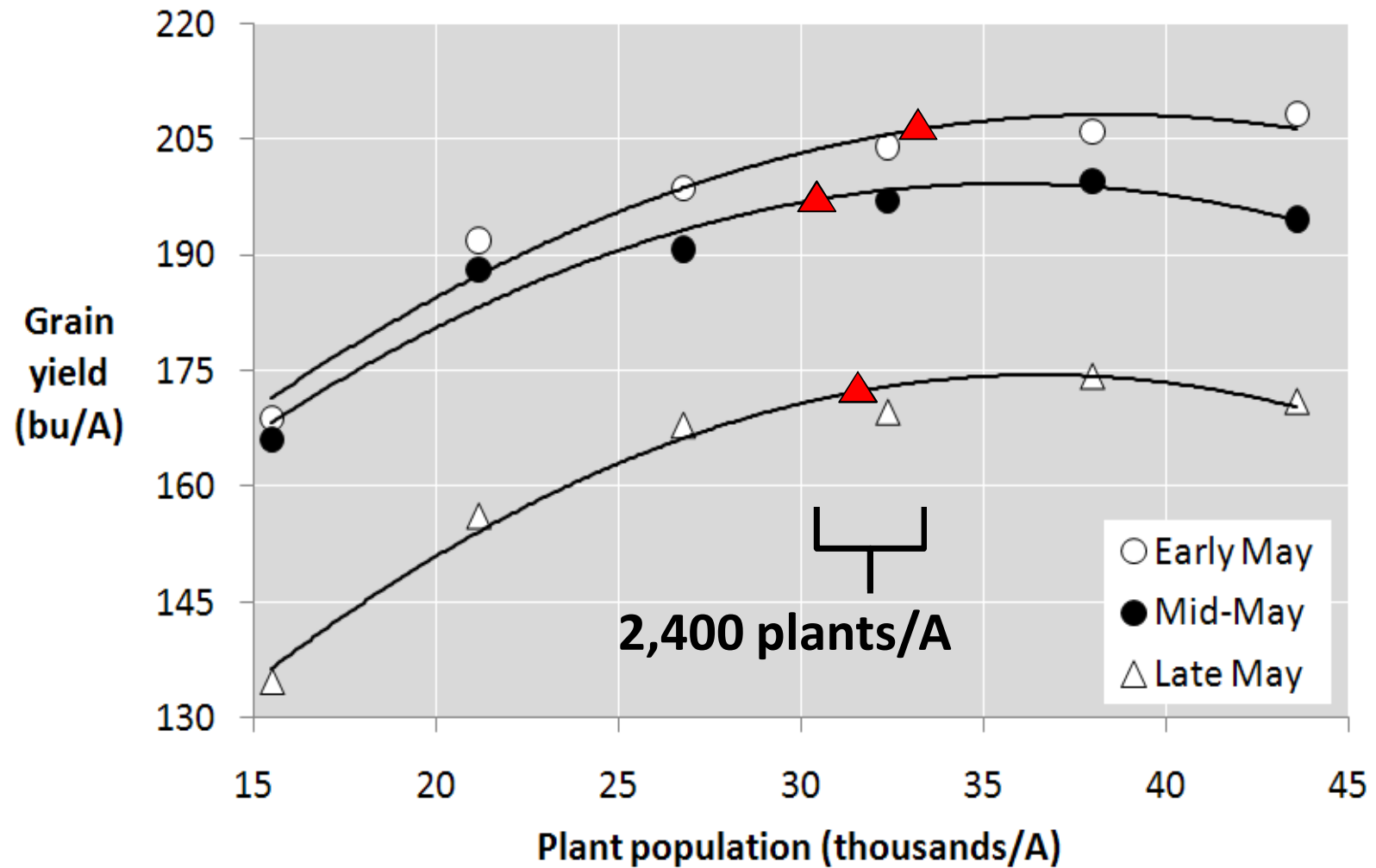




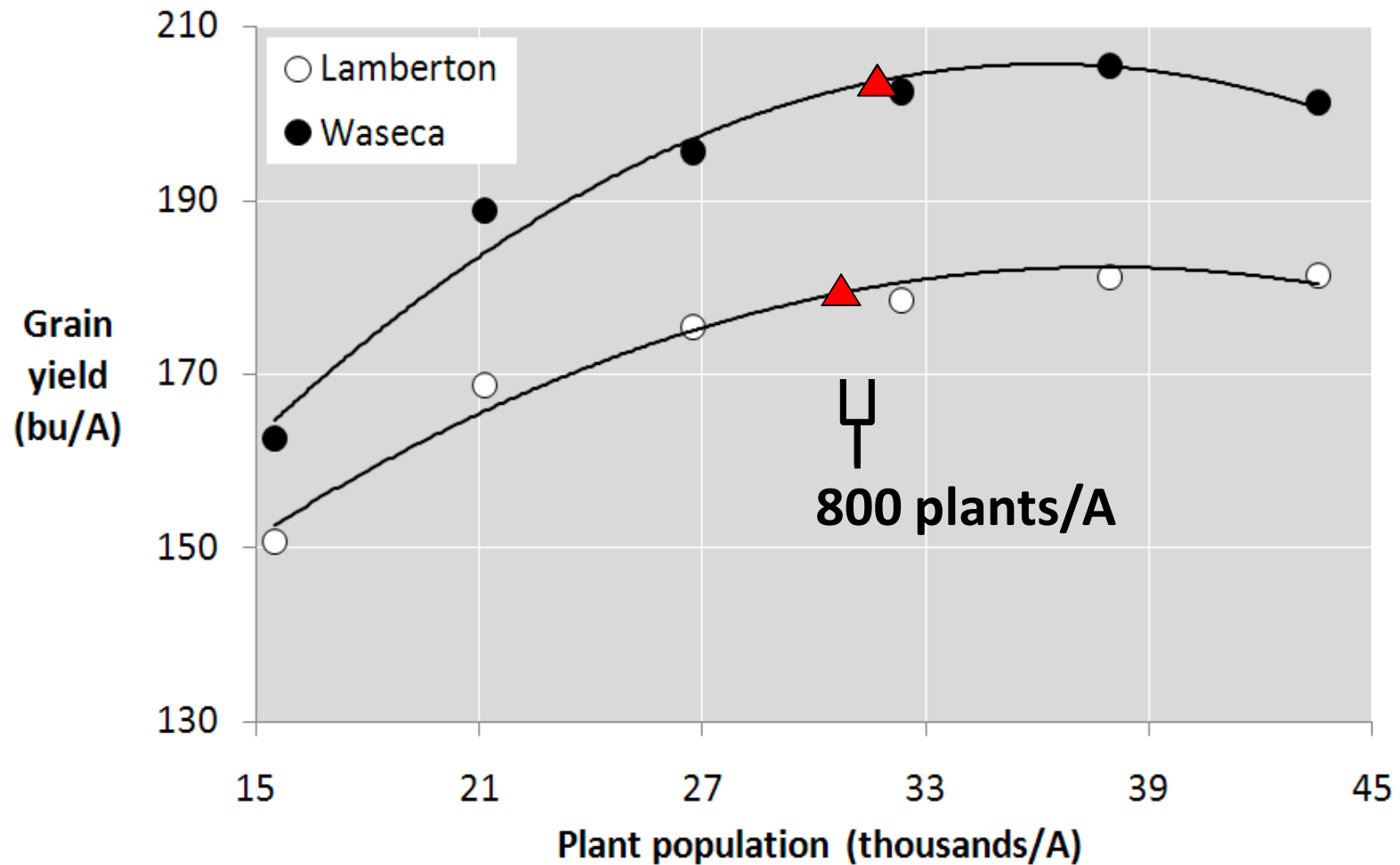
Greensnap at Waseca in 2008 with late planting date (May 28)



