Agronomy Update Meetings
Corn Observations For 2001

- Late planting was the major story.
- Window for corn planting in late April. Good shape if planted before May 2. Wet and cool planting conditions during early May caused reduced stands.
- Late-planting and drought conditions for eastern WI reduced yields ~50%.
- Good yields with low moisture in southern WI. Variable yield with higher than normal grain moisture in northern WI.
- Timing of silage harvest was ‘normal’.
- Uneven development within fields.

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Corn Grain Hybrid Performance Trials

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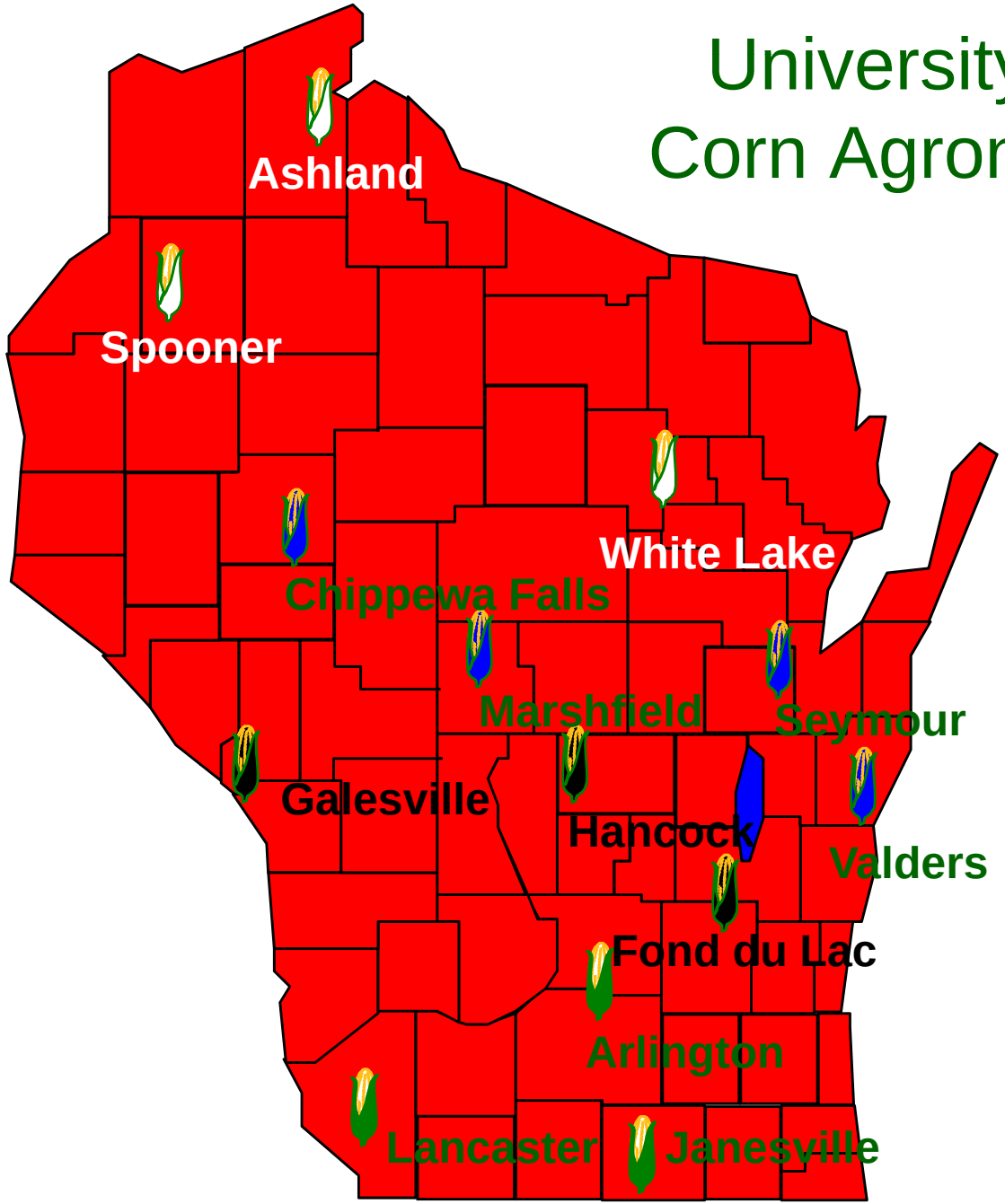
Corn Agronomy Program

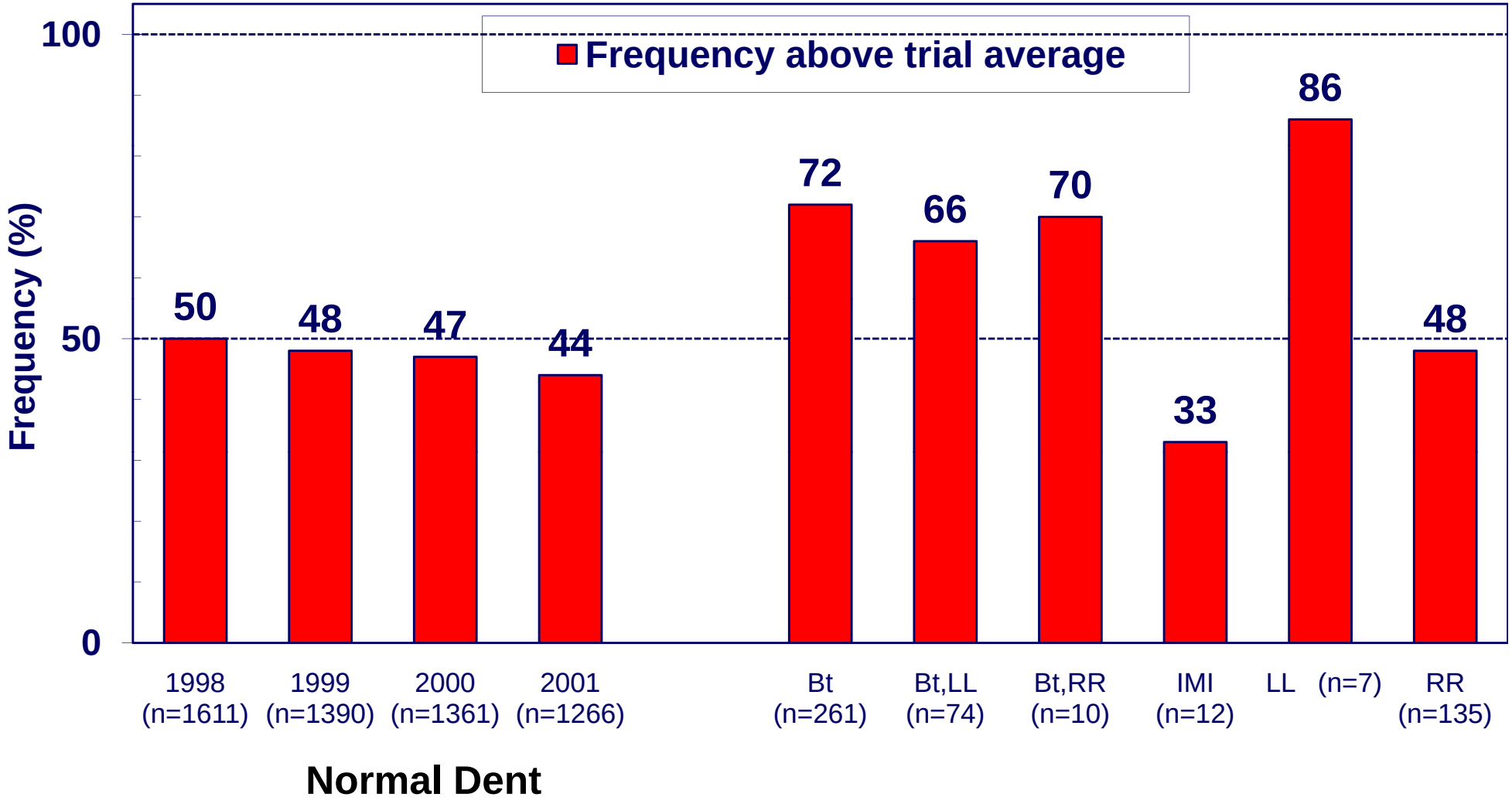


2001 Wisconsin Corn Performance Trials - Grain Summary

Location	1991-2000		2001		Percent Change
	N	Yield	*N*	Yield	
Arlington	1809	194	170	220	+ 13
Janesville	1809	184	170	219	+ 19
Lancaster	1809	177	170	185	+ 5
Fond du Lac	1592	169	155	156	- 5
Galesville	1592	160	155	206	+ 29
Hancock	1591	181	155	214	+ 13
Chippewa Falls	1472	149	145	153	+ 3
Marshfield	1062	149	137	147	- 1
Seymour	972	150	145	152	+ 1
Valders	1472	152	145	75	- 51
Ashland	161	129	16	143	+11
Spooner	1887	127	159	150	+18
White Lake	630	94	53	100	+ 6

Note: Seymour average includes New London 1991-1992.

