



# Corn Crop Development and Yield Potential

**Agronomy Field Tour  
Waseca, MN - June 21, 2011**

**Jeff Coulter - Extension Corn Agronomist  
[coult077@umn.edu](mailto:coult077@umn.edu)**



UNIVERSITY OF MINNESOTA  
**EXTENSION**

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## Lamberton, MN (1988-2003)

| Planting Date | Yield Loss (%) |
|---------------|----------------|
| April 30      | 0              |
| May 5         | 1              |
| May 10        | 2              |
| May 15        | 5              |
| May 20        | 8              |
| May 25        | 13             |
| May 30        | 18             |
| June 4        | 24             |
| June 9        | 31             |

**April 21 to May 6  
= within 1% of  
maximum yield**

Data from Bruce Potter & Steve Quiring



# 2010 Planting Date Trial - Morris, MN

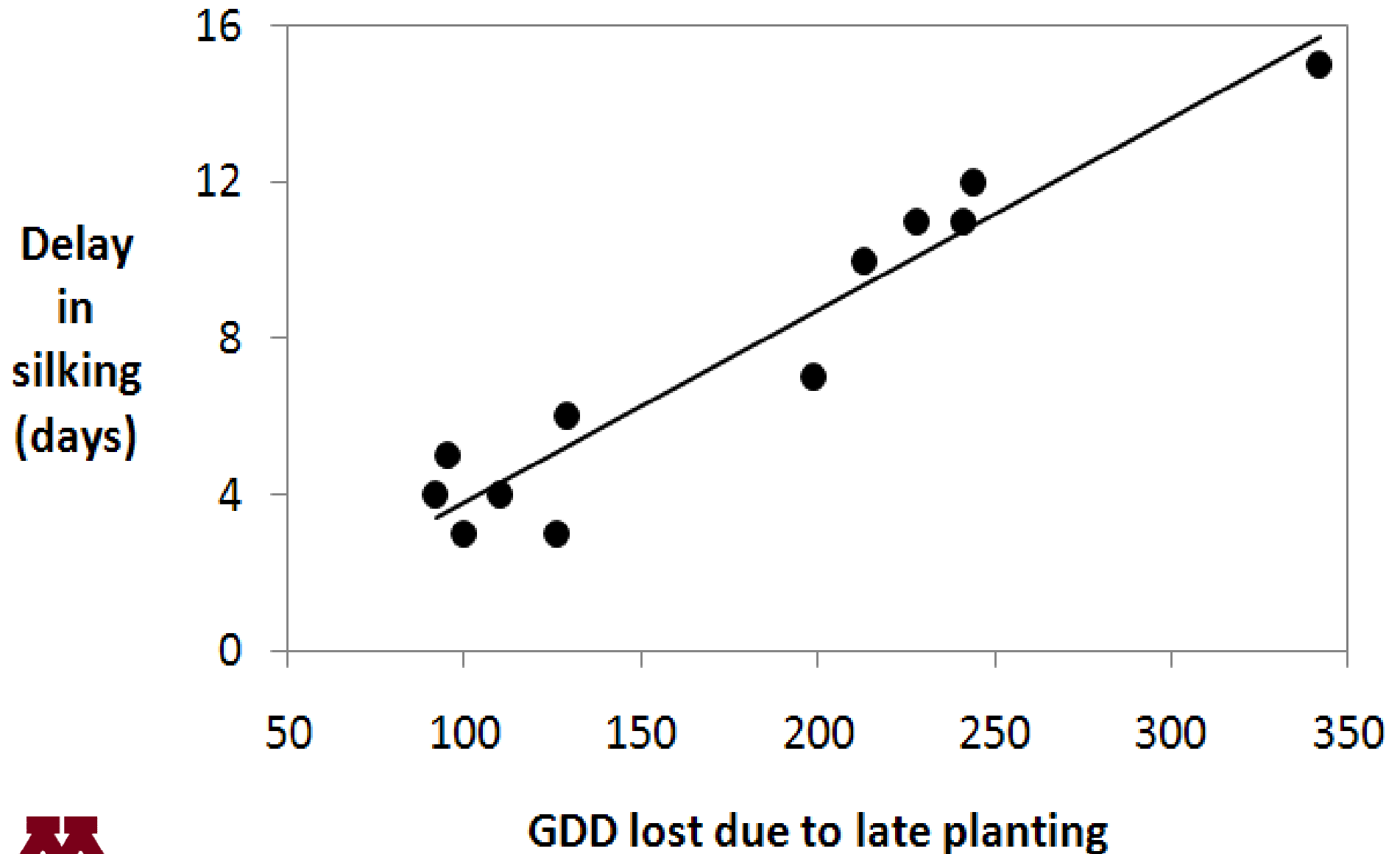
Photo on June 14

April 20

May 19

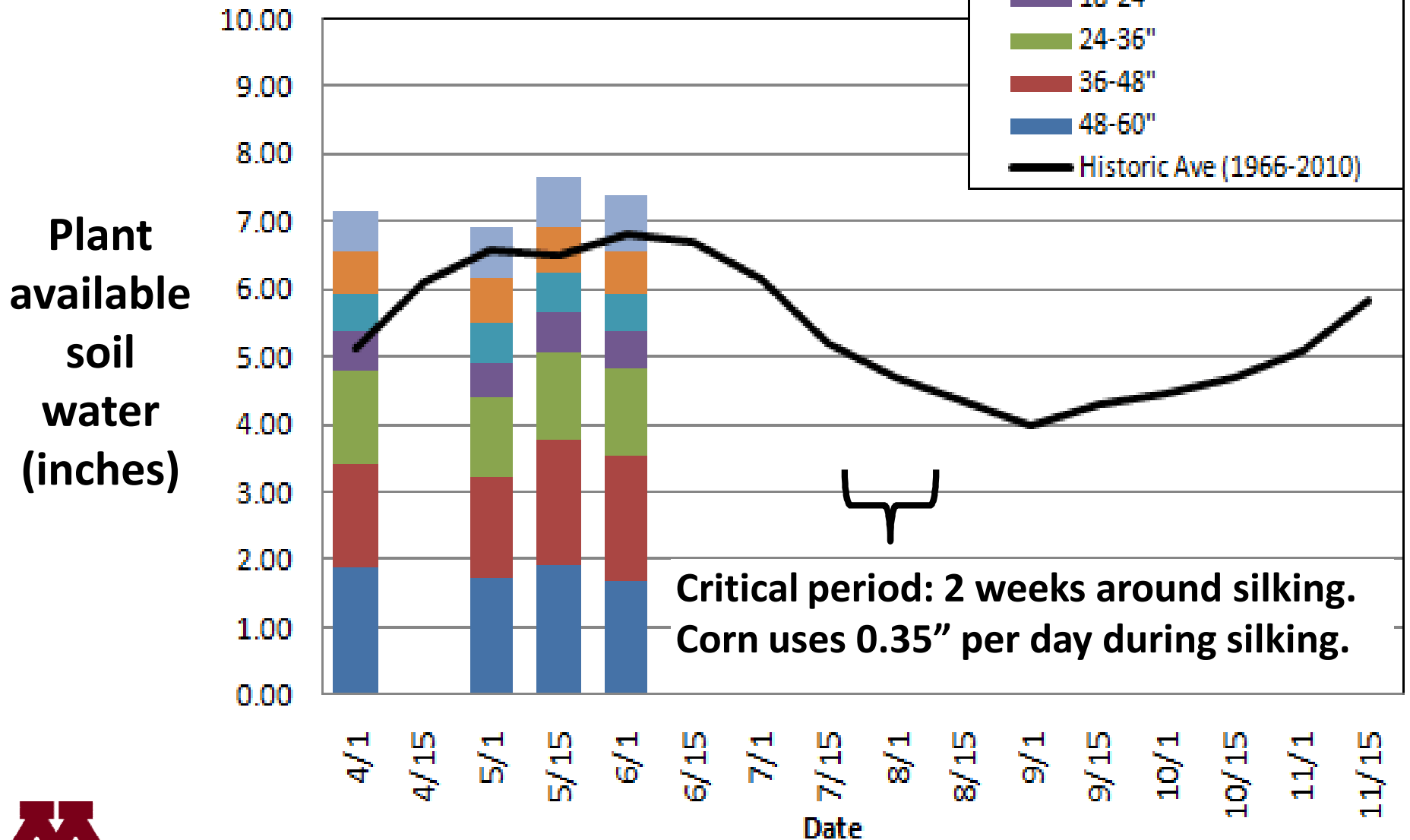


# Waseca & Lambertton (2008-2010)

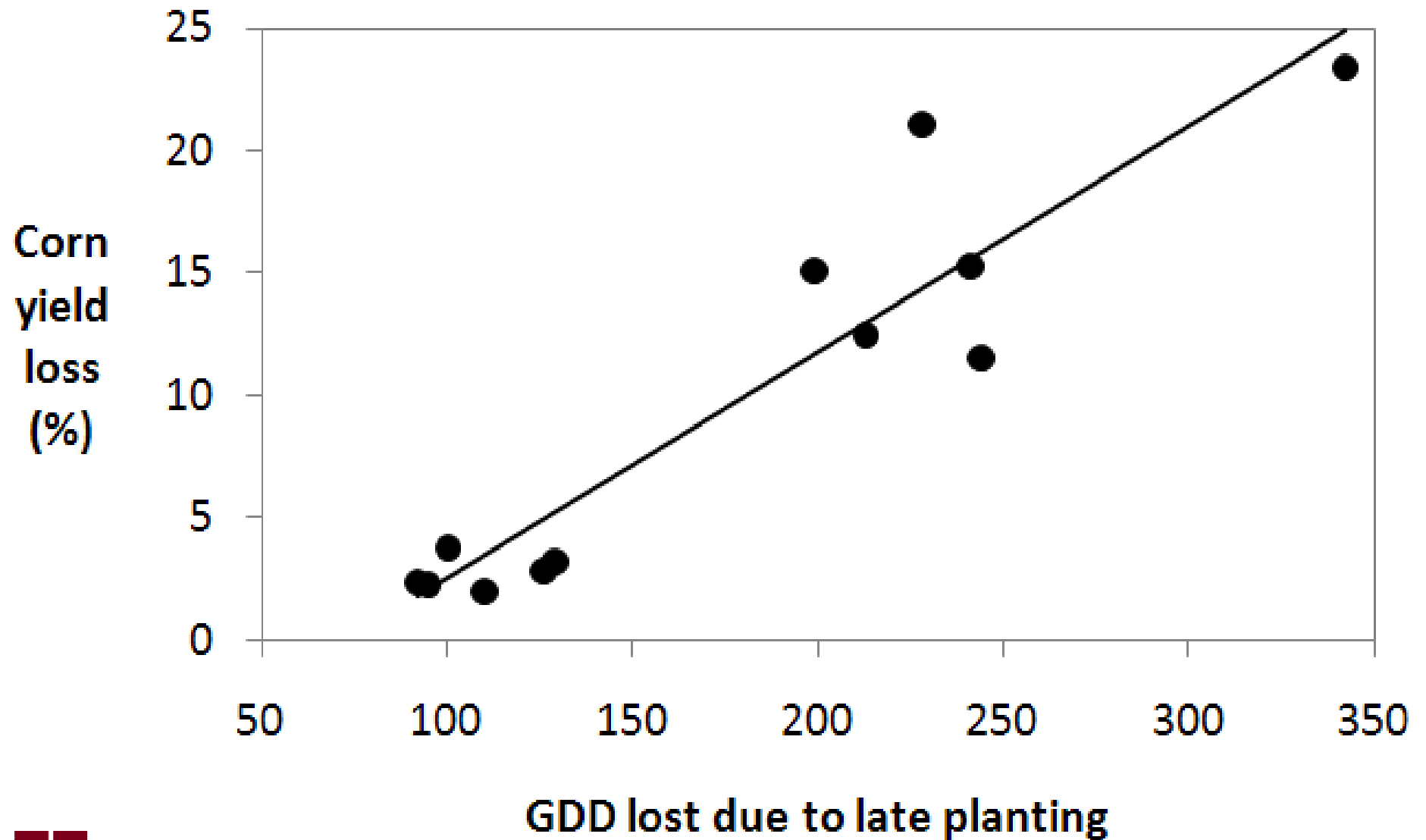


# Available soil water - Lambertton

## 2011 vs. historic average (1966-2010)



# Waseca & Lambertton (2008-2010)

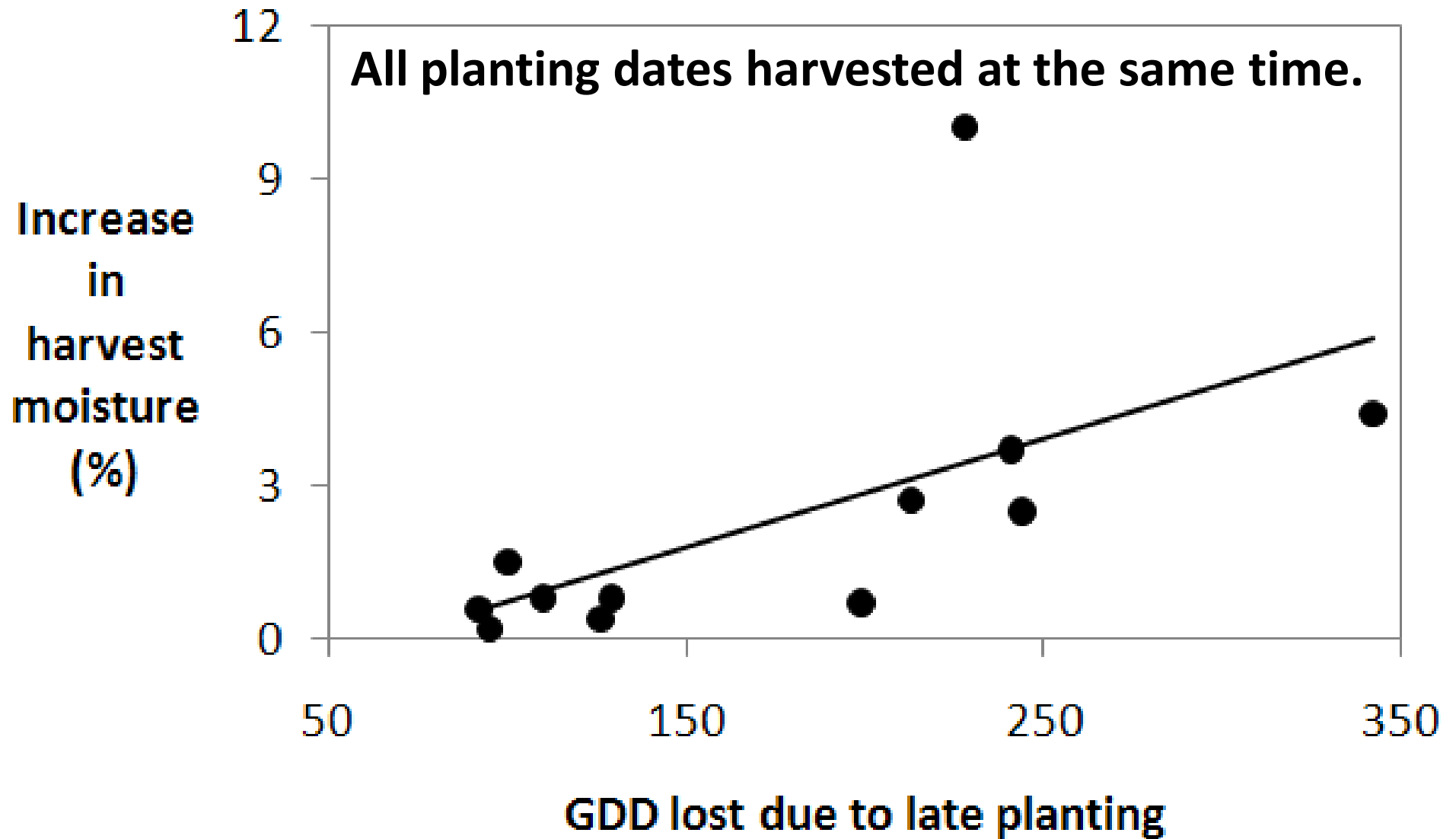


# Waseca, 2010

| Planting date | Stover yield (dry tons/acre) | Grain yield (bu/acre) | Kernels per square meter | Kernel weight (mg) |
|---------------|------------------------------|-----------------------|--------------------------|--------------------|
| April 23      | 3.29                         | 203                   | 3949                     | 273                |
| May 6         | 3.60 (+9%)                   | 199 (-2%)             | 3887 (-2%)               | 272 (-0%)          |
| May 20        | 3.48 (+6%)                   | 191 (-6%)             | 3808 (-4%)               | 266 (-3%)          |