Lamberton and Waseca, 2008



Avg. over 3 planting dates, 2008



44,000 plants/A

4.75" between plants in 30" rows



Canopy Development at V8 22" Rows – Crookston, MN

16,000 plants/A



44,000 plants/A



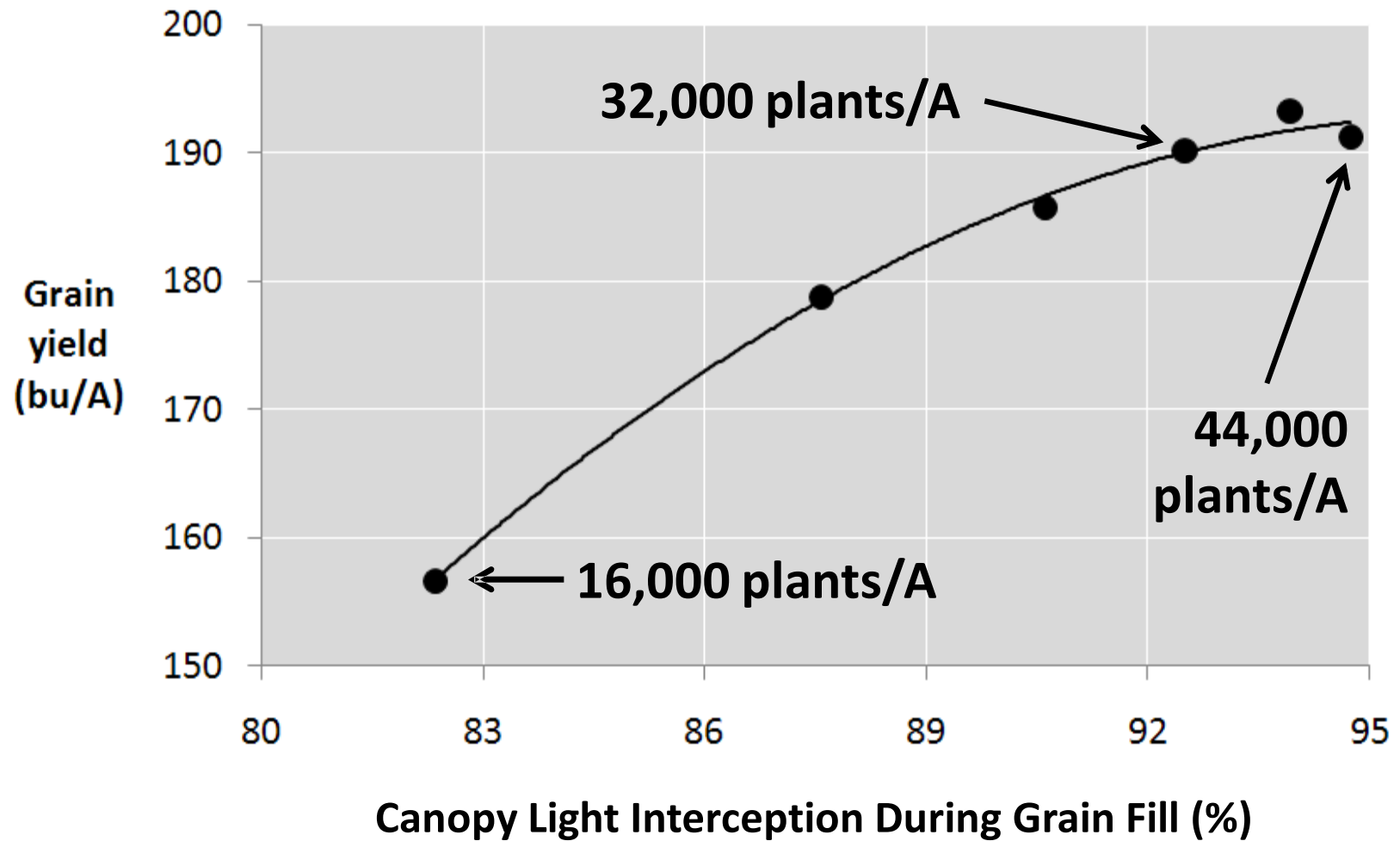
27,000 plants/A without nitrogen



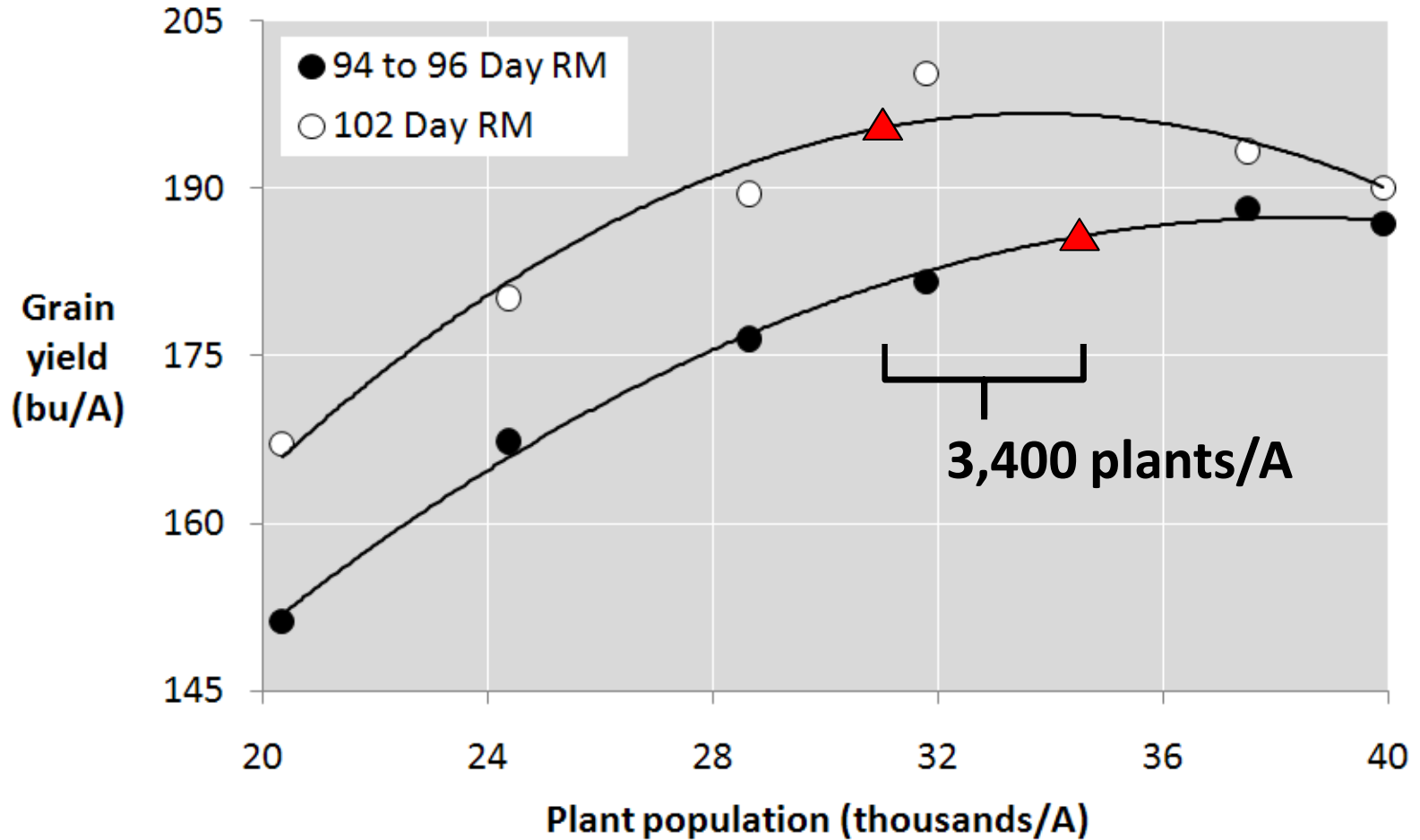
32,000 plants/A with nitrogen



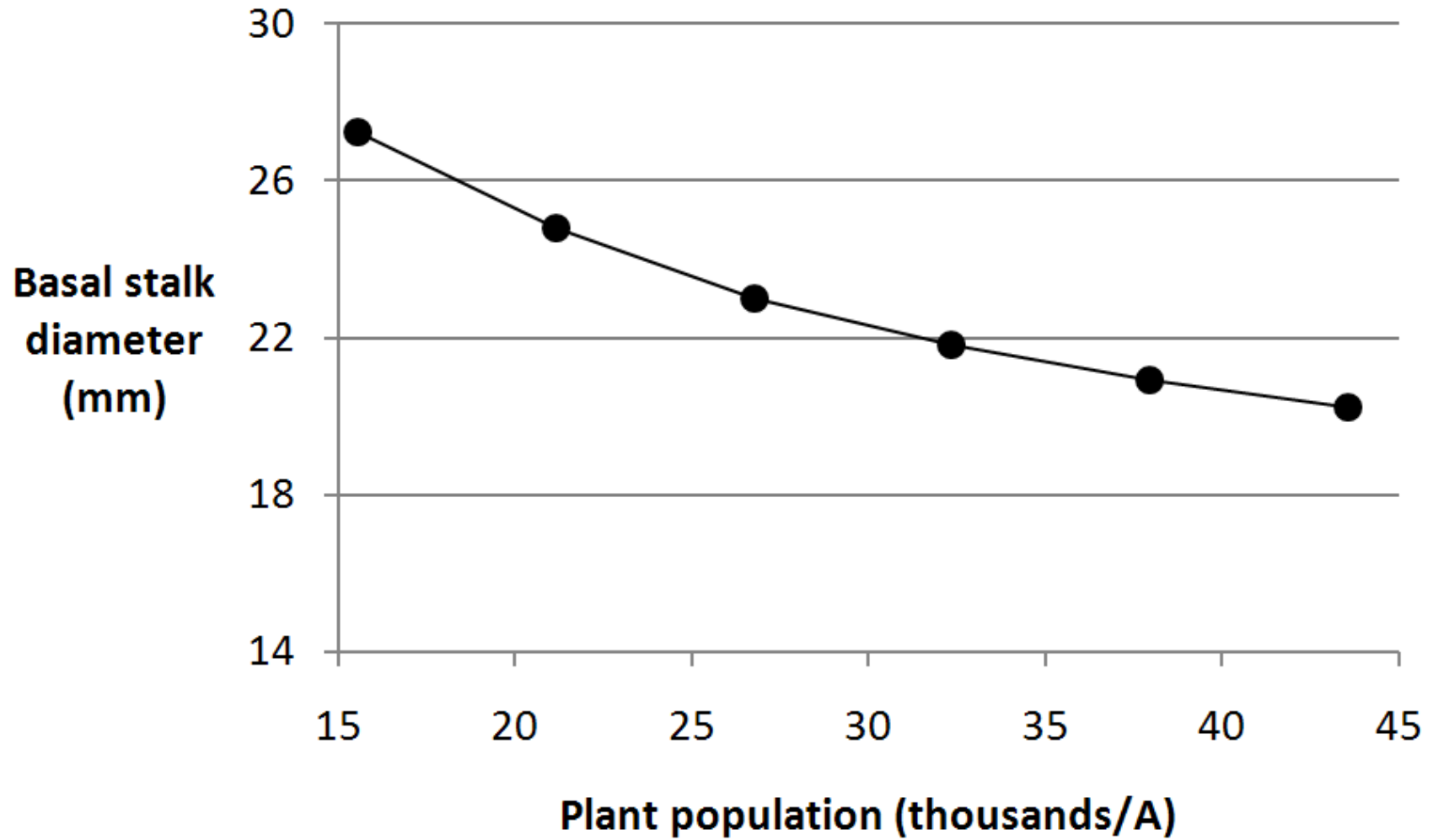
Lamberton & Waseca, 2008 (3 planting dates)