Frequency of Specialty Hybrids Yielding Above Average in the 2001 WI Hybrid Trials



Computer Software for Choosing Crop Varieties

http //corn.agronomy.wisc.edu

University of Wisconsin

Corn Silage Hybrid Performance Trials

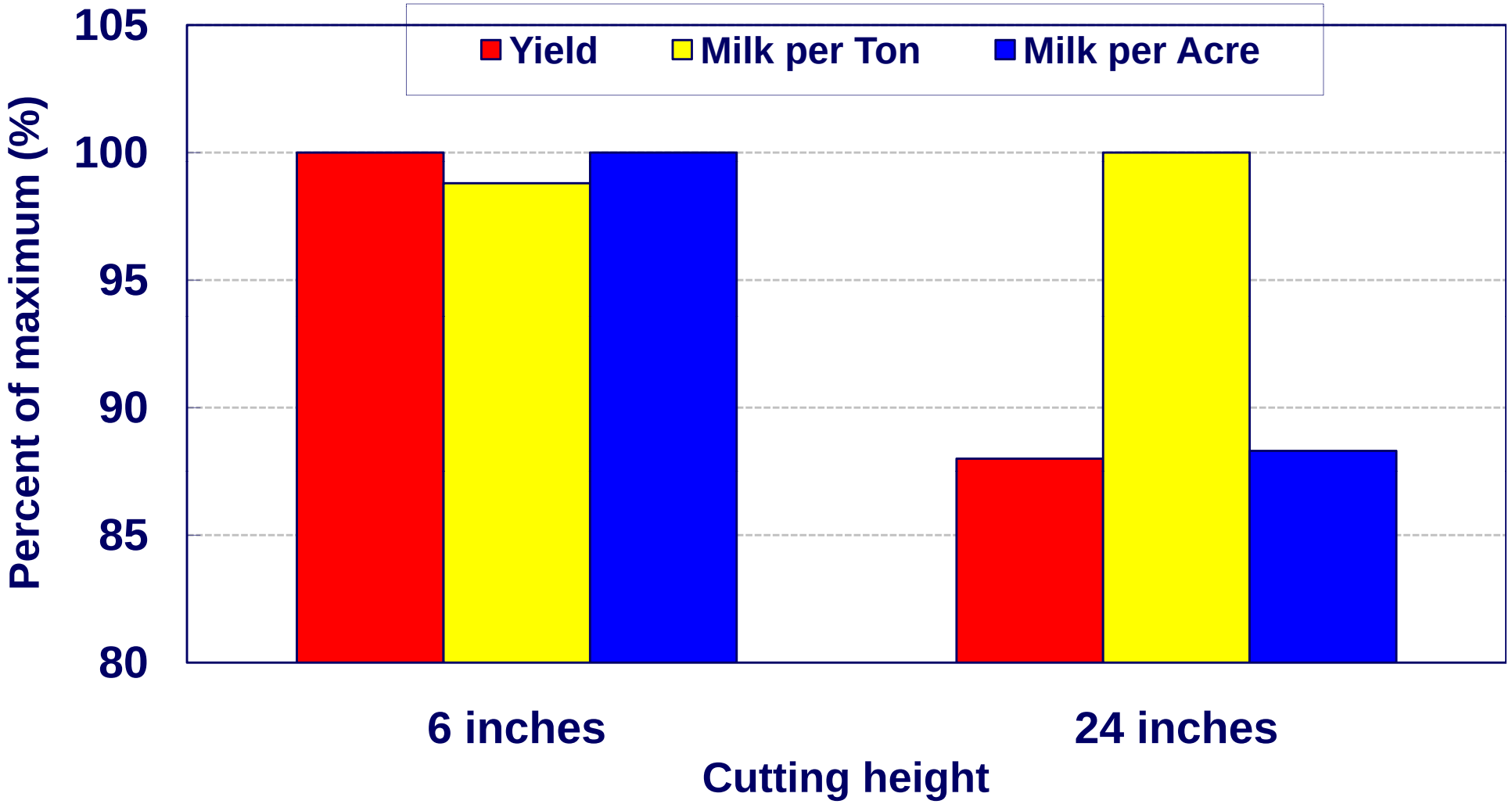
2001 Wisconsin Corn Performance Trials - Silage Summary

Location	1991-2000		2001		Percent Change
	N	Yield	*N*	Yield	
		T/A		T/A	
Arlington	463	9.5	75	10.5	+ 11
Lancaster	386	7.8	75	8.0	+ 3
Fond du Lac	352	8.6	68	8.2	- 5
Galesville	352	8.3	68	9.6	+ 16
Marshfield	428	6.8	55	7.3	+ 7
Valders	387	6.7	57	4.1	- 39
Ashland	125	6.8	16	7.3	+ 7

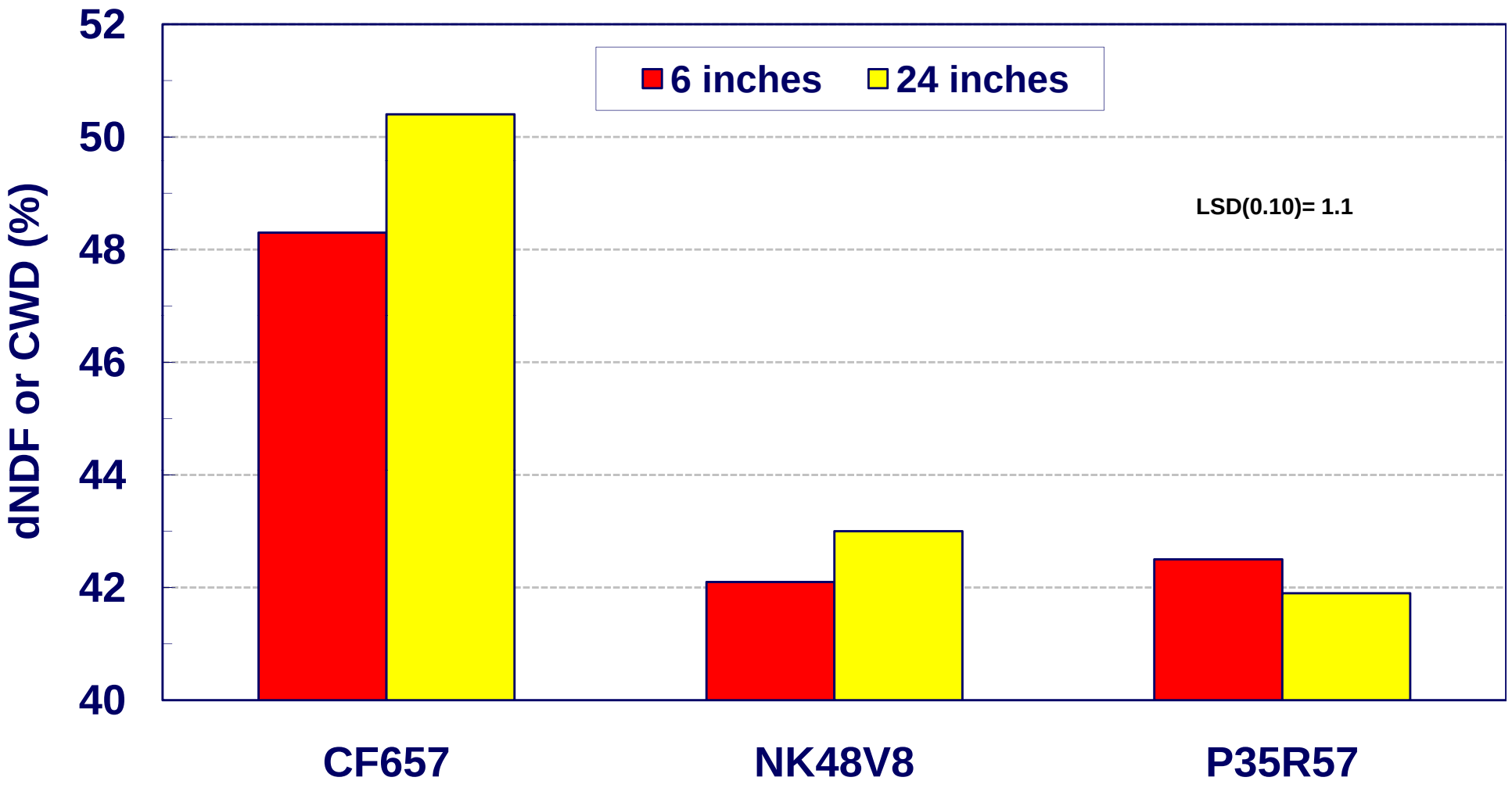
Do we need a silage CRM?

- RM historically based on grain moisture.
- How would we assign RM values for corn silage?
  - ✓ Grain is not usually mature at silage harvest
  - ✓ Milk2000 takes silage moisture into account
  - ✓ Use kernel milkline?
  - ✓ Use whole-plant silage moisture?

