

Optimum Plant Population for Corn in Minnesota

Winter Crops Days
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Corn Population Research, 2005-2008

Factors evaluated with plant population:

- Planting date
- Row spacing
- Hybrid maturity
- Hybrid traits



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Optimum Plant Population for Corn in Minnesota

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Summary:

This publication summarizes research on corn plant population conducted at the University of Minnesota Research and Outreach Centers in Lamberton and Waseca from 2005 to 2008. Overall, the results from this research indicate that:

- Optimum plant population does not change with planting date or row width, but early-maturing hybrids may require a higher plant population than full-season hybrids. Yield increases resulting from higher plant populations are primarily the result of increased light interception during grain-fill by the crop canopy.
- While the economically optimum plant population varies according to the cost of seed and the price of corn, the plant population needed to maximize profitability ranges from about 32,000 to 34,000 plants/A under current economic conditions.

Impact of Planting Date on Optimum Plant Population:

Planting date has a considerable impact on corn yield. When compared to an early May planting date for a population of 32,400 plants/A, our results from 2008 at Lamberton and Waseca show that yield was reduced by 3 and 17% when planting was delayed until mid-May and late May, respectively (Figure 1). This study also found that the optimum plant population was statistically similar across all three planting dates. However, the data in Figure 1 show that the optimum plant population may be slightly higher with early planting, possibly due to the greater yield potential of early-planted corn. Producers may also consider planting a few more seeds when planting early to compensate for reduced emergence in cooler and wetter soils. Seeding rates needed to achieve various plant populations based on expected emergence are listed in Table 1.

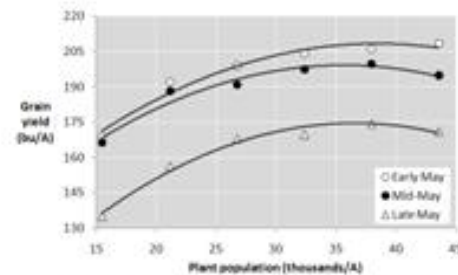


Figure 1. Corn response to plant population for three planting dates. Data are average over two locations (Lamberton and Waseca) in 2008.

Thanks to the Research Sponsors

- MN Corn Growers Association
- MN Corn Research & Promotion Council
- National Crop Insurance Services
- Monsanto



Crop Progress at Waseca, 2008

Planting date	GDD lost for delayed planting	Date of silking	Date of maturity
April 30	0	July 26	Sept. 23
May 14	92	July 30	Sept. 27
May 28	256	Aug. 5	Oct. 2



Photo on June 23 at Waseca

Planted April 30 (V7; 31")

Planted May 28 (V4; 15")



Photo on July 2 at Waseca

Planted May 14 (V8; 41")

Planted April 30 (V10; 49")