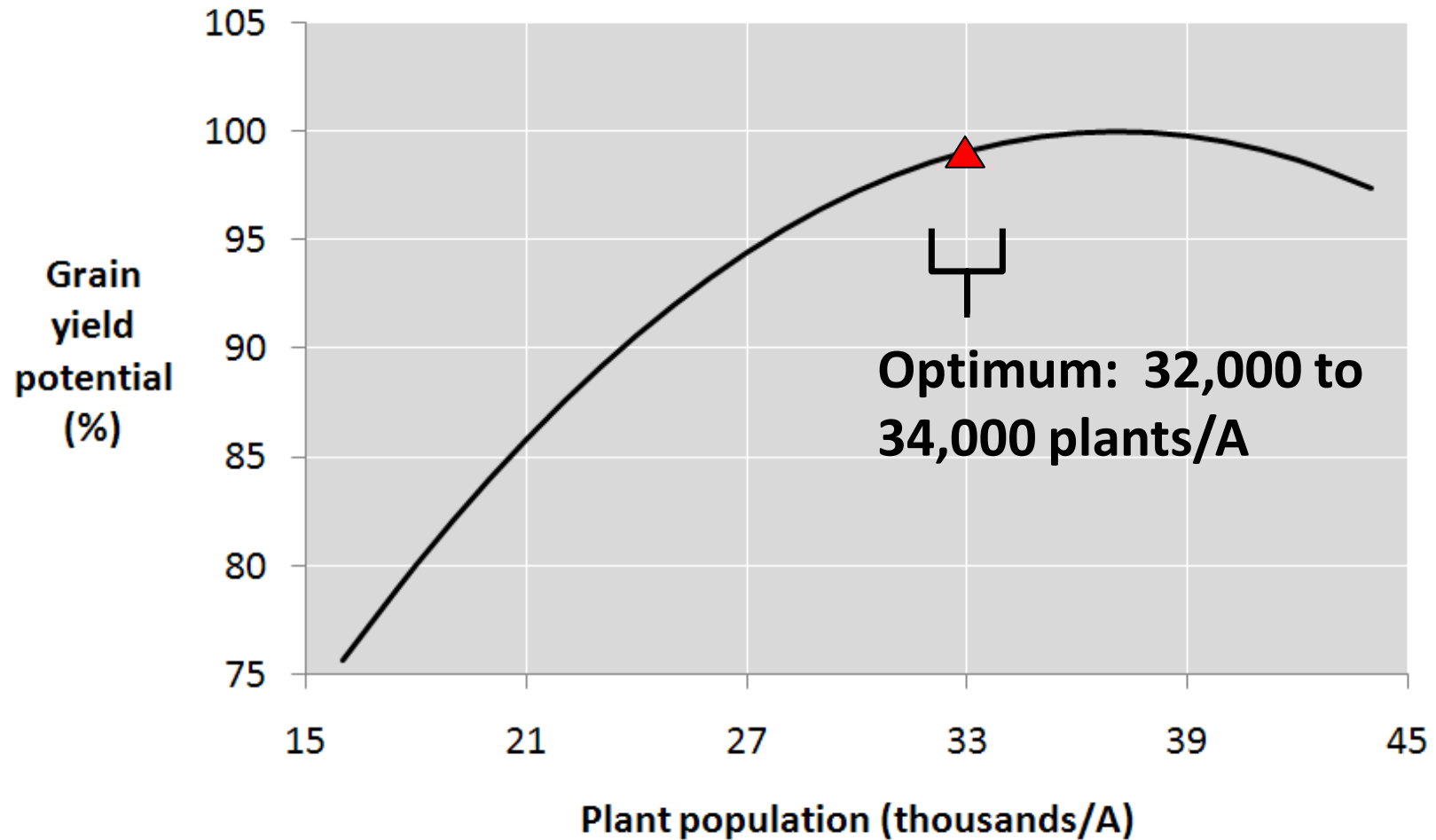
Lamberton and Waseca, 2008



Lamberton & Waseca, 2008 (3 planting dates)



Lamberton and Waseca, 