Average response of three corn hybrids to cutting height at during 2001 at Arlington



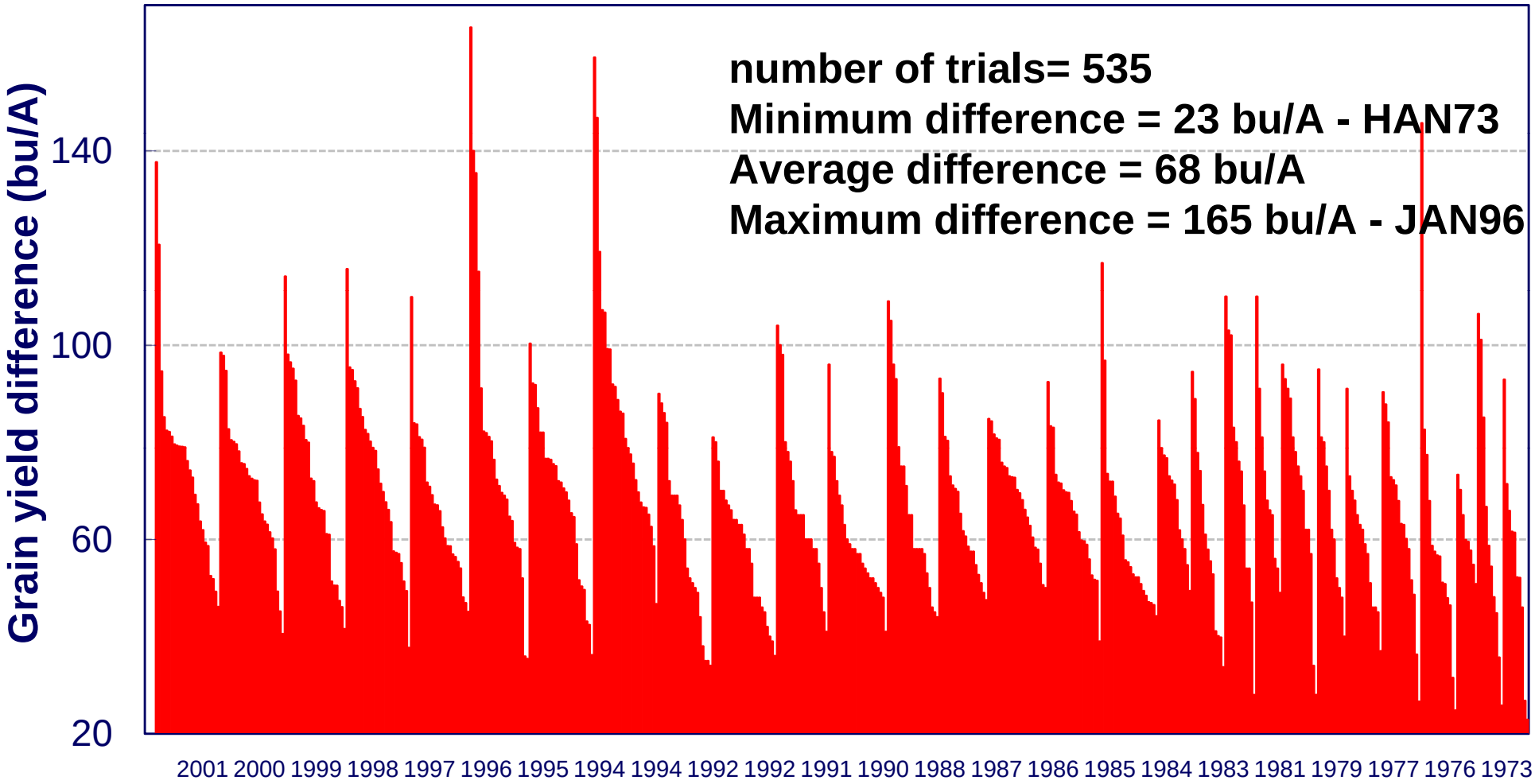
Corn hybrid dNDF (CWD) response to cutting height during 2001 at Arlington



When Should Trials Be Rejected?

- Historical reasons for rejecting a trial
  - ✓ Disturbance (biological or physical) that compromises the integrity of a trial.
    - At Marshfield 46% of plots below ½ stand therefore reject
  - ✓ Data analysis gives no evidence that hybrid means can be separated.
  - ✓ Some statistical measure suggests that a trial gives imprecise hybrid averages.
- Procedure
  - ✓ Check CVs to spot problem plots. Can we explain?
  - ✓ Analysis of variance. Range must be within 3x of minimum.
- Criticism: Yield spread between top- and bottom-yielding hybrid.

Grain yield difference between highest and lowest corn hybrid in UW trials since 1973



Round-up Ready Corn Hybrid Performance Evaluation in the U.S.

Joe Lauer
Corn Agronomist

University of Wisconsin-Extension
Cooperative Extension

Round-up Ready Corn Performance Evaluation - Background

- Justification
  - ✓ Some farmers perceive that herbicide resistant crops are inherently lower yielding than conventional hybrids due to yield drag or yield lag.
  - ✓ To develop a new model for testing corn hybrids quickly collecting meaningful unbiased data (Based on the WAPAC model)
- No funding

- Objectives
  - ✓ To determine if Round-up Ready genes suppress yield
  - ✓ To determine the effect of Round-up Ultra on Round-up Ready hybrids

Materials and Methods

1999 Hybrids (GA21 event):

- Early DeKalb (94-106 RM):
  - ✓ DK448RR and DK448
  - ✓ DK493RR and DK493
  - ✓ DK512RR and DK512
  - ✓ DK566RR and DK566
- Medium DeKalb (108-112 RM):
  - ✓ DK580RR and DK580
  - ✓ DK626RR and DK626
- Late DeKalb (114 RM)
  - ✓ DK642RR and DK642
- NC+ (100, 107, 111 RM)
  - ✓ NC+2019R
  - ✓ NC+4339R
  - ✓ NC+5029R
- Used conventional herbicides

1999 Herbicide Study

- ✓ MP: Herbicide
  - Round-up Ultra
  - Conventional herbicides
- ✓ SP: RR Hybrids

2001 Hybrids (NK603 - CP4 EPSPS event):

- ✓ DKC39-45/ 47RR
- ✓ DKC46-26/ 28RR
- ✓ DKC53-7/ 33RR
- ✓ DKC57-38/ 40RR
- ✓ DKC58-5/ 53RR
- ✓ DKC60-15/ 17RR

Materials and Methods

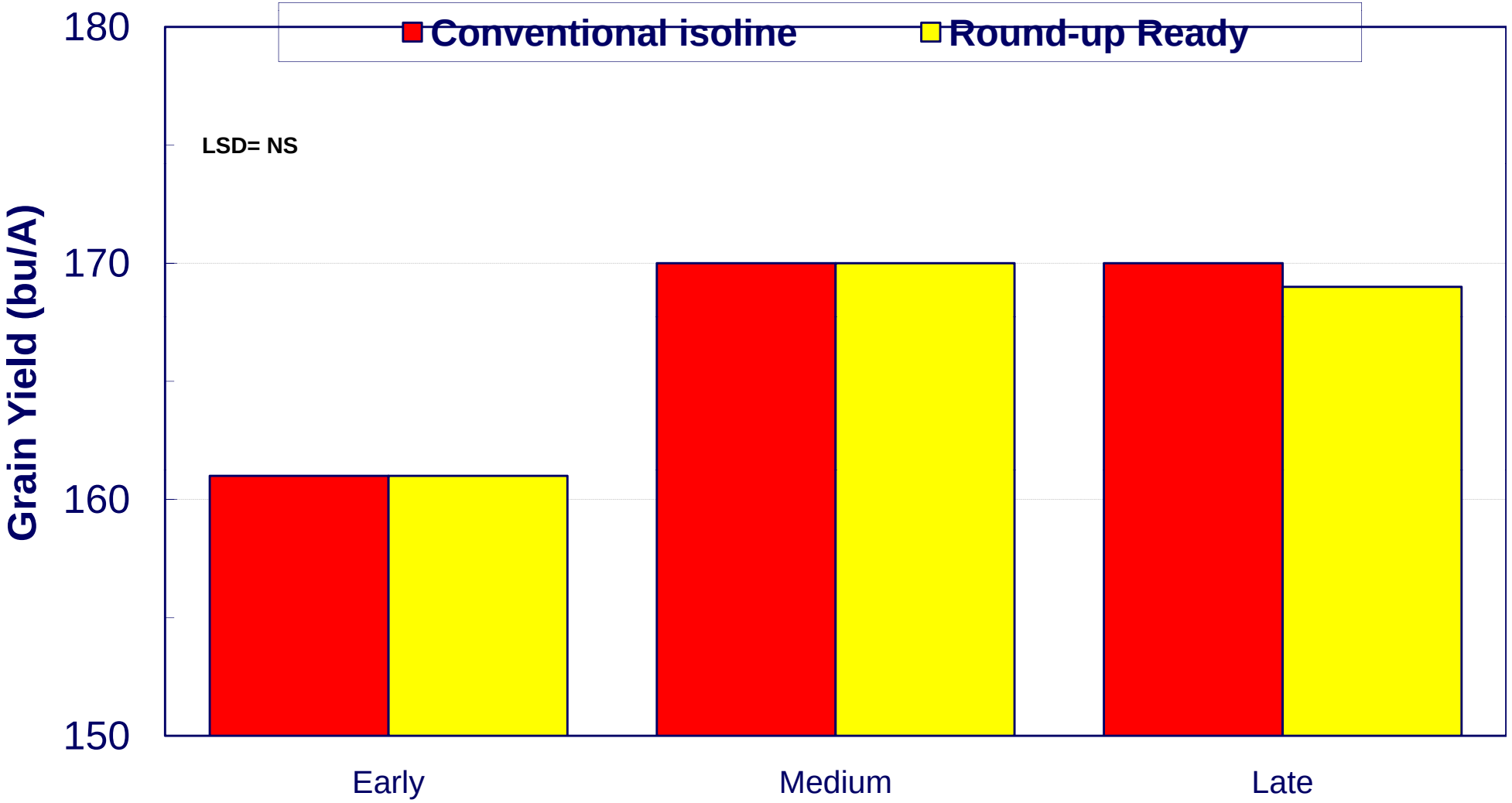
1999 Locations

1. Arlington, WI
2. Wooster, OH
3. Charleston, OH
4. University Park, PA
5. Lamberton, MN
6. Waseca, MN
7. Clay Center, NE
8. Lincoln, NE
9. North Platte, NE