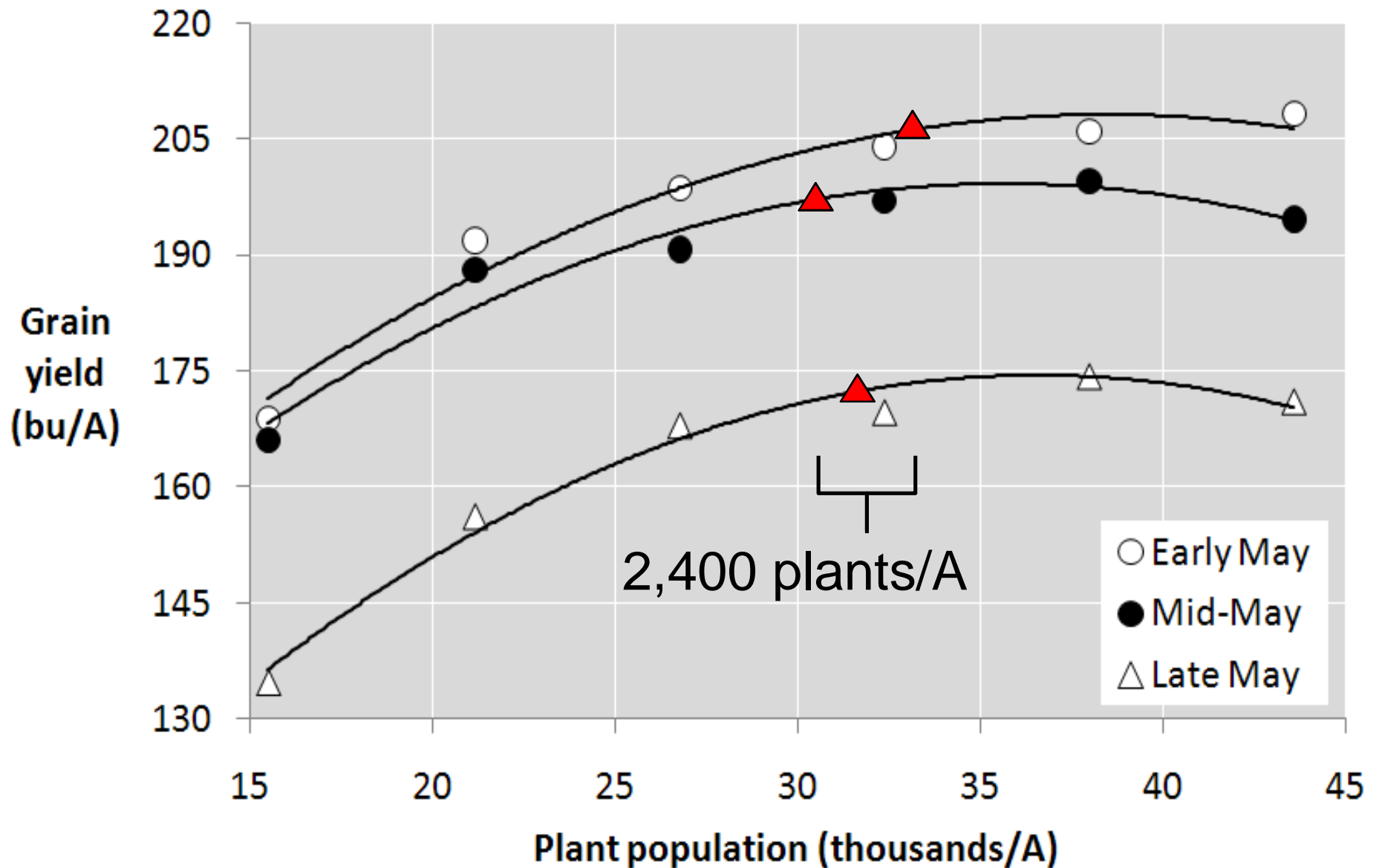
Avg. of Lamberton & Waseca, 2008

(32,000 plants/A)

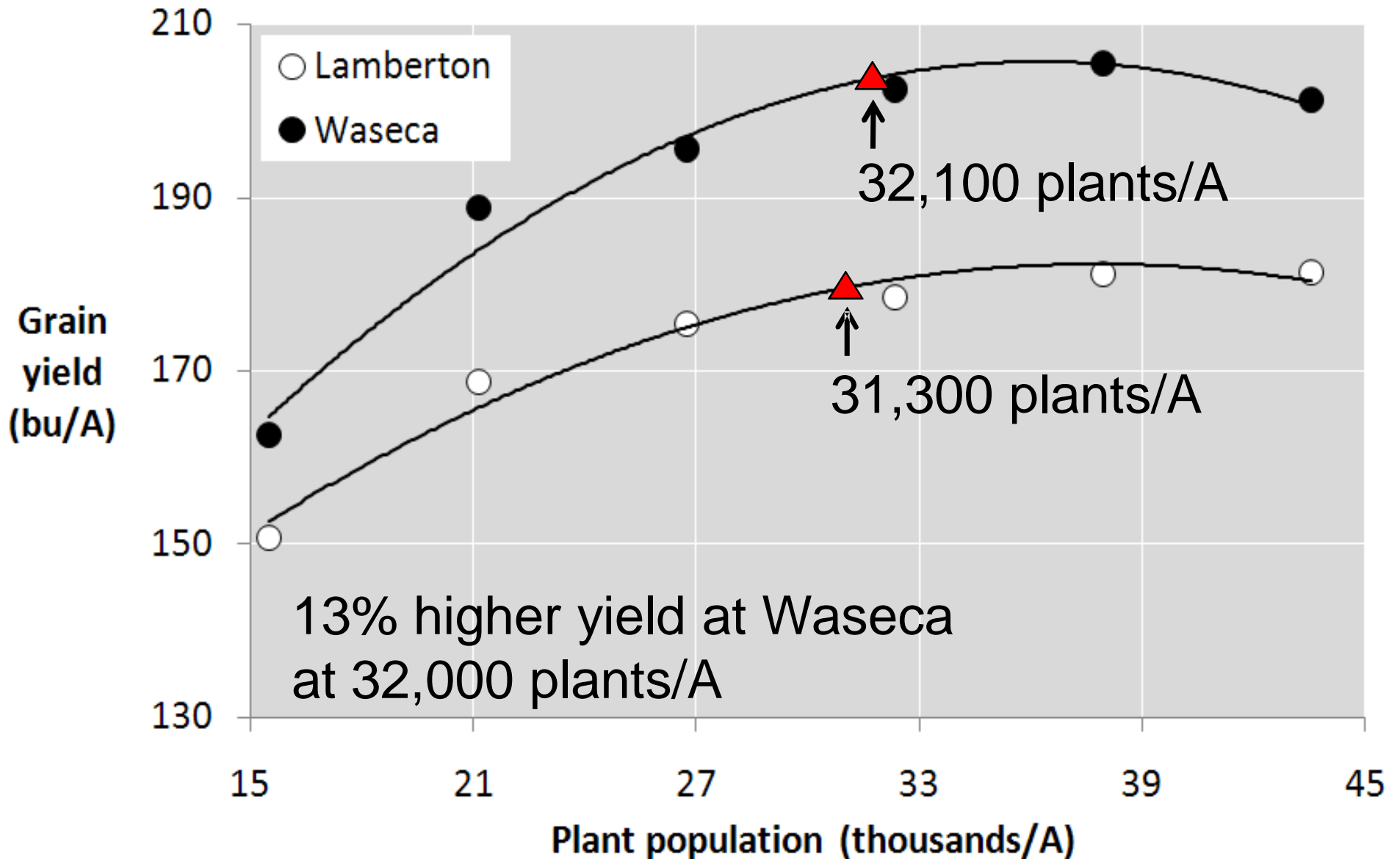
Planting date	Yield (bu/A)	Yield loss for late planting
Early May	204	0%
Mid-May	197	3%
Late May	170	17%