# Waseca & Lamberton (2008-2010)

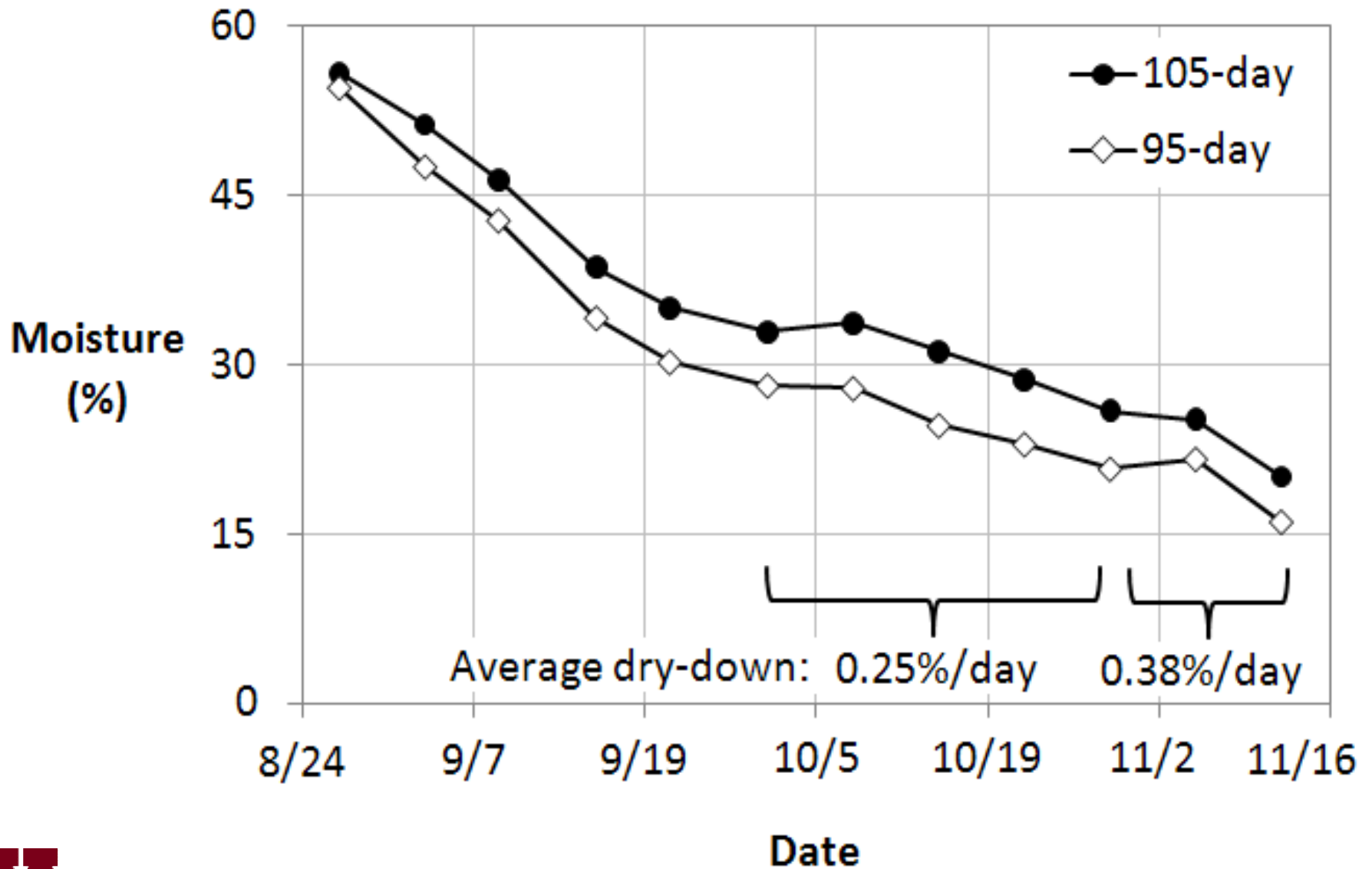


# Waseca, 2011

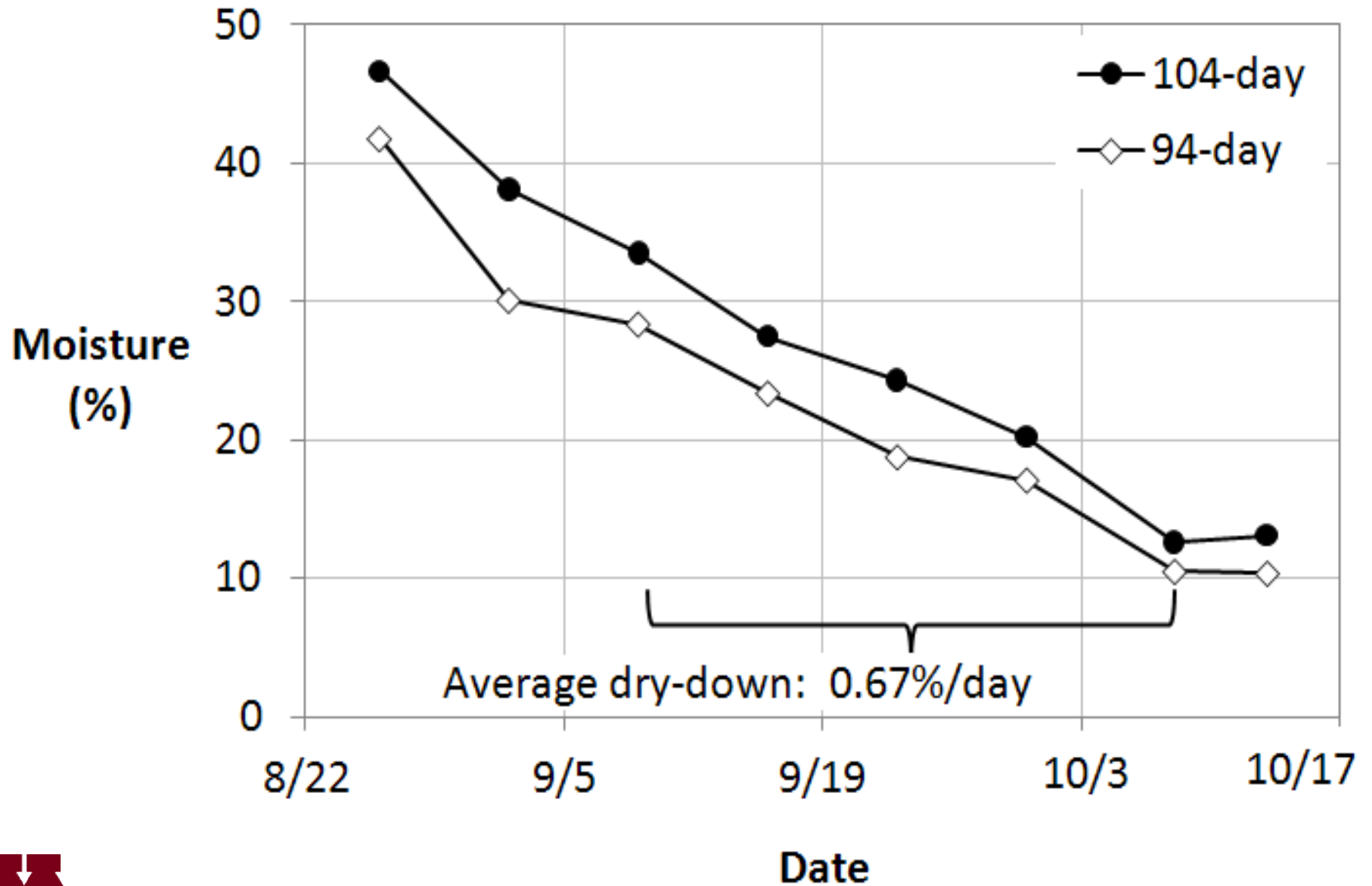
| <b>Planting date</b> | <b>GDD lost due to late planting</b> | <b>Predicted delay in silking</b> | <b>Predicted yield loss</b> | <b>Predicted increase in harvest moisture</b> |
|----------------------|--------------------------------------|-----------------------------------|-----------------------------|---|
| May 4                | 0                                    | 0 days                            | 0%                          | 0%  |
| May 13               | 99                                   | 4 days                            | 2%                          | 1%  |
| May 24               | 201                                  | 9 days                            | 12%                         | 3%  |
| May 31               | 294                                  | 13 days                           | 20%                         | 5%  |



