Wisconsin Regional Corn Conferences 1998

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Wisconsin Corn Growers Association

University of Wisconsin - Madison

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10 Keys to Increased Corn Yield & Profitability

- Establish realistic corn performance goals
- Soil test and add fertilizer, if needed
- Hybrid selection
- Plant quality seed that is treated
- Rotation
- Plant early
- Use narrow rows
- Optimize seeding rate
- Control weeds
- Harvest carefully

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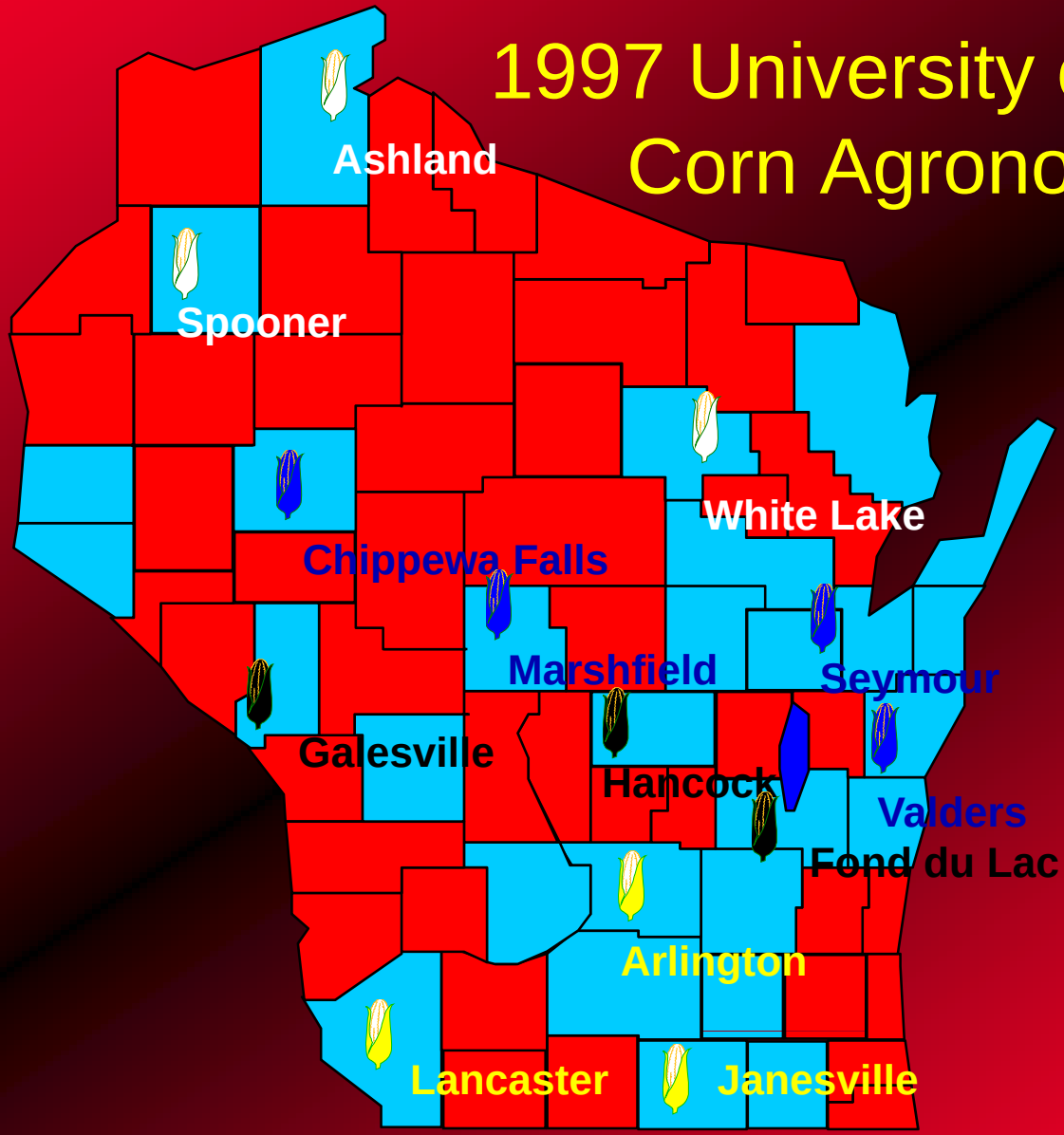
1997 University of Wisconsin Corn Agronomy Program