Avg. of Lamberton & Waseca, 2008



Avg. of 3 planting dates, 2008



44,000 plants/A



44,000 plants/A

4.75" between plants in 30" rows

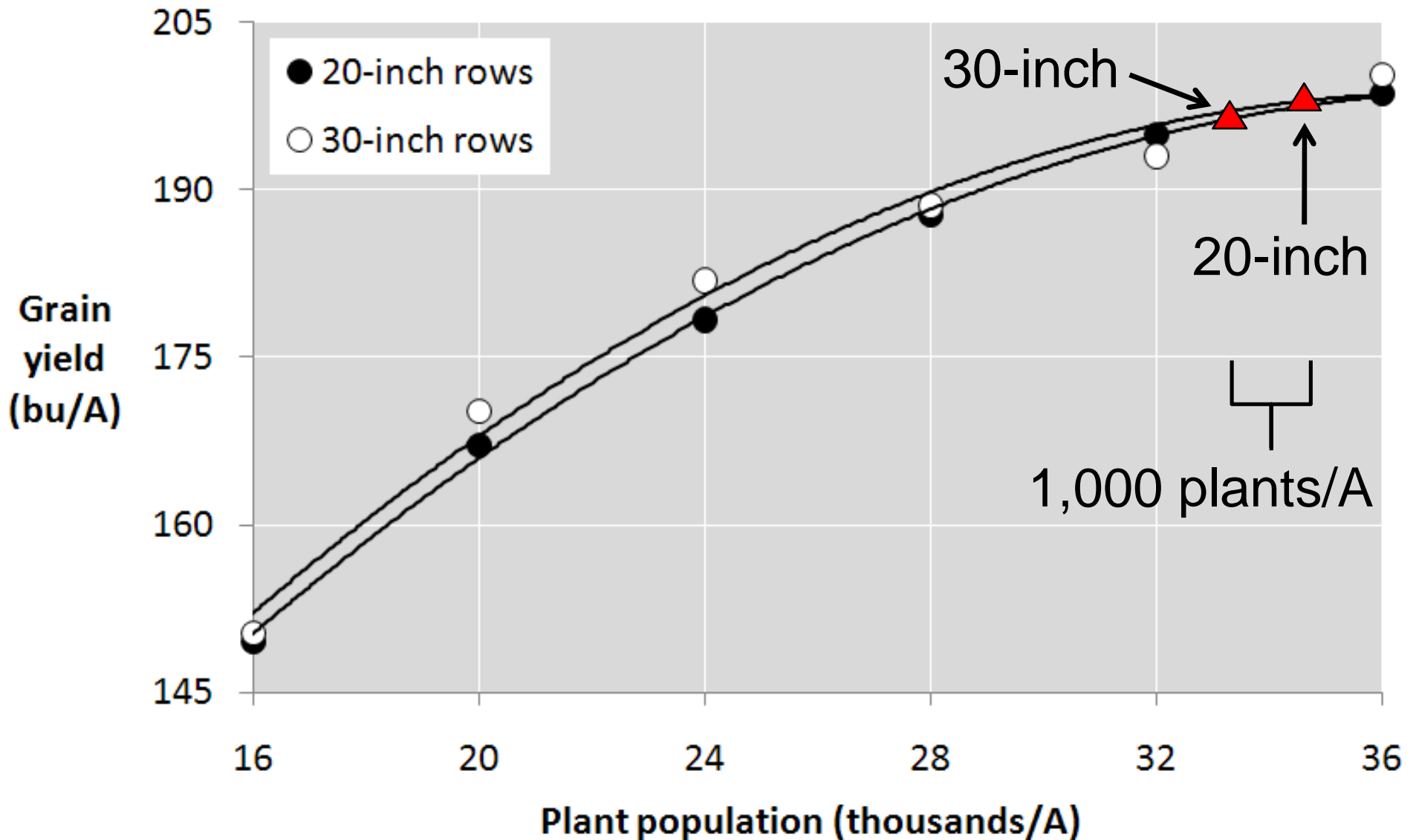


Seeding Rates Needed to Obtain Desired Stand