# Waseca & Lamberton (2009)



# Waseca, 2010



# Average Field Drying Rates for Corn in MN

| Date                   | Grain moisture loss<br>(% per day) |
|------------------------|------------------------------------|
| September 15-25        | 0.75-1.00                          |
| September 26-October 5 | 0.50-0.75                          |
| October 6-15           | 0.25-0.50                          |
| October 16-31          | 0.00-0.33                          |
| After October 31       | very little                        |

From Hicks (2004)



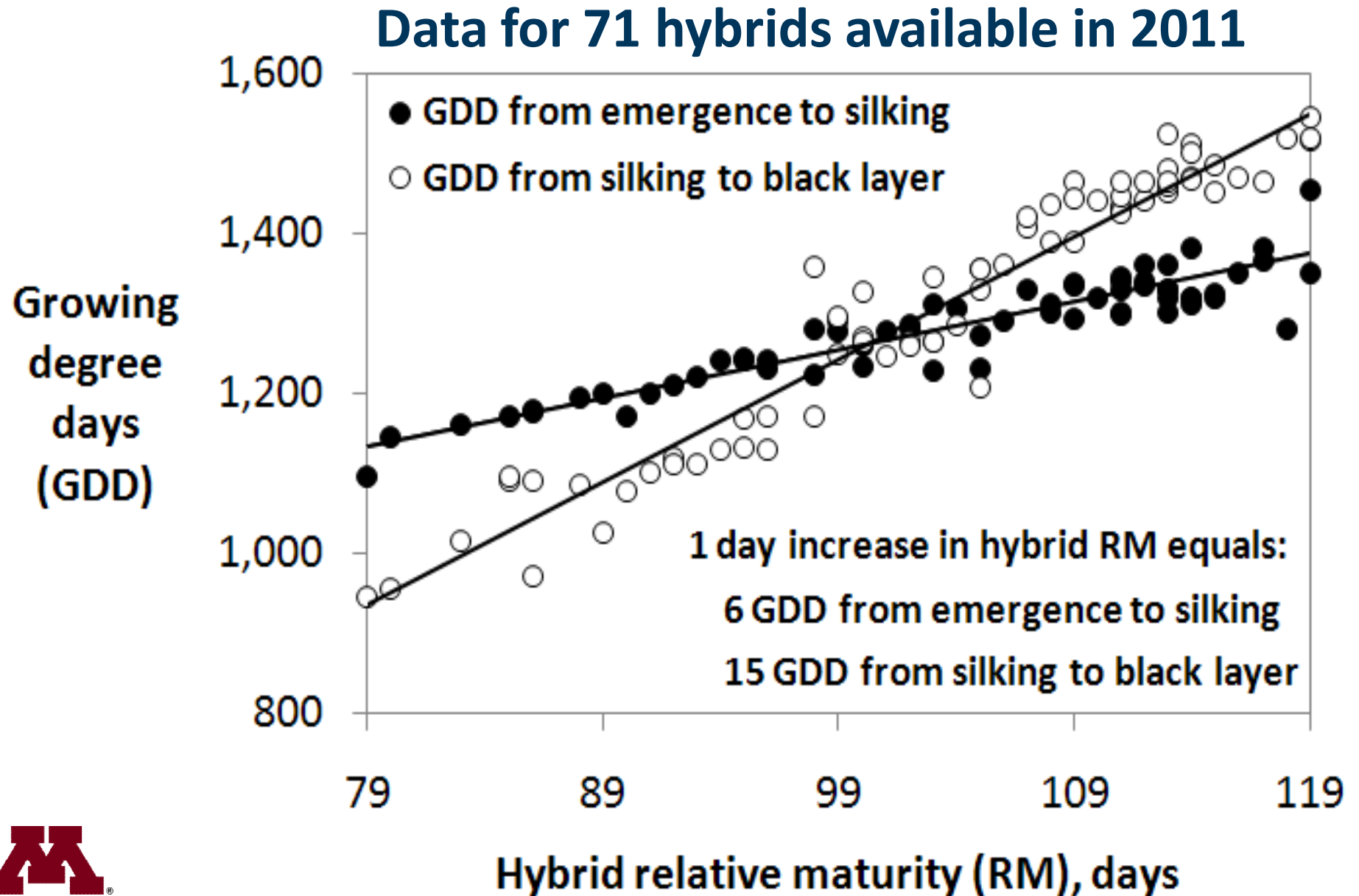
# Waseca, Rochester, & Lamberton (2006-2010)