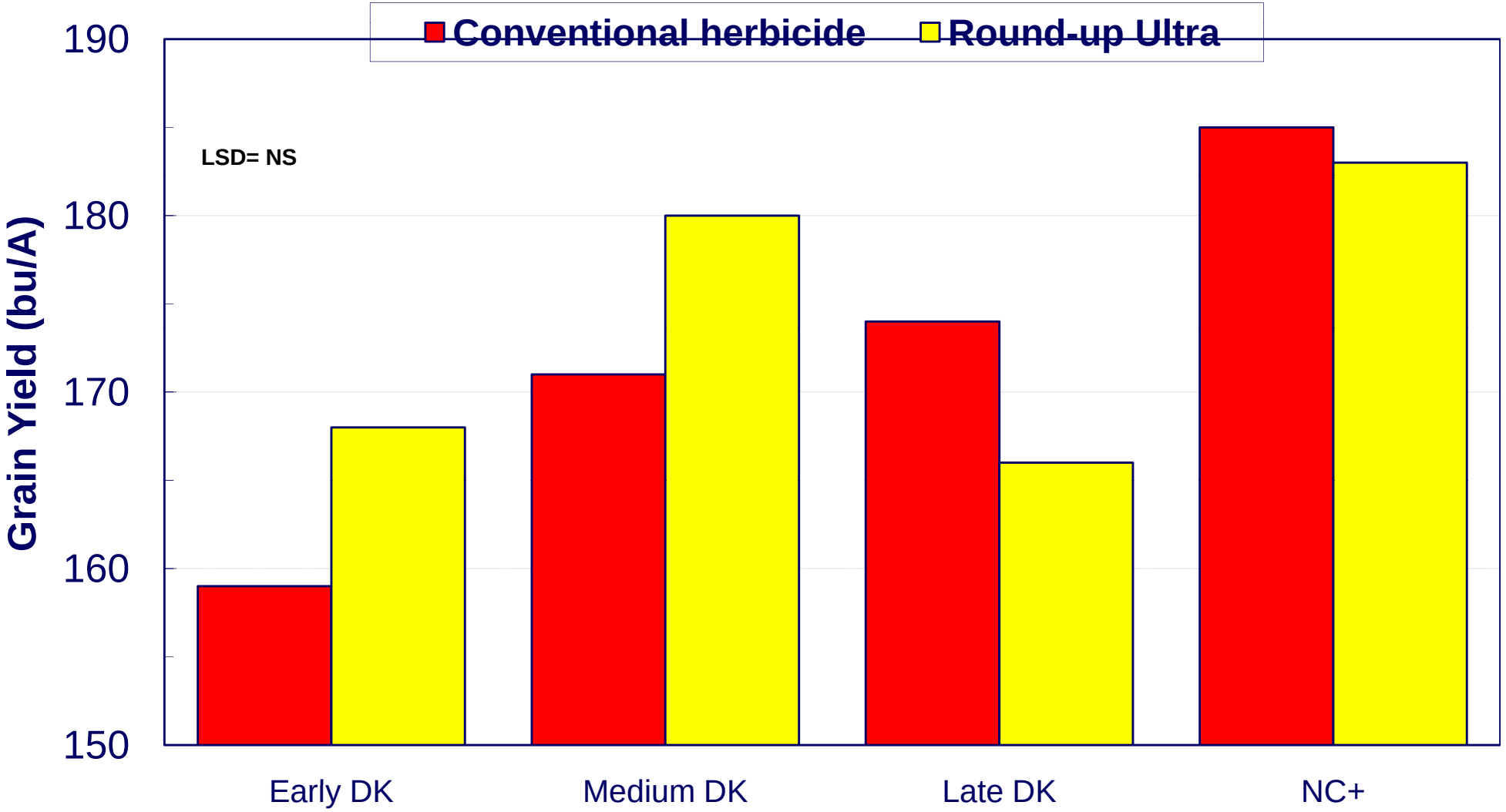
2001 Locations

1. Arlington, WI
2. North Platte, NE
3. Lincoln, NE
4. Columbia, MO
5. Novelty, MO
6. Wooster, OH
7. University Park, PA
8. IA
9. MI
10. ND

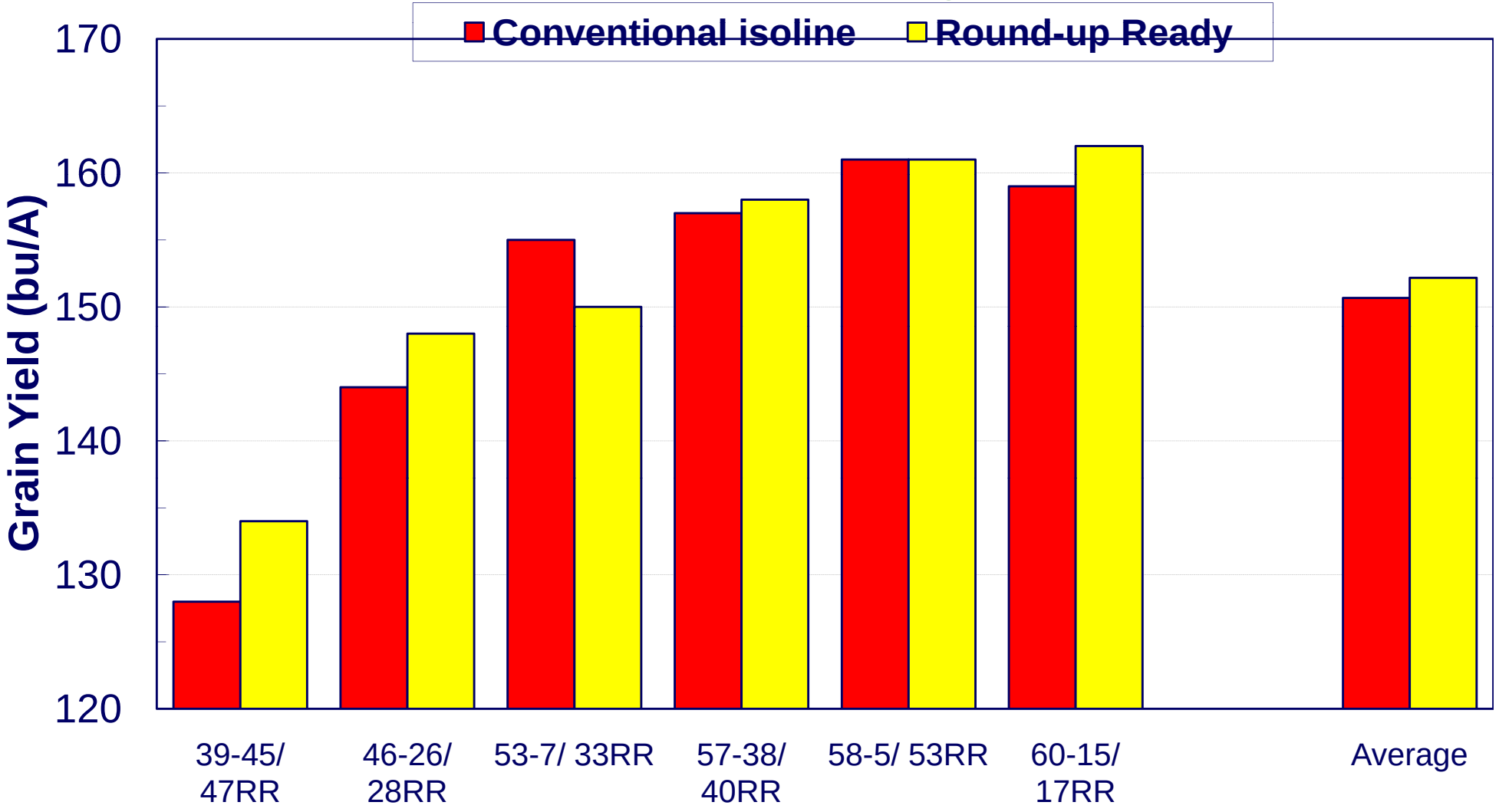
Corn hybrid grain yield for conventional v. Round-up Ready (GA21) isolines at nine locations during 1999