Wisconsin On-Farm Testing

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1997 Wisconsin Corn Hybrid Performance Trial Summary

	1997		1996		1987-96	
Location	*N*	Yield	*N*	Yield	*N*	Yield
Arlington	*202*	170	*208*	174	*166*	176
Janesville	*202*	179	*208*	162	*166*	169
Lancaster	*202*	**185**	*208*	**154**	*166*	**154**
Fond du Lac	*178*	**176**	*183*	**136**	*150*	**149**
Galesville	*178*	157	*183*	123	*150*	154
Hancock	*178*	174	*183*	176	*150*	177
Chippewa Falls	*151*	164	*160*	162	*109*	153
Marshfield	*151*	**165**	*160*	**---**	*93*	**123**
Seymour	*151*	---	*160*	130	*101*	142
Valders	*151*	147	*160*	145	*109*	137
Ashland	*22*	**140**	*16*	**146**	*12*	**125**
Spooner	*206*	**149**	*195*	**127**	*177*	**118**
White Lake	*68*	**101**	*65*	**47**	*63*	**87**

Note: Seymour average includes Waupaca, 1987 and New London 1988-1992.
White Lake average includes Antigo, 1987

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Specialty Corns

Marketing niches

- Amylomaize(high amylose)
- Waxy corn
- High-protein (lysine) corn
- High-oil corn
- White & Yellow Food corn
- HAP corn (high available P)
- Silage corn
- Sweet corn
- Popcorn

Management tools

- Imidazolinone resistant or tolerant (“IT/IR”)
- Sethoxydim resistant (“SR”)
- Glufosinate resistant ("Liberty Link”)
- “B.t.”
- Glyphosate resistant ("Round-up Ready”)

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"Yield lag" versus "Yield drag"

- Yield lag (time factor)
  - specialty traits not yet incorporated into the best inbreds of a seed company
- Yield drag (bad genes)
  - specialty traits causing yields to be lower regardless of genetic background

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High Amylopectin Corn
"Waxy corn"

- Single recessive gene
- Current production: 80 million bushels on 700,000 acres
- Value-added traits: Amylopectin: branched chain starch = 100% amylopectin (dent corn = 75%)
  - retrogrades back to crystalline form slowly
  - livestock feed
- Key problems
  - slightly reduced yields: 5%