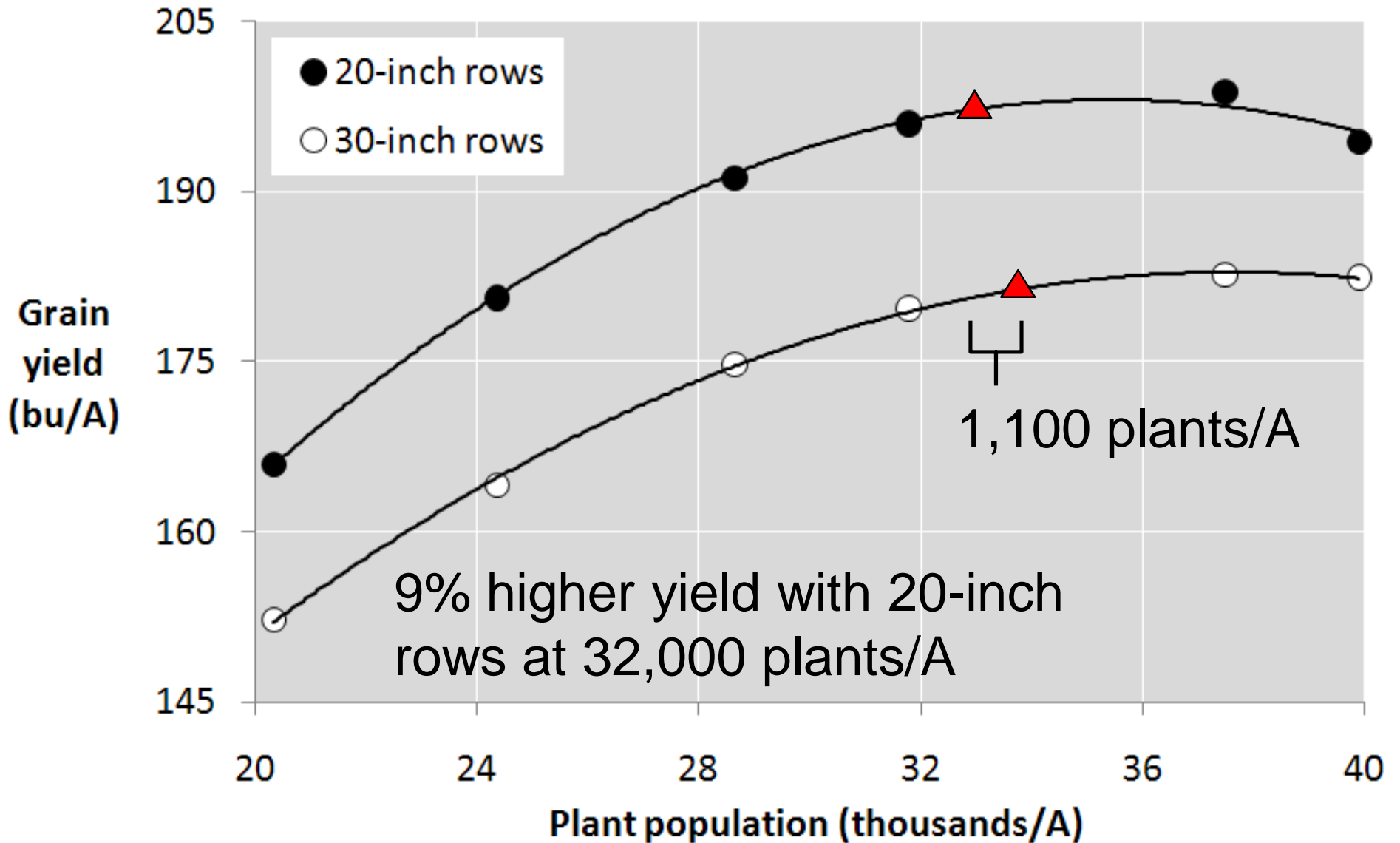
Desired stand (plants/A)	Seeding rate based on expected emergence (seeds/A)		
	85%	90%	95%
30,000	35,300	33,300	31,600
32,000	37,600	35,600	33,700
34,000	40,000	37,800	35,800