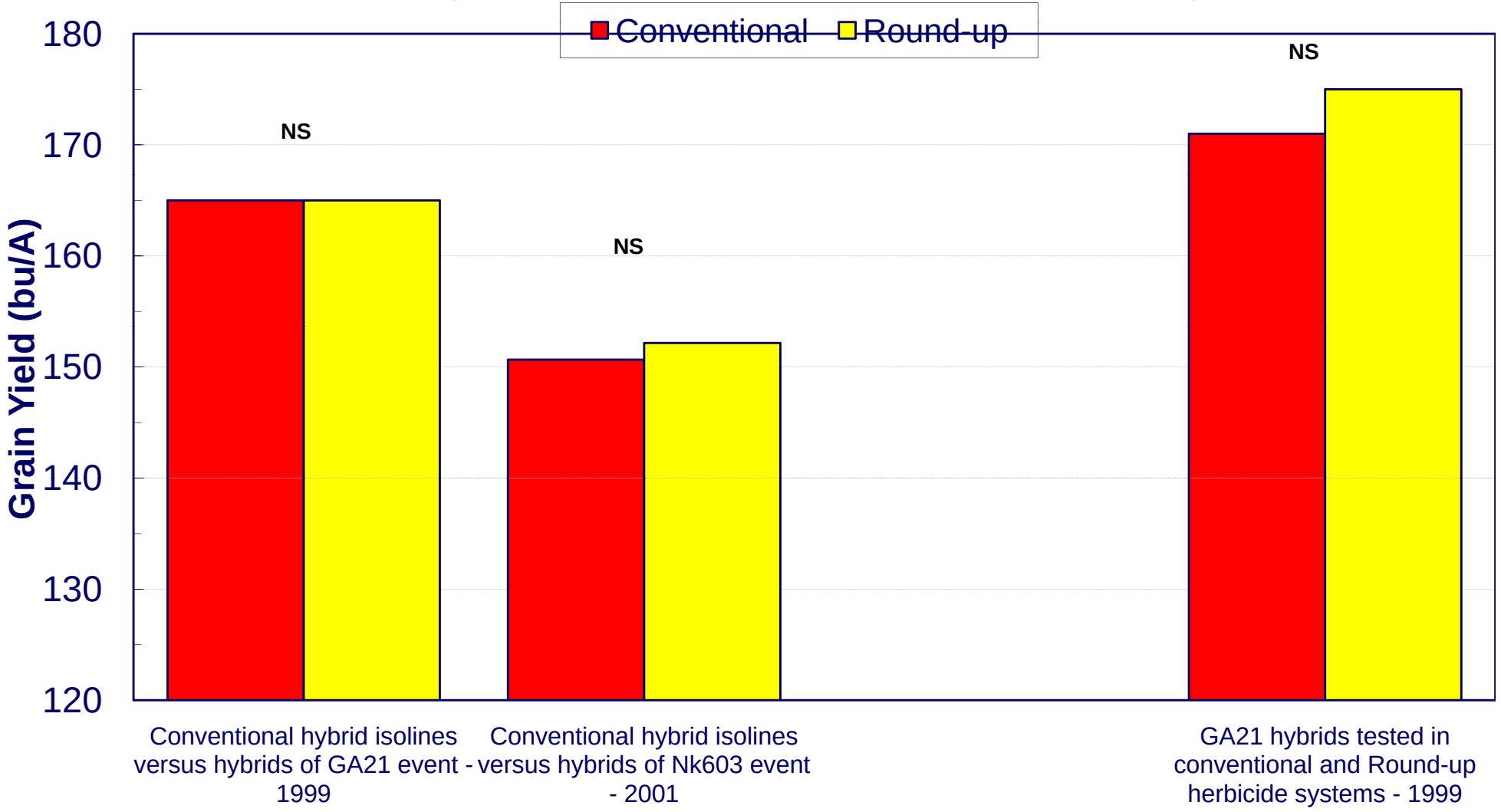
Grain yield of RR corn hybrids (GA21) grown using conventional and Round-up herbicides at nine locations during 1999



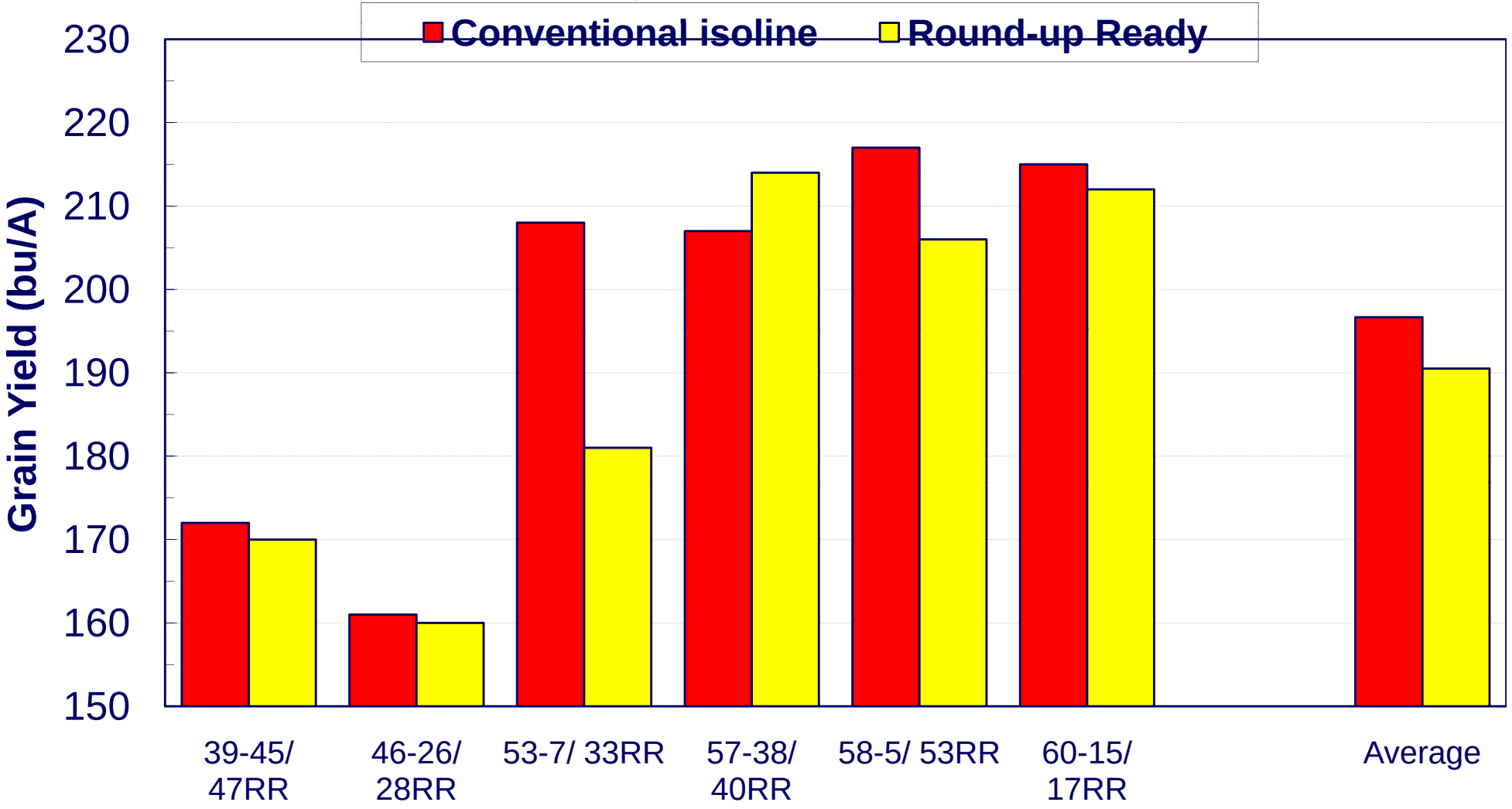
Corn hybrid grain yield for conventional v. Round-up Ready (Nk603 event) isolines at 10 locations during 2001



Corn grain yield for conventional versus Round-up Ready isolines. Values are averaged across locations and hybrids.



Corn hybrid grain yield for conventional v. Round-up Ready (Nk603 event) isolines during 2001 in Wisconsin



Conclusions

- The Round-up Ready gene or its insertion did not affect yield.
- Glyphosate (Roundup Ultra) had no effect on glyphosate resistant hybrids.
- There is no evidence of yield suppression associated with Round-up Ready corn technology

With-in Row Plant Spacing in Corn

Joe Lauer
Corn Agronomist

Background

- Recent interest in the grain yield response of corn to plant spacing variability.
  - ✓ Planter “tuning” services offered
- Some advertisements in popular press claim up to 20% yield increases with properly tuned planters.
- Pioneer agronomists estimate yield advantages of between 5 and 10 bushels/A in uniformly spaced corn stands over non-uniform spacing.

Objective

- To determine the relationship between corn yield response and plant spacing variability.

Previous Research on Corn Grain Yield Response to Plant Spacing Variation

- Iowa: Non significant up to 6 inches standard deviation
  - ✓ Erbach et al. (1972)
- Illinois: Non significant
  - ✓ Johnson and Mulvaney (1980)
  - ✓ Dungan et al., (1958): hills
- Indiana: Non significant and Significant (web)
  - ✓ Nielsen (1997)
  - ✓ Nielsen (web): Grain yield decreases 2.5 bu/A for each inch standard deviation > 2 inches
- Ontario: Non significant
  - ✓ Daynard et al. (1983, 1981, 1979)
- Kansas: Significant
  - ✓ Krall et al. (1977): 3.4 bu/A decrease for each inch increase standard deviation
  - ✓ Vanderlip et al (1988): grain yield decreased when standard deviation values were greater than 2.4 inches
- Nebraska: Non significant in hills
  - ✓ Kiesselbach and Weihing (1933)