16 to 64 hybrids per group in each year

| Hybrid relative maturity (days) | Yield (bu/acre) | Harvest moisture (%) |
|---------------------------------|-----------------|----------------------|
| 93 to 97                        | 194             | 17.2                 |
| 98 to 102                       | 198 (+2%)       | 18.4 (+1.2)          |
| 103 to 107                      | 203 (+5%)       | 20.2 (+3.0)          |



# Hybrid Maturity & Crop Growth



# Waseca & Lamberton (2010)

| Hybrid relative maturity (days) | Stover yield (dry tons/acre) | Grain yield (bu/acre) | Kernels per square meter | Kernel weight (mg) |
|---------------------------------|------------------------------|-----------------------|--------------------------|--------------------|
| 94                              | 3.18                         | 172                   | 3443                     | 266                |
| 99                              | 3.67 (+15%)                  | 196 (+14%)            | 3621 (+5%)               | 289 (+9%)          |
| 104                             | 4.04 (+27%)                  | 195 (+13%)            | 3641 (+6%)               | 284 (+7%)          |



# Hybrids Adjust for Late Planting Waseca & Lamberton (2008-2010)

| Delay in planting (days) | Days to silking |
|--------------------------|-----------------|
| 0                        | 85              |
| 14                       | 77 (-8)         |
| 28                       | 69 (-16)        |

\*Data from a 102-day hybrid.



# Corn maturity guidelines for late planting in southern MN

| Planting date | Relative maturity units earlier than full-season |
|---------------|--|
| Before 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                                       |

From Hicks et al. (1999)