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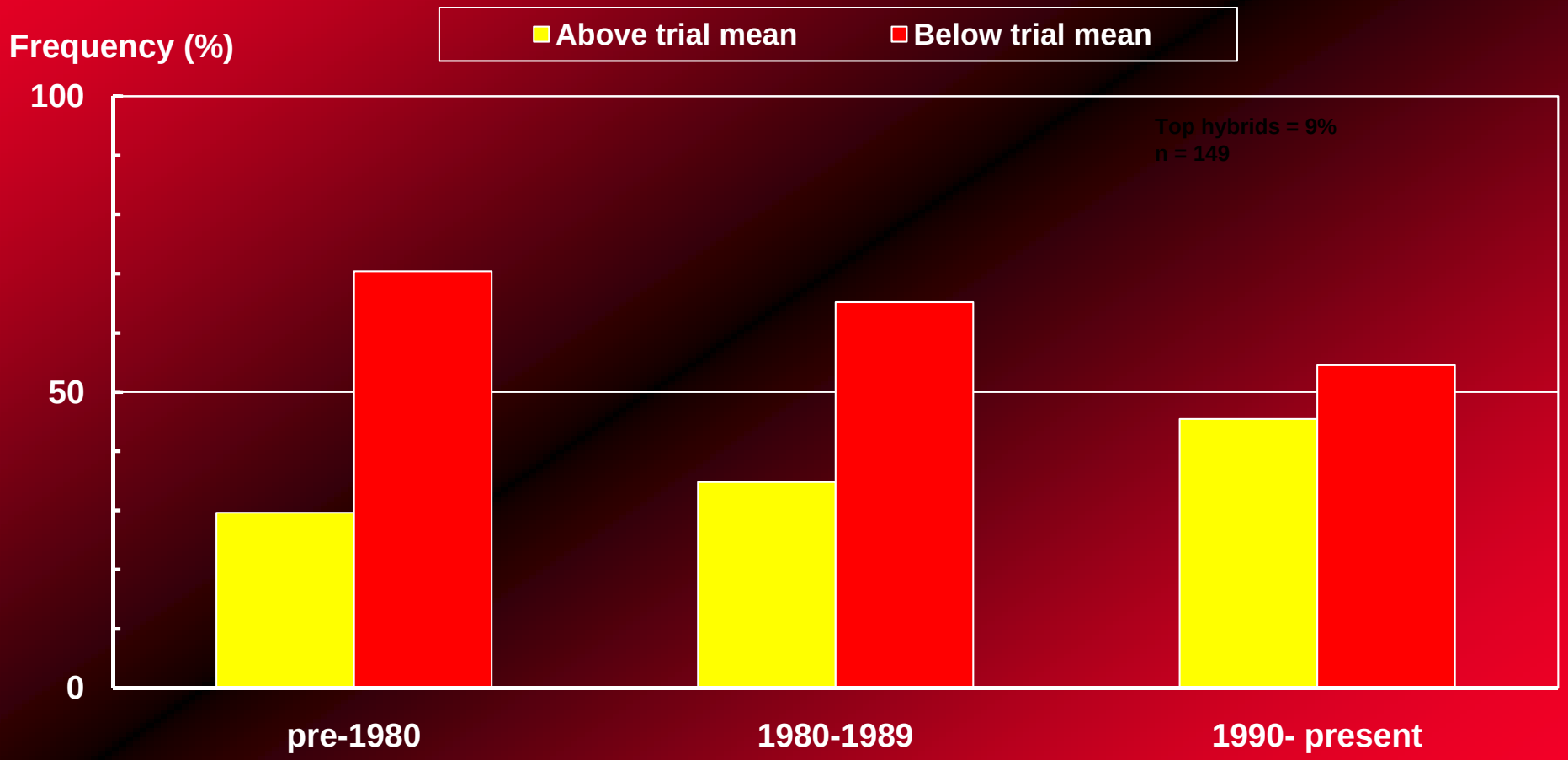
Yield of “waxy” hybrids in Wisconsin trials



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High-oil Corn
"Energy-dense corn"

- Quantitative genes
- Current production: 26 million bushels on 200,000 acres
- Value-added traits
  - high-oil corn= >6% oil content (dent corn= 3.5 to 5%)
  - enhanced source of corn oil in margarine and oils
  - increased energy per unit of feed
- Key problems
  - reduced grain yield: 5 to 10%
  - increased moisture content at harvest
  - environment influences total oil content

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High Available Phosphorous / Low phytate "HAP Corn"

- Single gene
- No current production
- Value-added traits: phosphorous more readily available to monogastric animals
  - less environmental pollution from manure
  - low phytic acid concentrate chelates less minerals
- Key problems
  - reduced grain yield: 10 to 20%