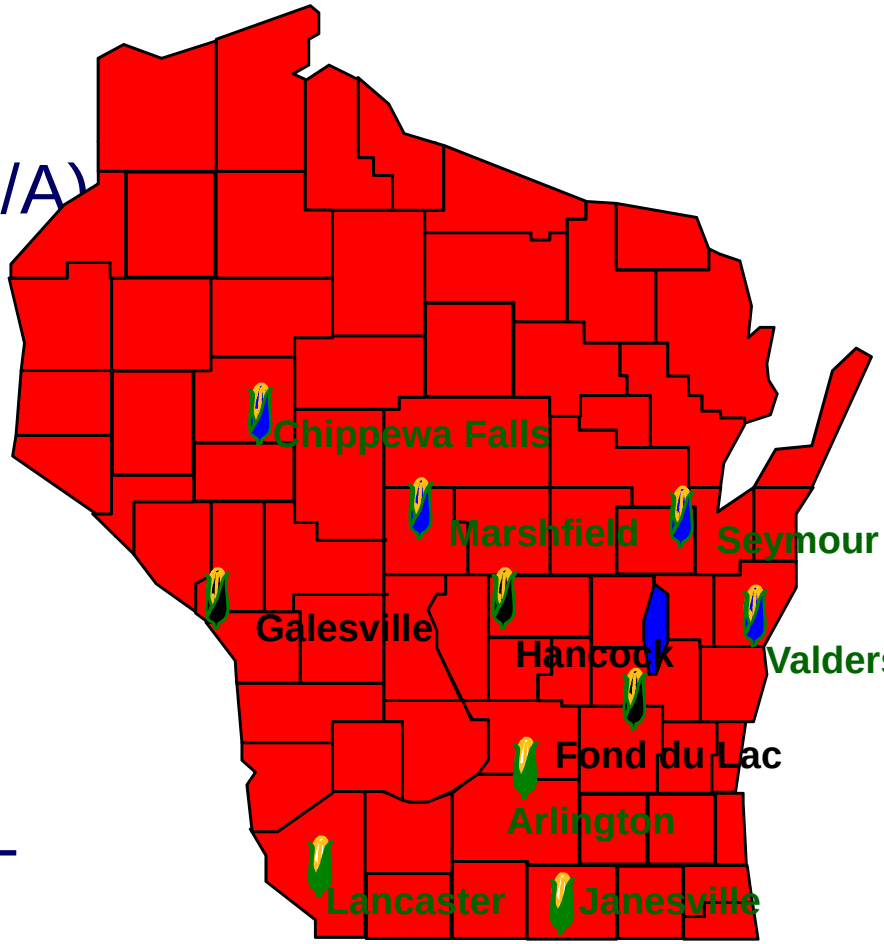
Stand Characteristics of WI Corn Fields Evaluated for Stand Uniformity (n= 127)

	Average	Minimum - Maximum
Standard deviation (inches)	3.3	1.9 – 6.8
Doubles per 50 ft. (≤2”)	5.4	0.1 – 25.9
Gaps per 50 ft. (≥12”)	7.0	1.0 – 16.9
Average spacing (inches)	7.2	4.7 – 14.8
Planting rate (plants/A)	30,553	21,000 – 42,000
Actual plant density (plants/A)	29,727	21,916 – 44,605
Stand as % planted	97	78 - 121

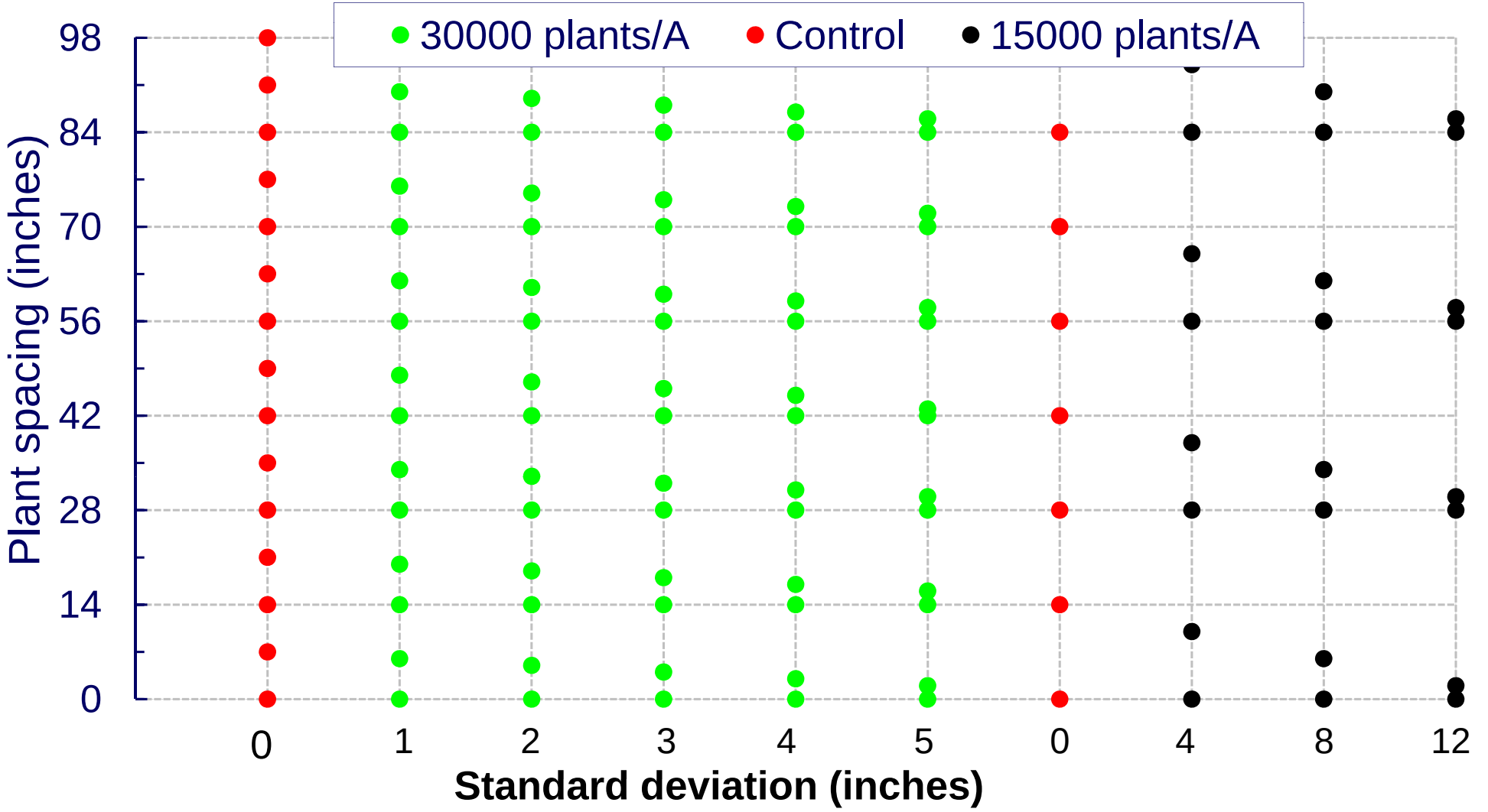
Rankin, 2000

Corn Plant Spacing Variability 1999-2001 Materials and Methods

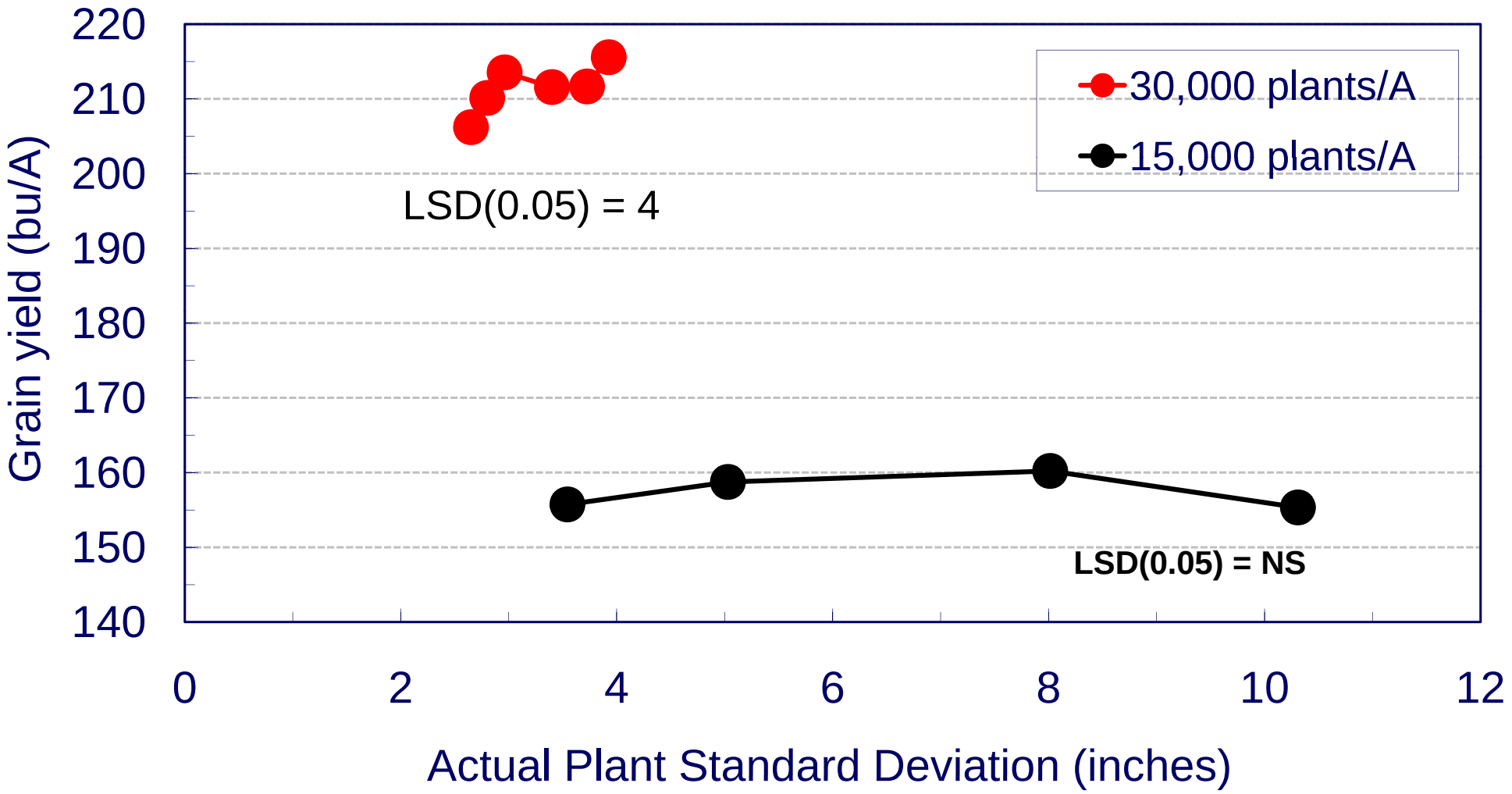
- Target plant population
  - ✓ 7 inches (30,000 plants/A)
  - ✓ 1999: 14 inches (15,000 plants/A)
- Target standard deviation
  - ✓ 0 to 12 inches
- Hybrid
  - ✓ P35R57: ARL, JAN, LAN
  - ✓ C4111: FON, GAL, HAN
  - ✓ N3030Bt: CHI, MAR, SEY, VAL



Plant Spacing Variability Treatments 1999 (2-Plant Pattern)



Corn yield response to plant spacing variability treatments during 1999.