2005-2008 (avg. of 34 trials)

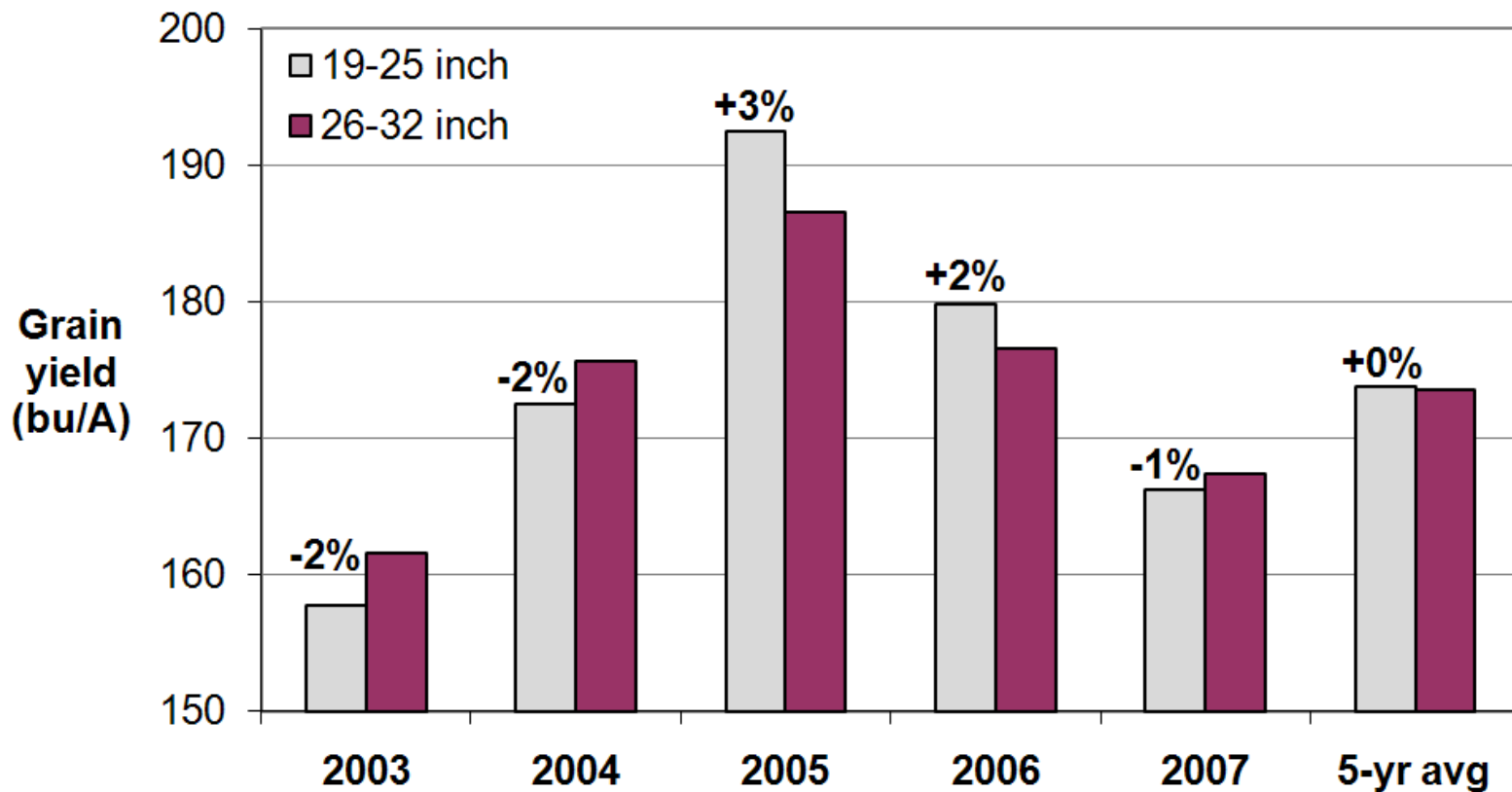


Economic Optimum Final Population (Lamberton and Waseca, 2005-2008)