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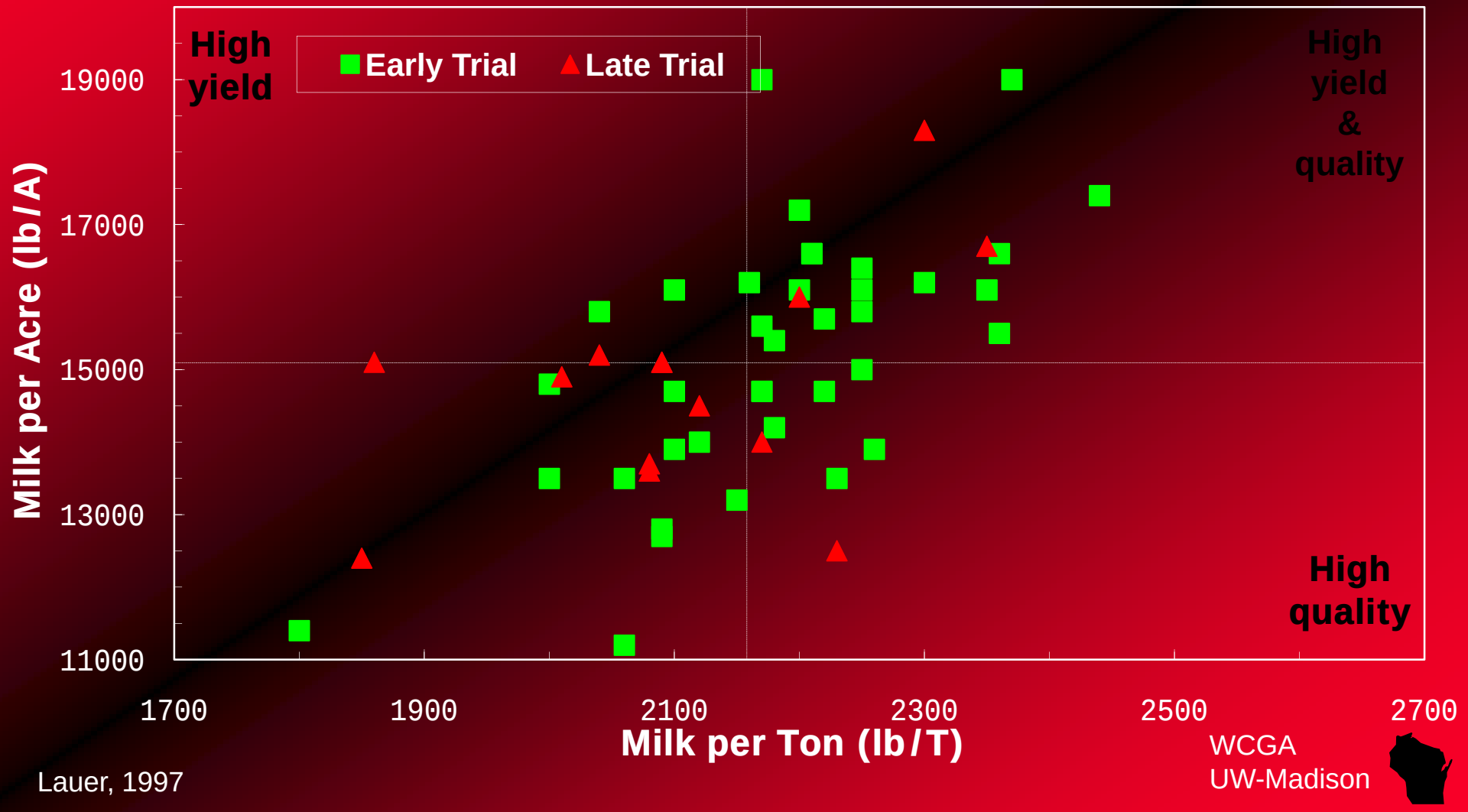
Corn hybrid silage yield and quality in the south central production zone of Wisconsin.