Significance of corn plant spacing variability treatments during 1999

30,000 plants/A Location	Grain yield	Grain moisture	Lodging	Grain test weight
Arlington	NS	NS	NS	NS
Janesville	NS	NS	NS	NS
Lancaster	NS	NS	NS	NS
Fond du Lac	*	NS	NS	NS
Galesville	NS	*	NS	NS
Hancock	NS	NS	NS	NS
Chippewa Falls	NS	NS	NS	NS
Marshfield	NS	NS	NS	NS
Seymour	NS	NS	NS	NS
Valders	NS	NS	NS	NS

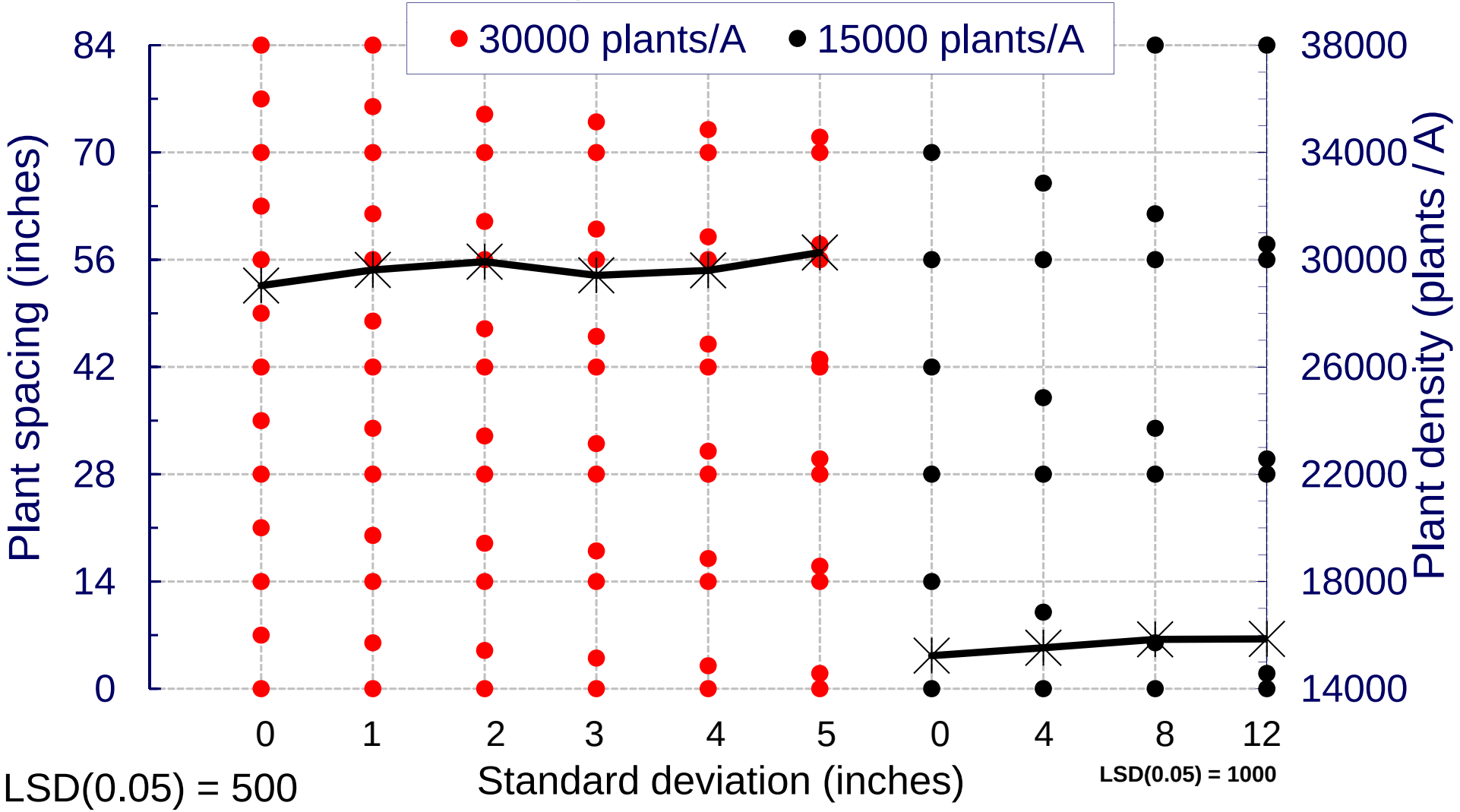
**, *, and † indicates significance at $P \leq 0.01$, 0.05 and 0.10

Significance of corn plant spacing variability treatments during 1999

15,000 plants/A Location	Grain yield	Grain moisture	Lodging	Grain test weight
Arlington	NS	NS	NS	NS
Janesville	NS	NS	NS	NS
Lancaster	NS	NS	NS	NS
Fond du Lac	NS	NS	†	NS
Galesville	†	NS	NS	NS
Hancock	NS	NS	NS	NS
Chippewa Falls	NS	NS	NS	NS
Marshfield	NS	NS	NS	†
Seymour	*	NS	NS	NS
Valders	NS	NS	NS	NS

**, *, and † indicates significance at $P \leq 0.01$, 0.05 and 0.10

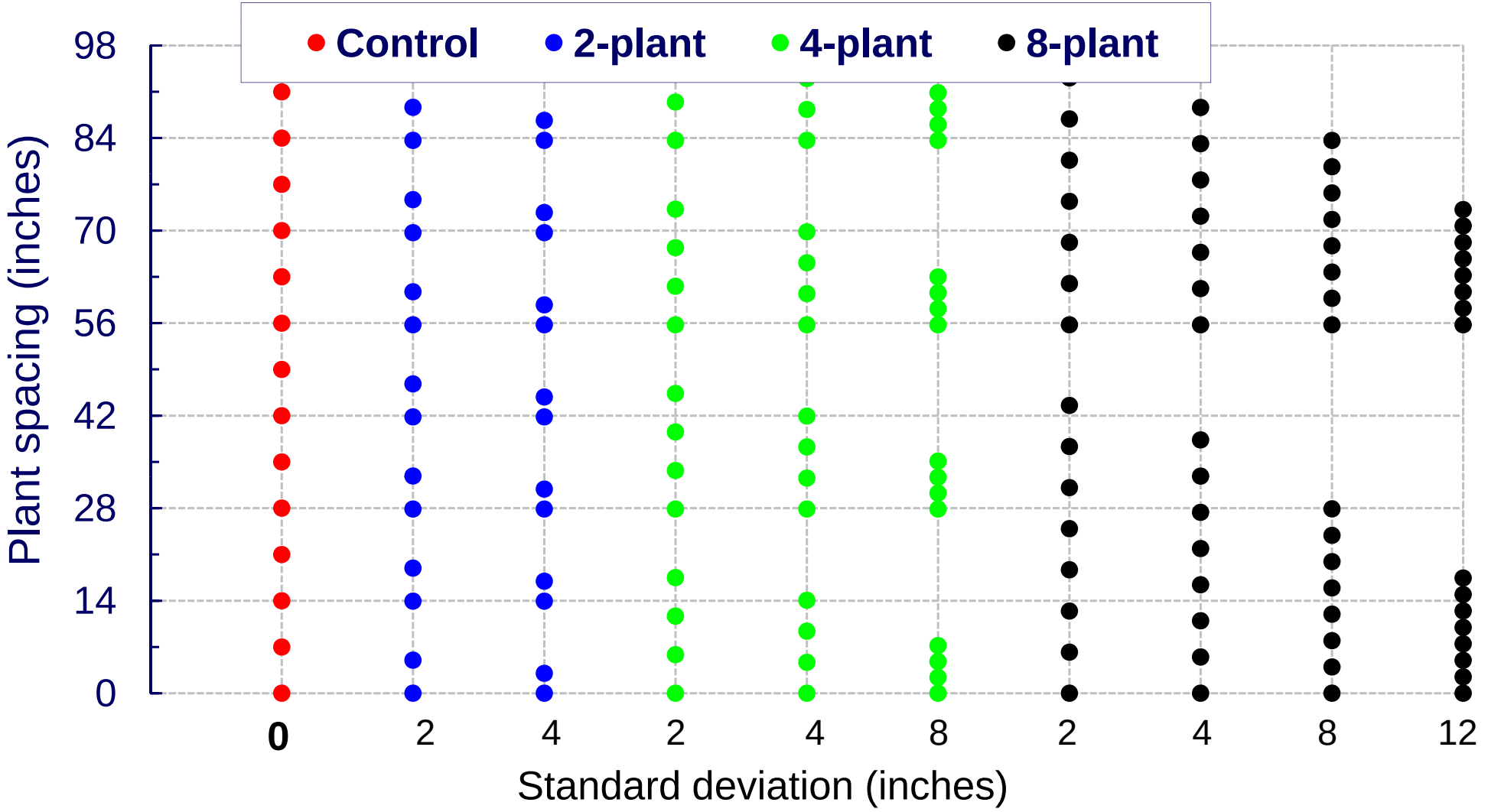
Corn harvest plant density of spacing variability treatments during 1999. Values are averaged across all locations.