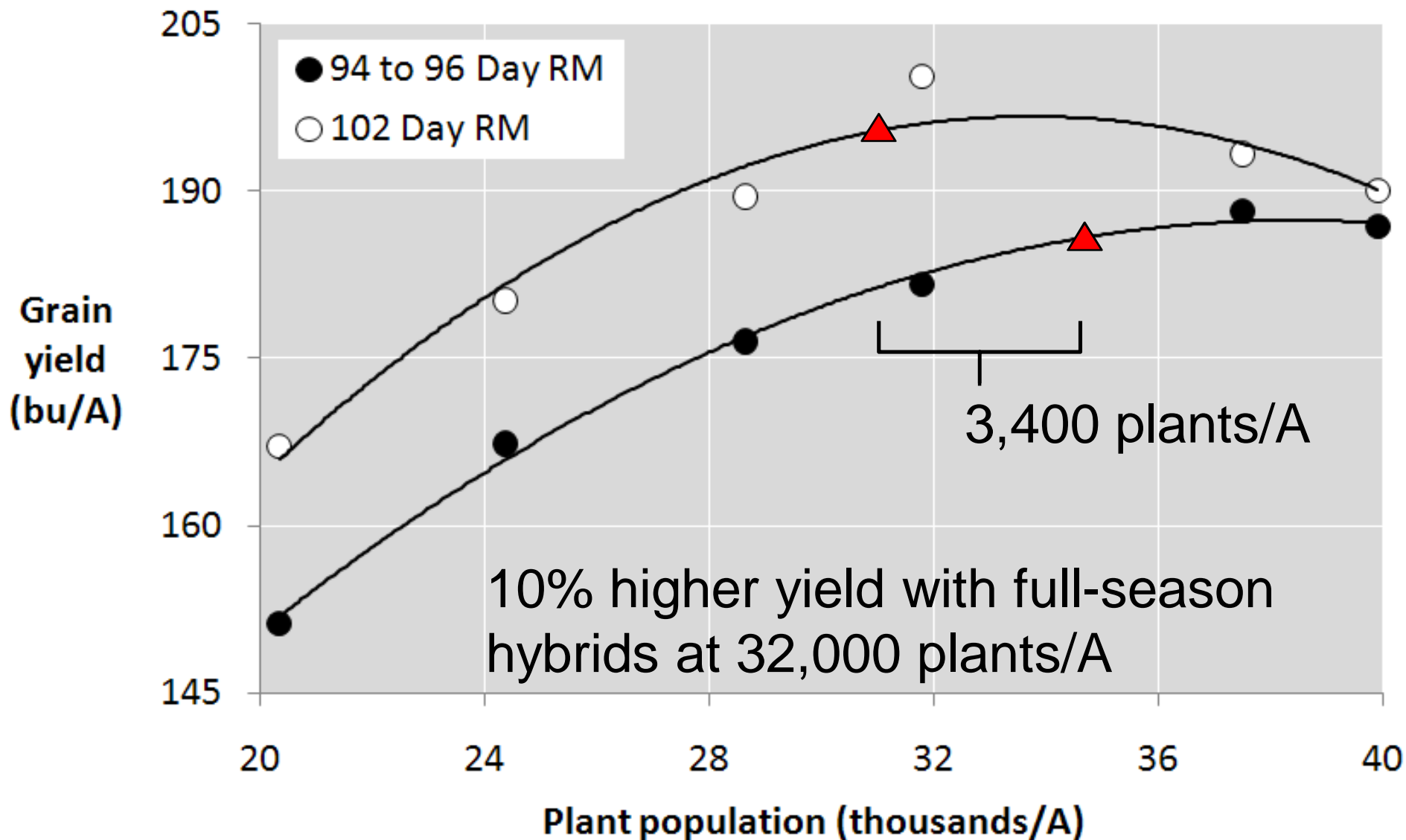
Avg. of Lamberton & Waseca, 2005-2007



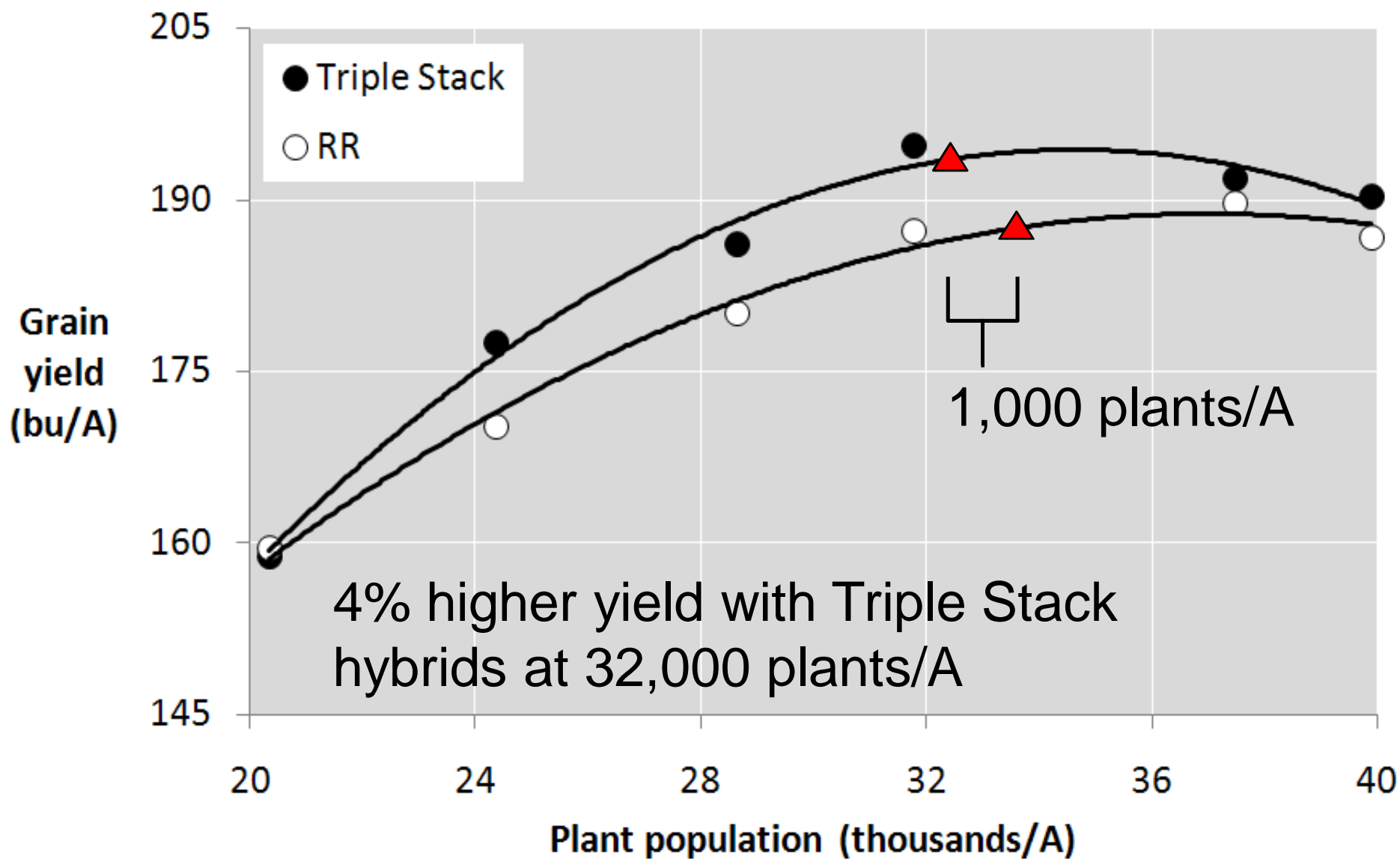
Avg. of 4 hybrids at Lamberton & Waseca, 2008