Seed cost (\$/unit)*	Corn price (\$/bu)		
	3.00	4.00	5.00
175	33,600	34,500	35,000
225	32,600	33,700	34,400
275	31,600	33,000	33,800

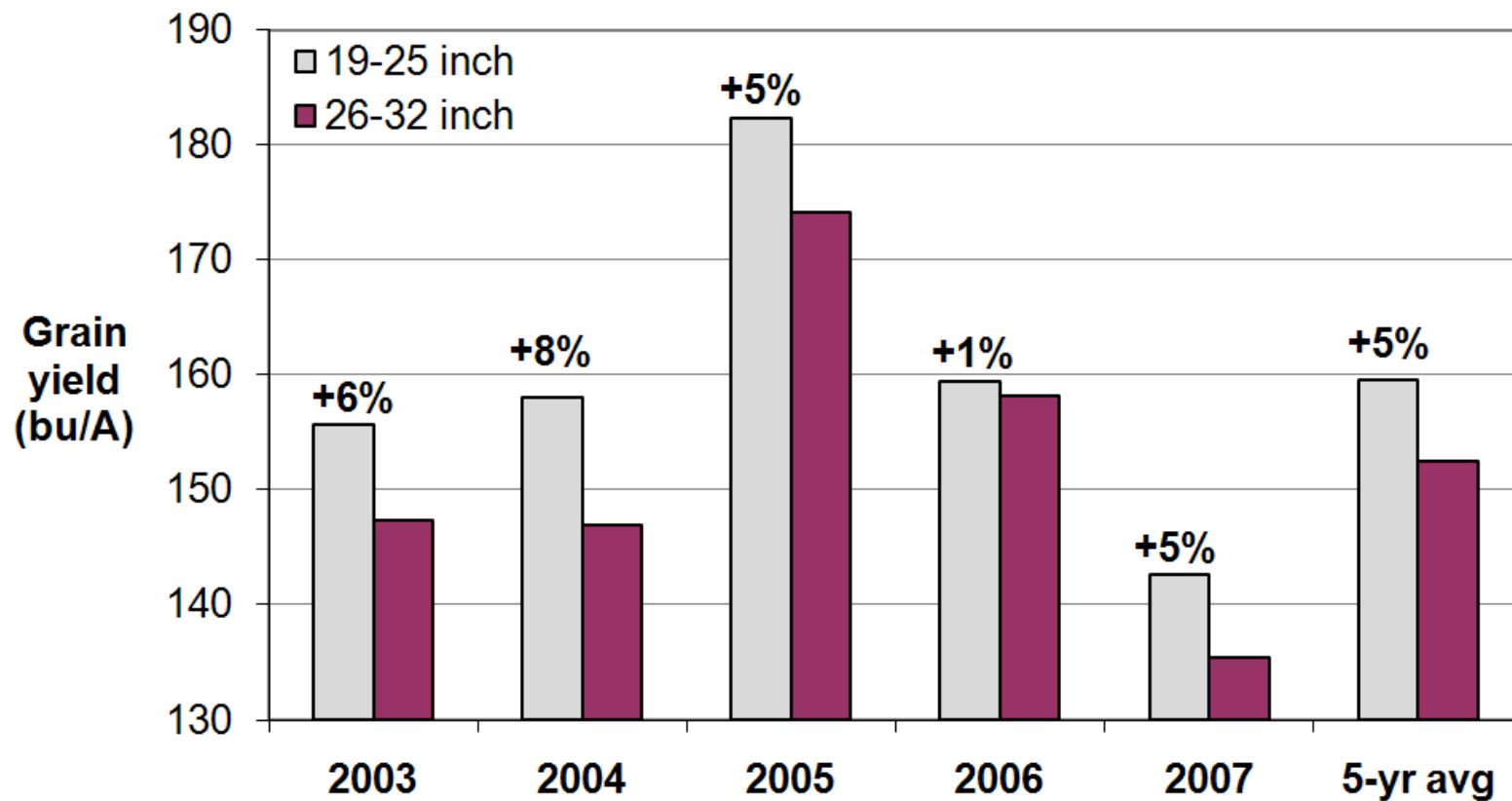
Southern Minnesota

(Results from Farm Financial Database)