Expected corn yield changes (%) for various plant densities in Wisconsin

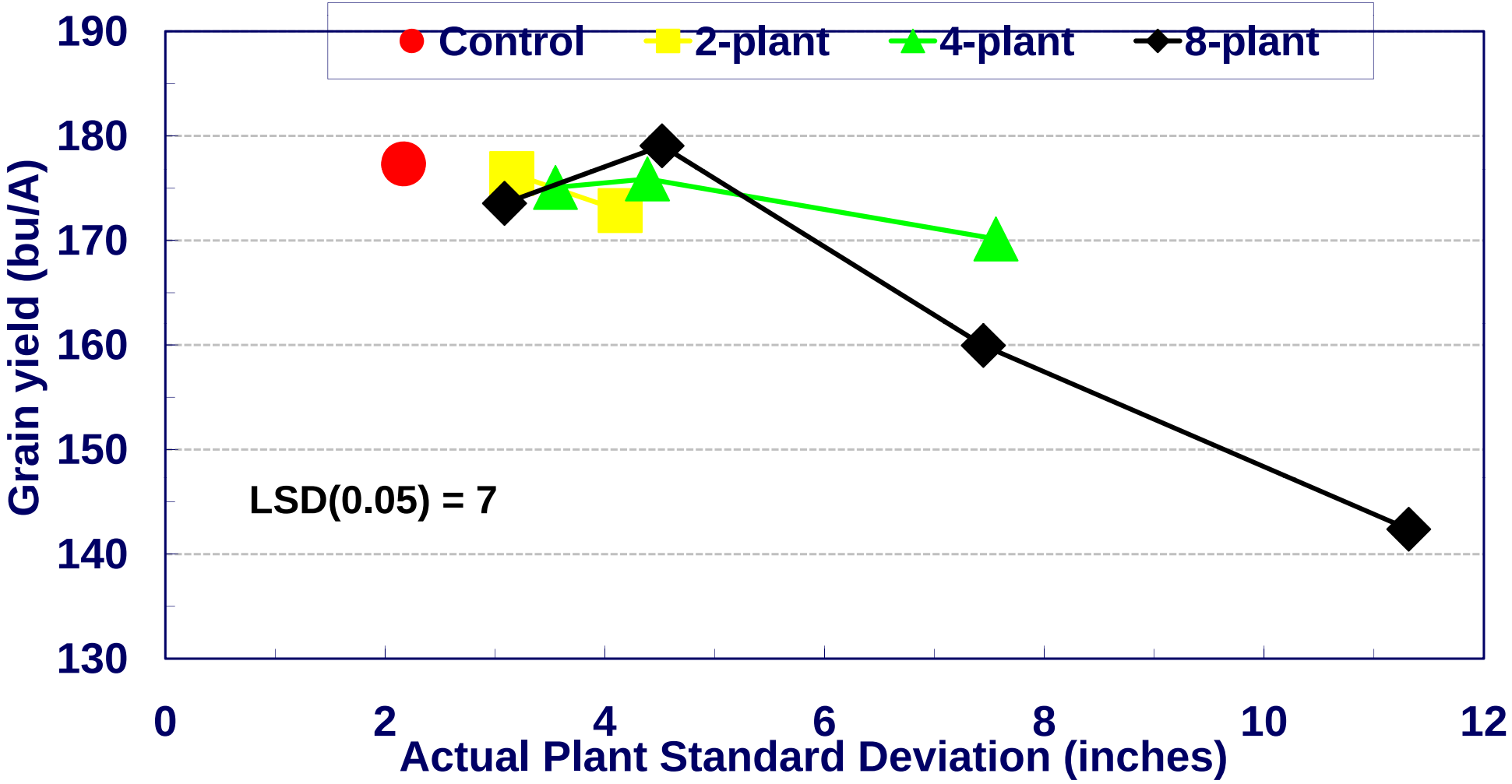
Plants / Acre	Northern	Southern
36,000	100	99
34,000	99	100
32,000	98	100
30,000	97	100
28,000	95	99
26,000	93	97
24,000	91	95
22,000	89	92
20,000	86	89

Plant spacing variability treatments for 2000-2001. Plant density = 30,000 plants/a




JUN

Corn yield response to plant spacing variation during 2000. Values averaged across all locations.

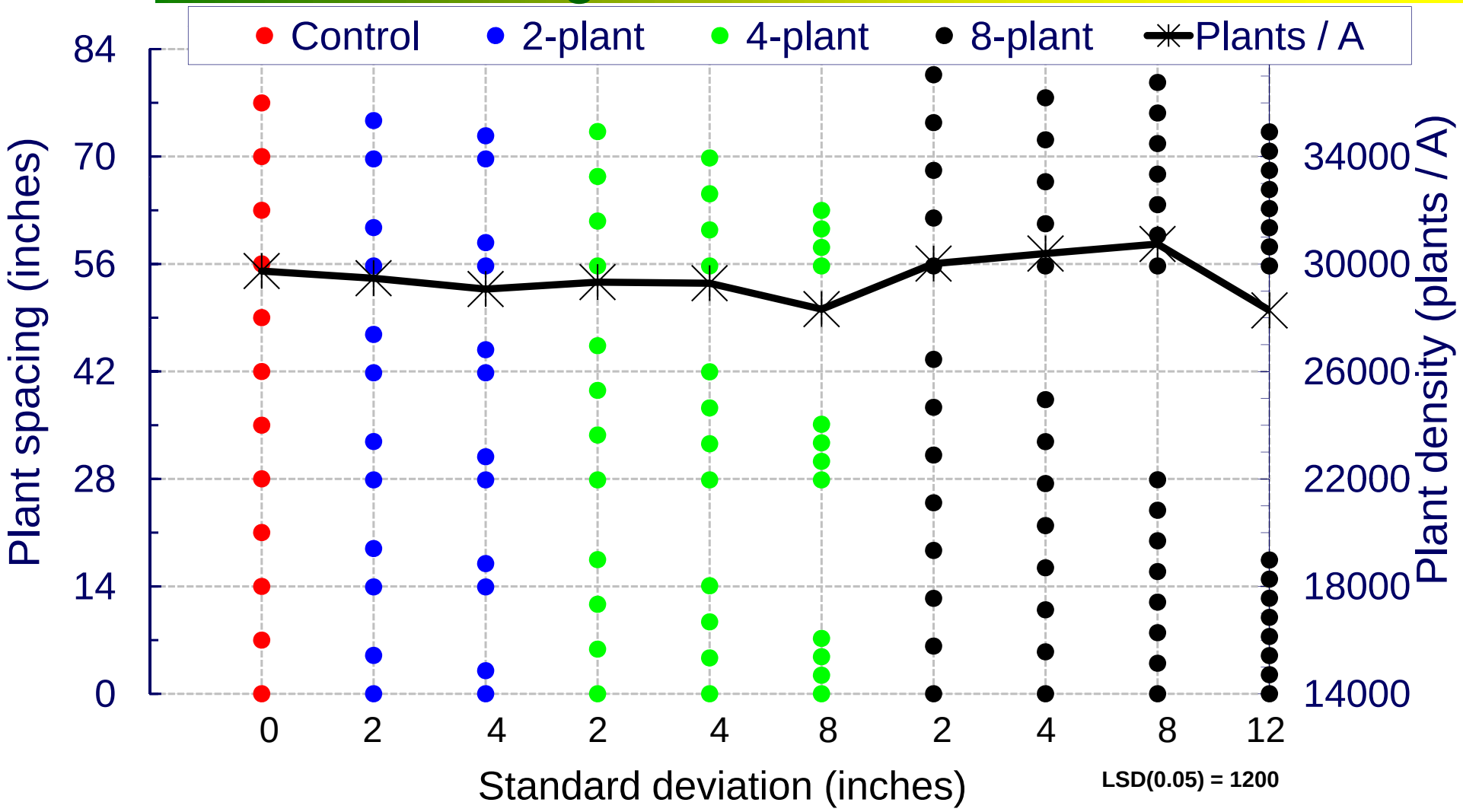


Significance of corn plant spacing variability treatments during 2000

30,000 plants/A Location	Grain yield	Grain moisture	Lodging	Grain test weight
Arlington	**	NS	†	NS
Janesville	NS	NS	NS	NS
Lancaster	†	NS	NS	NS
Fond du Lac	*	NS	NS	NS
Galesville	**	NS	NS	NS
Hancock	**	NS	NS	†
Chippewa Falls	NS	NS	†	NS
Marshfield	**	NS	NS	NS
Seymour	**	NS	NS	NS
Valders	**	NS	NS	NS

**, *, and † indicates significance at $P \leq 0.01$, 0.05 and 0.10

Corn harvest plant density of spacing variability treatments during 2000. Values are averaged across all locations.



Summary

- Grain yield decreased in 4- and 8-plant patterns where standard deviation of plant spacing treatments was greater than 7 inches.
  - ✓ Possibly due to competition and/or a population decrease (plant death)
- In most agronomic situations, plant spacing variation has no effect on grain yield or other agronomic measures as long as population is not affected.
  - ✓ Do planters need to be tuned?
  - ✓ Other types of plant variability?

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Wisconsin Corn Promotion Board