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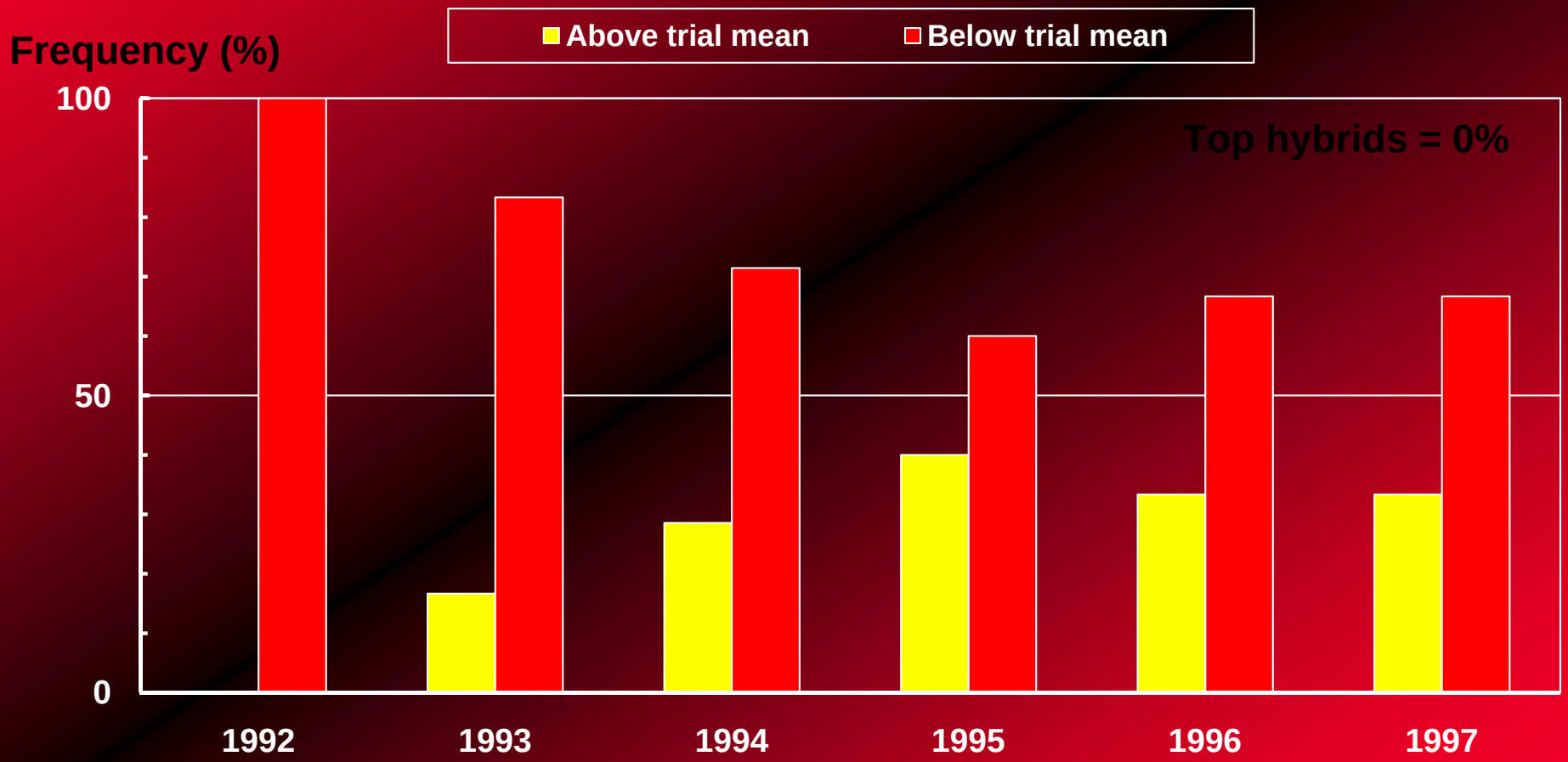
Yield of “IT/IR” hybrids in Wisconsin trials