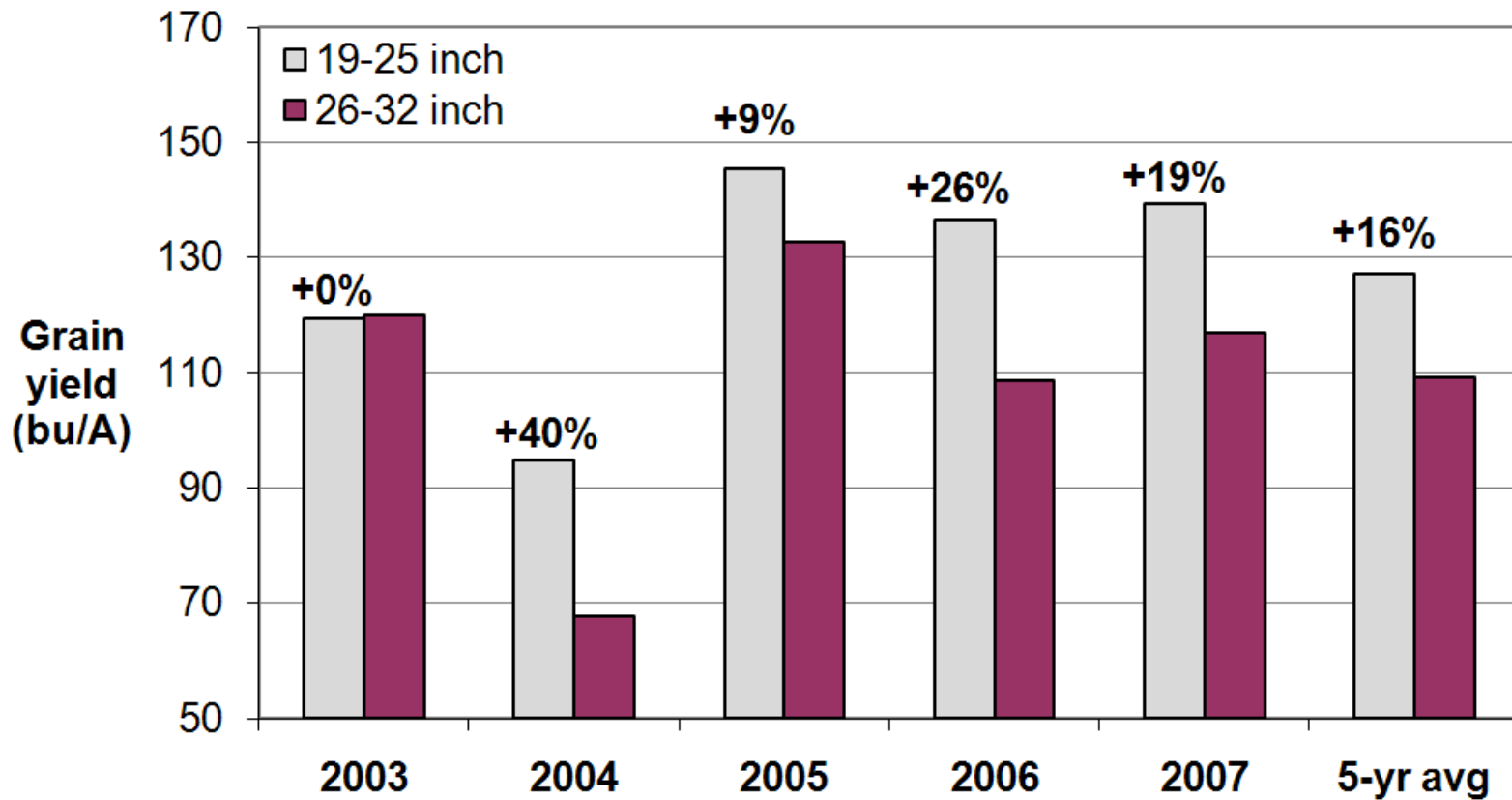
West-Central Minnesota

(Results from Farm Financial Database)