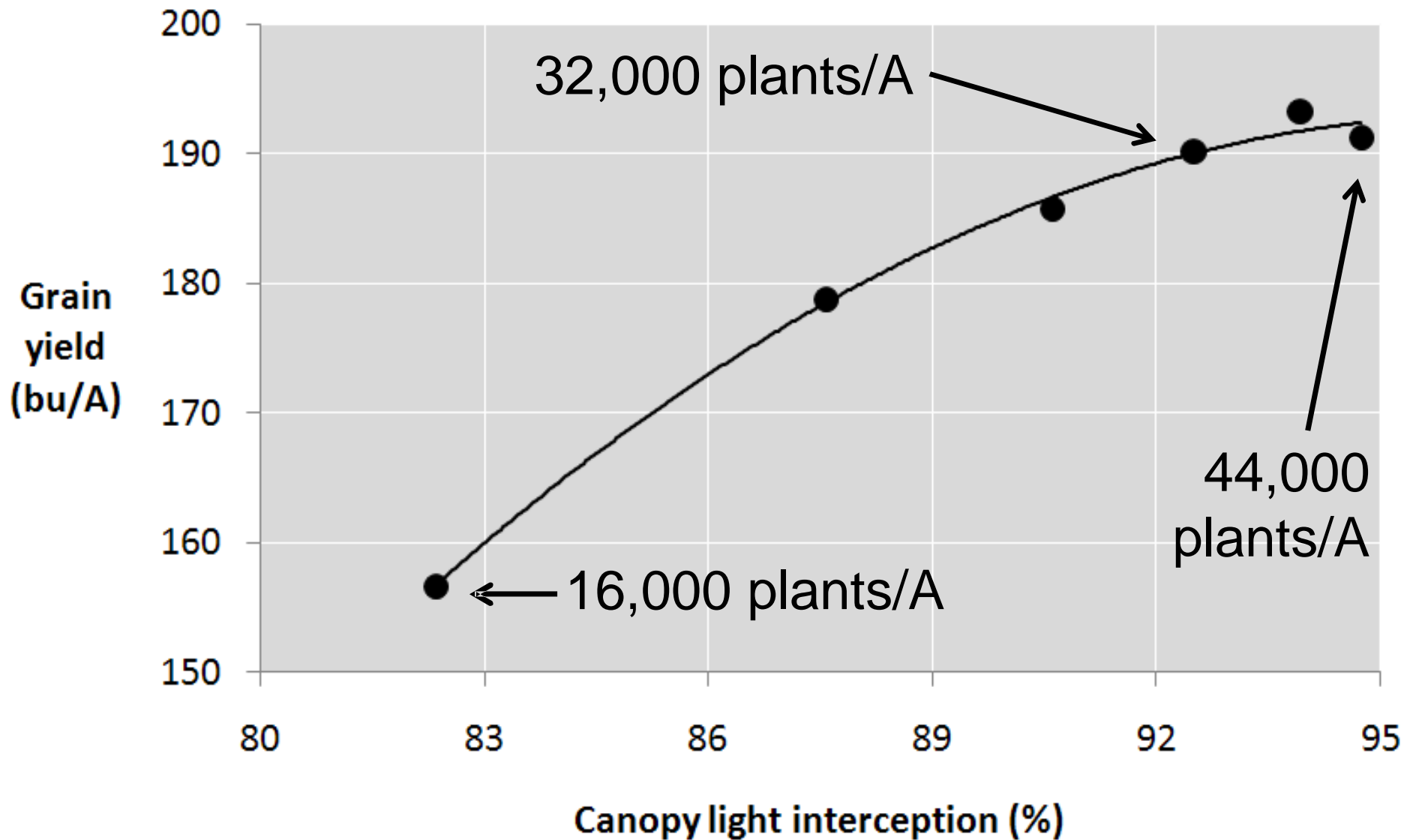
Avg. of 2 Hybrids & 2 Row Widths at Lamberton & Waseca, 2008