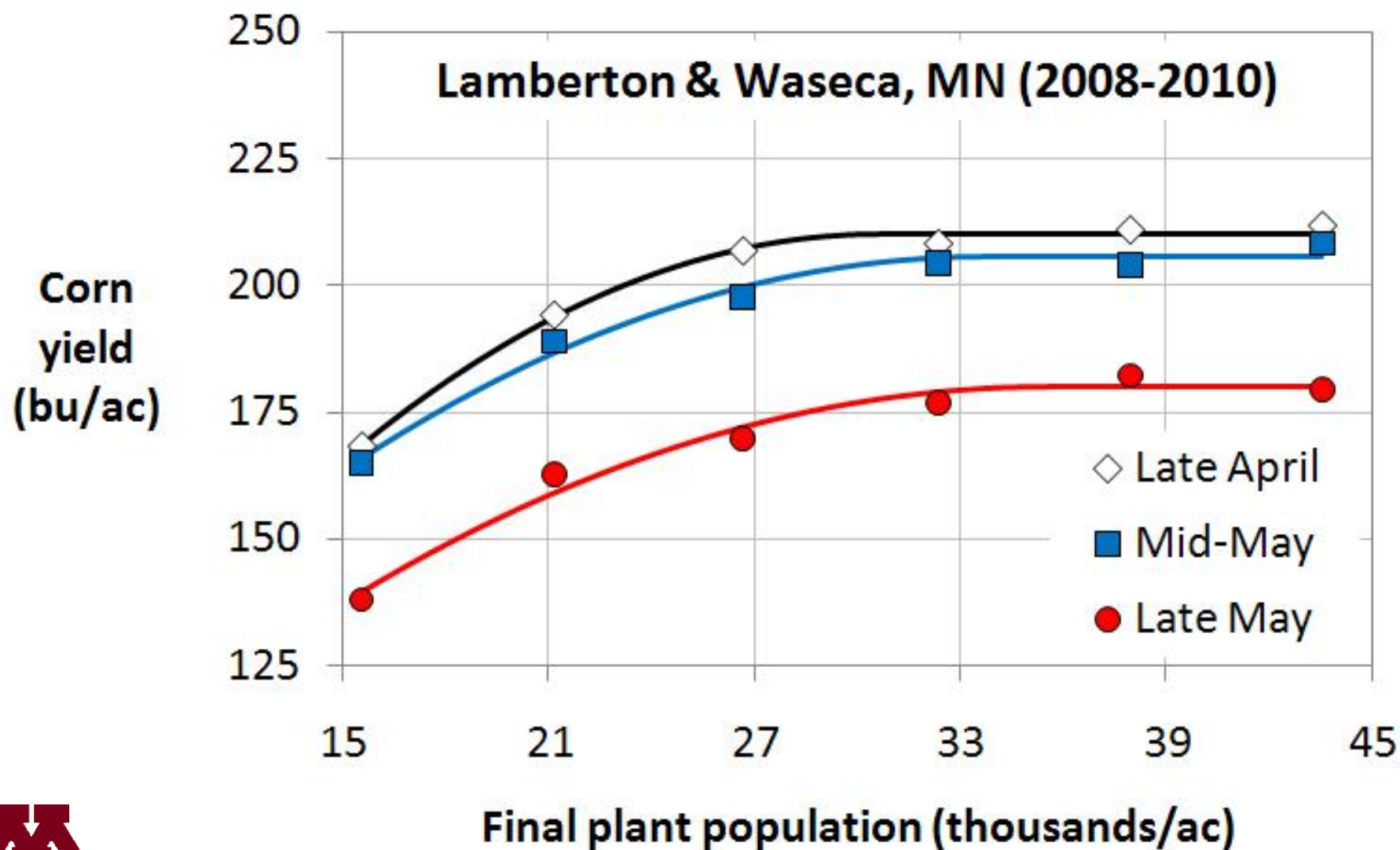


# Waseca & Lamberton (2006-2008)

| <b>Final stand<br/>(plants/acre)</b> | <b>Grain yield<br/>potential (%)</b> |
|--------------------------------------|--------------------------------------|
| 36,000                               | 100                                  |
| 32,000                               | 99                                   |
| 28,000                               | 95                                   |
| 24,000                               | 91                                   |
| 20,000                               | 84                                   |
| 16,000                               | 76                                   |



- 1) Response to plant population similar for all planting dates.
- 2) On average, yield maximized at 32,800 plants/ac or higher.



**Plant that was  
2 ½ leaf stages  
behind is  
late to silk**



# Lamberton, MN (32,000 plants/acre)

| Emergence pattern                          | Avg.<br>of all<br>plants | Early<br>plants | Late<br>plants |
|--|--------------------------|-----------------|----------------|
| — Yield (% of control) —                   |                          |                 |                |
| Uniform                                    | 100%                     | ---             | ---            |
| 1 leaf-stage delay on<br>every other plant | 94%                      | 107%            | 80%            |
| 2 leaf-stage delay on<br>every other plant | 83%                      | 118%            | 49%            |
| Every other plant missing                  | 73%                      | ---             | ---            |

Ford and Hicks, 1992 (*Journal of Production Agriculture*)

# Uniform Plant Spacing



# Uneven Plant Spacing



# Uneven Spacing Study - 2 locations in Ontario 2000 & 2001 (27,000 plants/acre)

| Plant spacing               | Avg. of all plants | Plant next to gap | Avg. of plants in double or triple |
|-----------------------------|--------------------|-------------------|------------------------------------|
| ——— Yield (% of control) —— |                    |                   |                                    |
| Uniform                     | 100%               | ---               | ---                                |
| 1 double in 6               | 99%                | 110%              | 92%                                |
| 1 triple in 6               | 98%                | 110%              | 91%                                |

- **V6 stage:**
  - Growing point 1" above soil; ear shoots forming.
  - Rapid growth and N uptake begins.
- **Yield determination:**
  - Rows/ear = V6 to V8
  - Potential kernels/row = V6 to V16
- **V10 stage:** new leaf collar every 2 to 3 days.
- **V10 to R1:** high susceptibility to greensnap.
- **Shallow roots:** greater susceptibility to root lodging and drought stress later in the season.

## **V10 - Silking: High Susceptibility to Green-snap**



# Simulated Root Lodging Study

## University of Wisconsin (over 2 years)

| Time of root lodging | Yield (bu/acre) |
|----------------------|-----------------|
| No lodging           | 193             |
| V11                  | 186 (-4%)       |
| V14                  | 175 (-9%)       |
| VT                   | 156 (-19%)      |

Adapted from Carter and Hudelson, 1988 (*Journal of Production Agriculture*)



# Thanks!



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