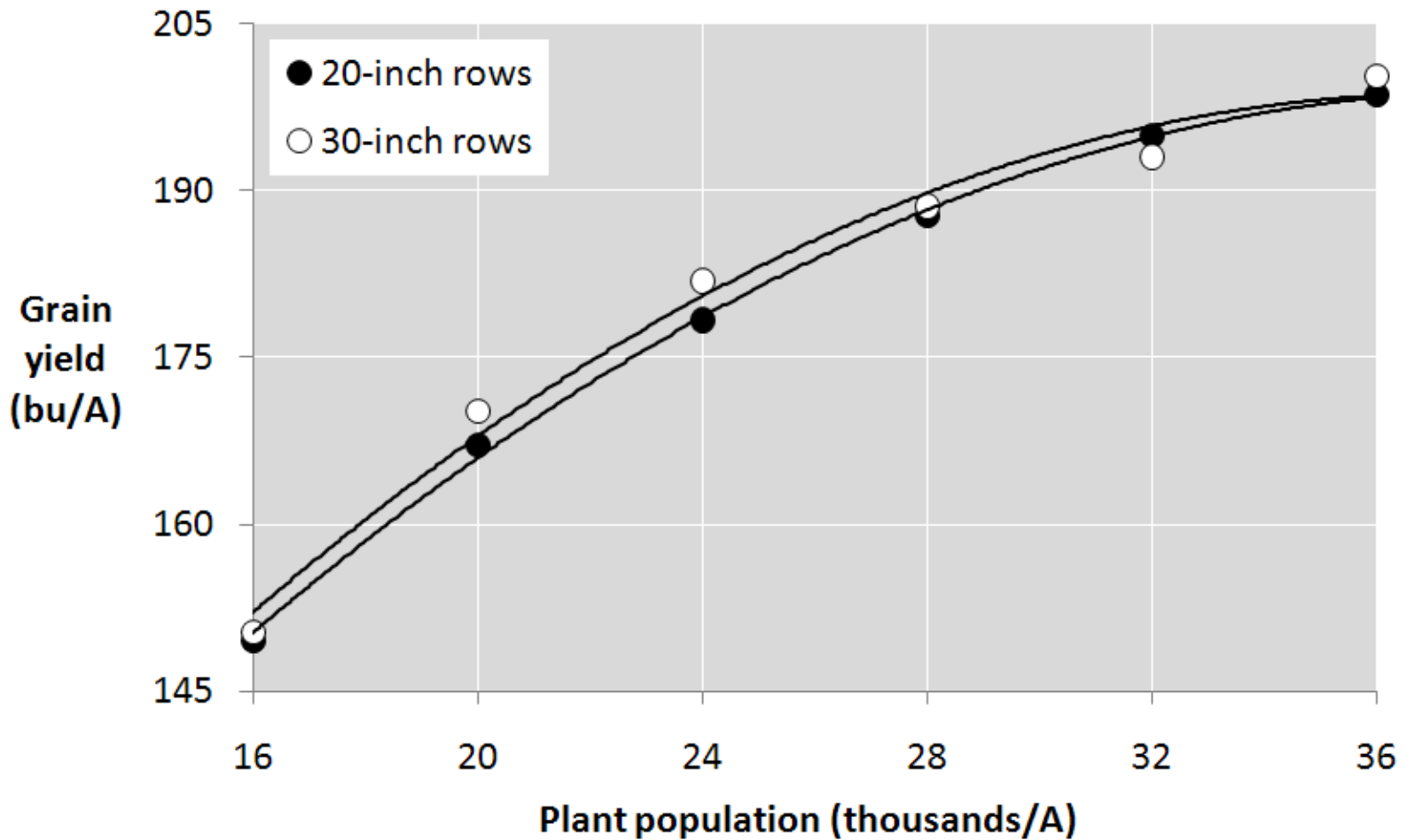


Northwest Minnesota

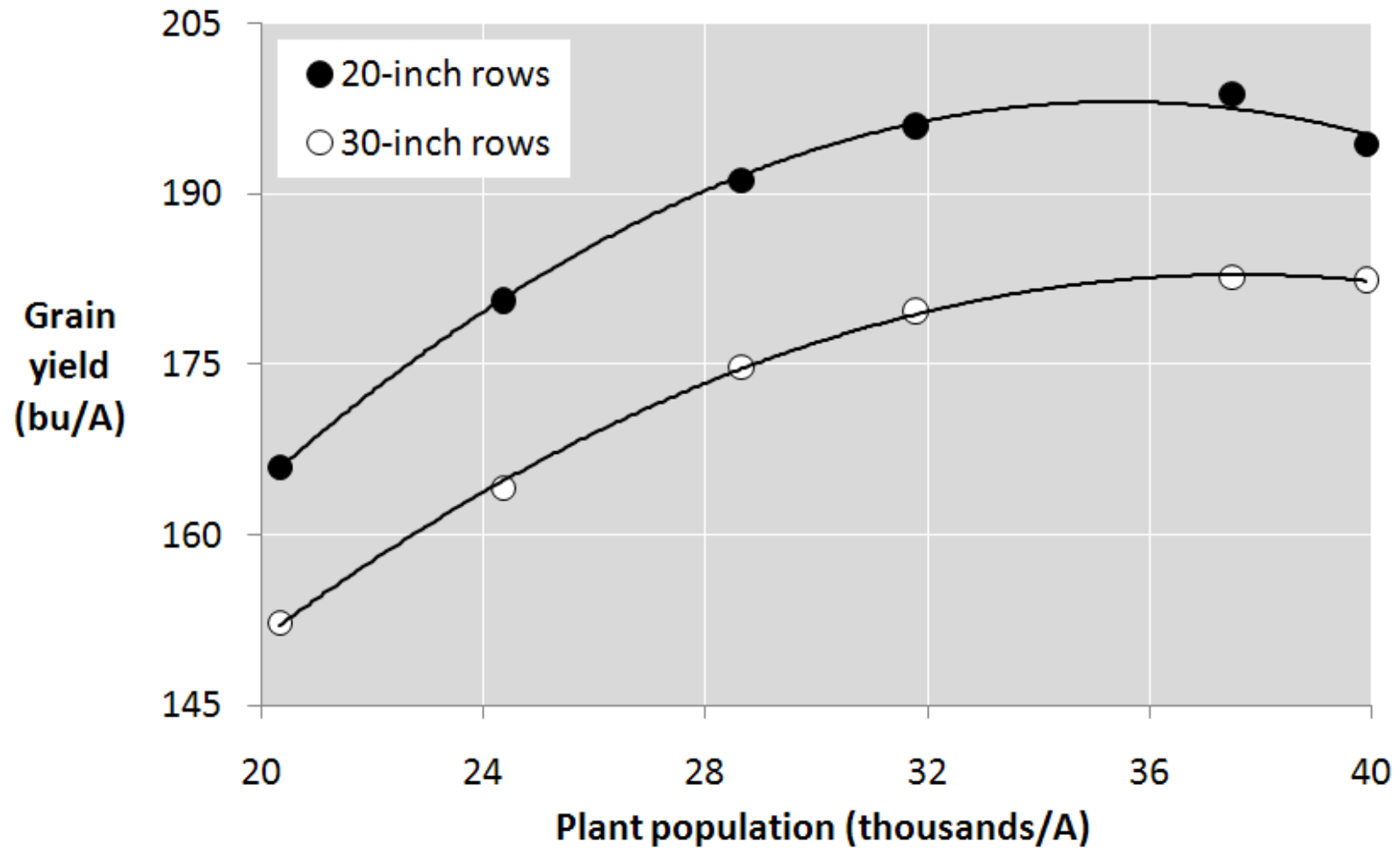
(Results from Farm Financial Database)



Lamberton & Waseca, 2005-2007



Lamberton & Waseca, 2008 (4 hybrids)



Narrow Rows May Improve Stalk Strength

44,000 plants/A – Crookston, MN

22-inch rows



30-inch rows





Thanks!

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