Avg. of 2 Hybrids & 2 Row Widths at Lamberton & Waseca, 2008



Avg. of 3 Planting Dates at Lamberton & Waseca, 2008



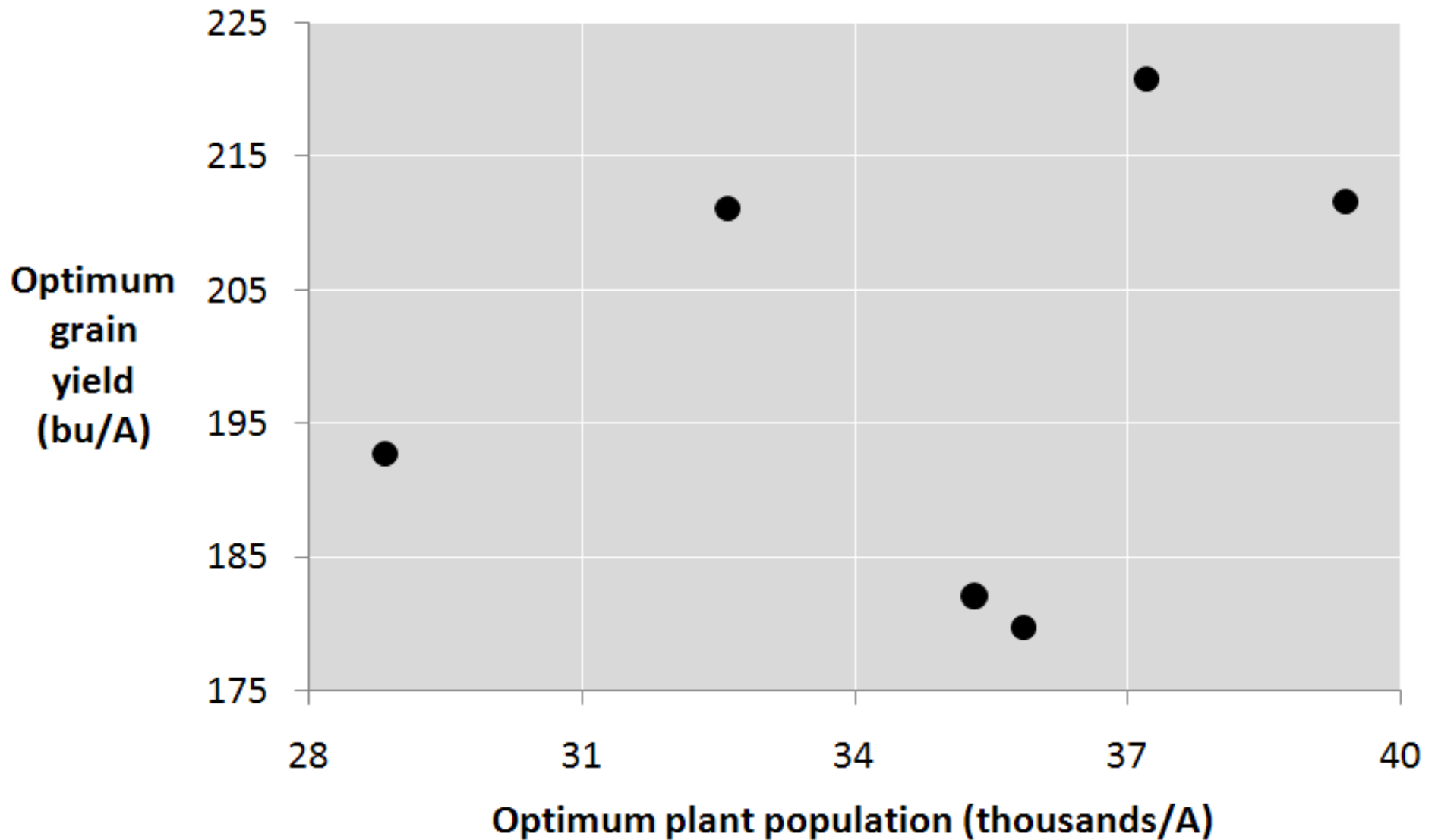
27,000 plants/A without nitrogen



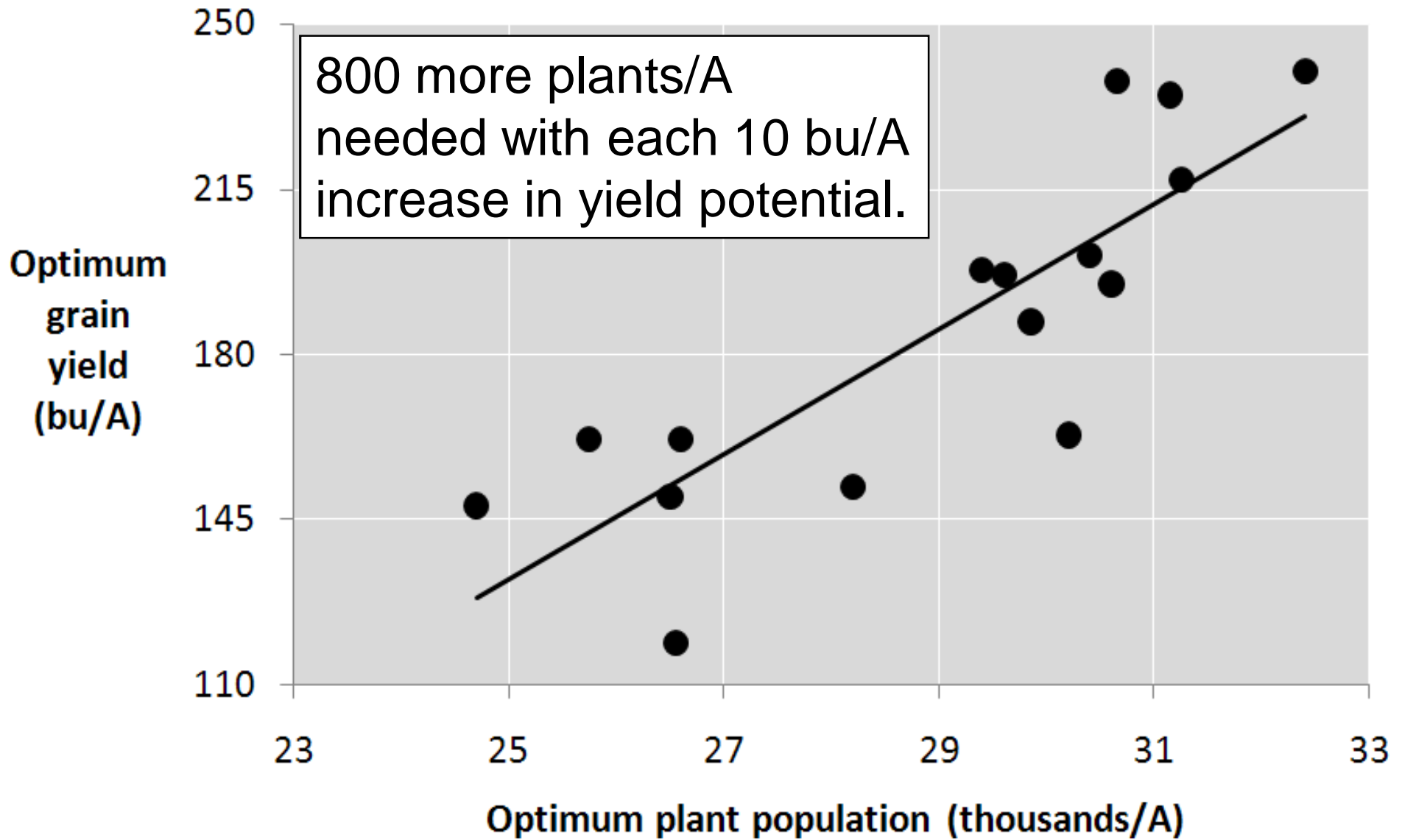
32,000 plants/A with nitrogen



Optimum Population vs. Yield Potential from 2005-2007 at Lamberton & Waseca

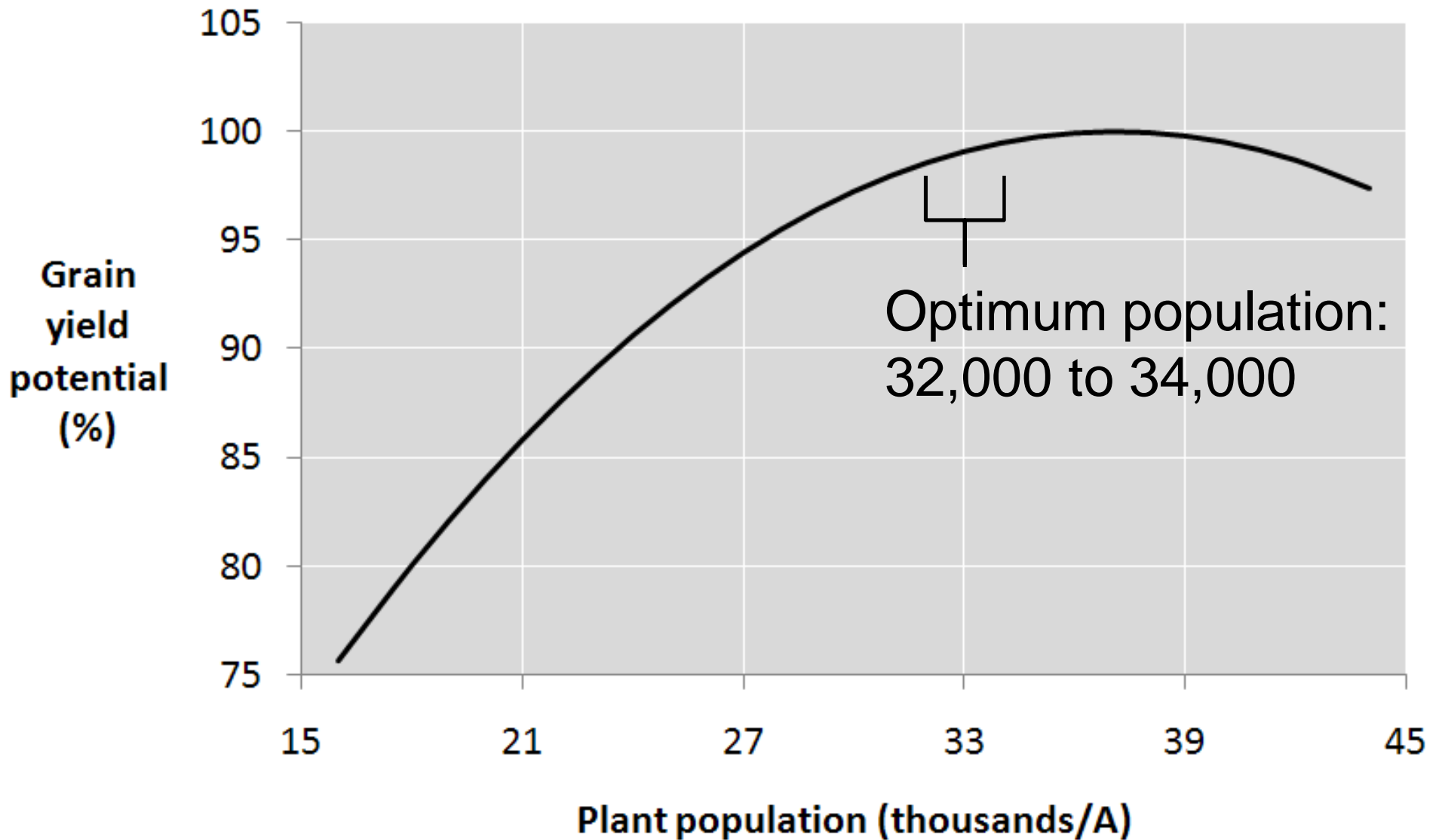


Optimum Pop. vs. Yield Potential in Illinois



Data from Emerson Nafziger

Avg. of all trials from 2005-2008 at Lamberton & Waseca



**Avg. of all trials from
2005-2008 at Lamberton & Waseca**

Population (plants/A)	Grain yield potential (%)
36,000	100
34,000	99
32,000	99
30,000	97
28,000	95

Optimum Plant Population

(Avg. of all trials from 2005-2008 at
Lamberton & Waseca)

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

*One unit is 80,000 seeds.

*Does not include extra seed needed for stand.

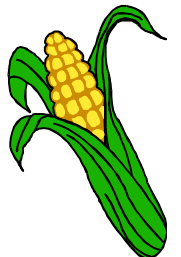
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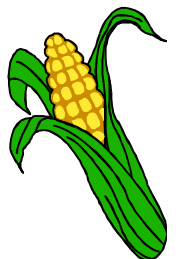
Summary of MN Research (2005-2008)

- Overall optimum: 32,000 to 34,000 plants/A
- Optimum population varies little with:
 - Planting date
 - Row width
 - Hybrid traits
- Optimum population is higher for:
 - Early-maturing hybrids (3,400 more/A)
 - High-yield environments



Additional Findings

- Yield increases from higher populations are due to increased light interception
- Narrow rows
 - Often no yield increase
 - Sometimes large yield increase (9%)
- Full-season hybrids
 - 10% higher yield than short-season hybrids
- Triple stack hybrids
 - 4% yield increase over RR counterparts



Questions or Comments?

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