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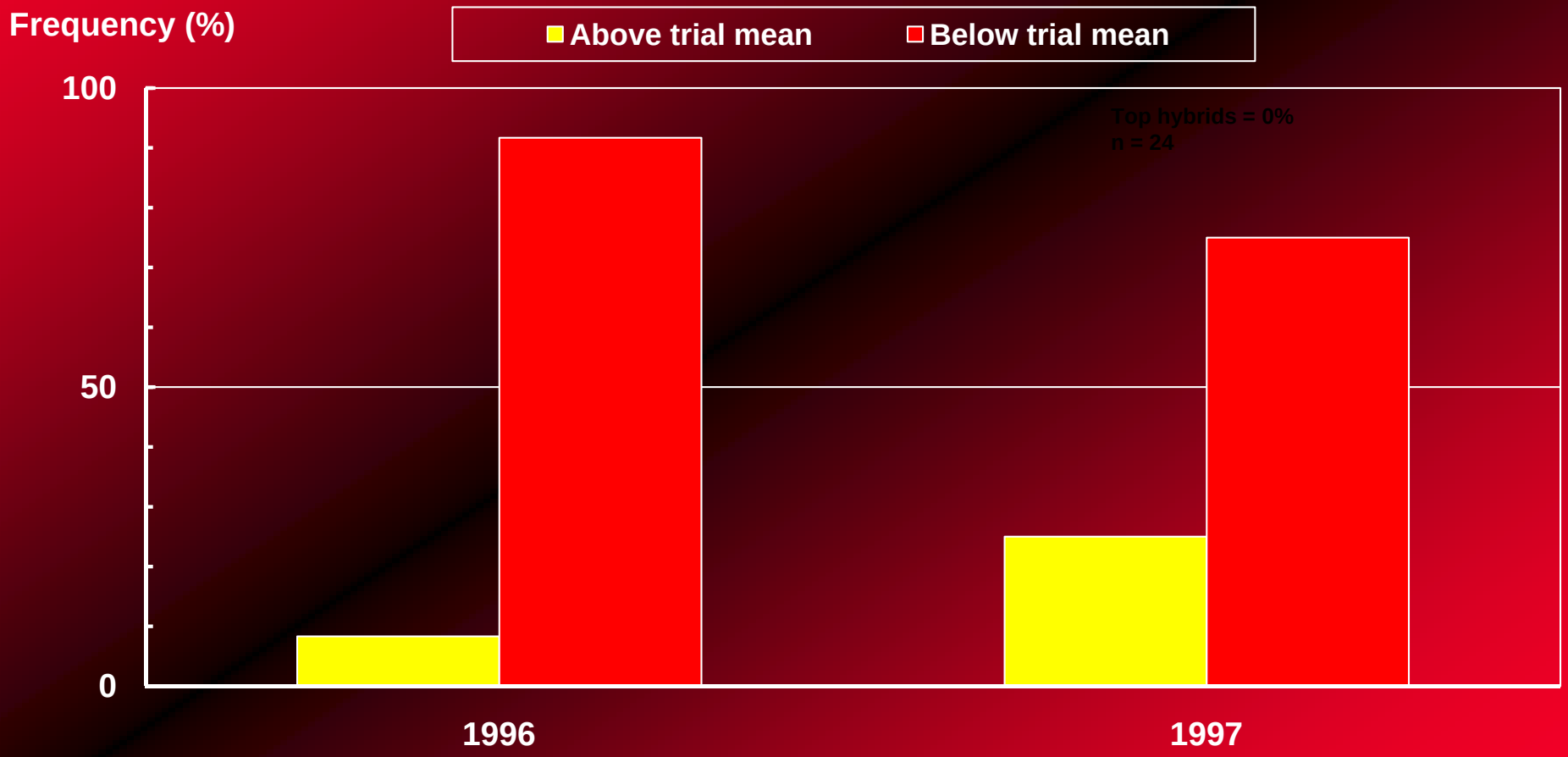
Yield of “SR” hybrids in Wisconsin trials



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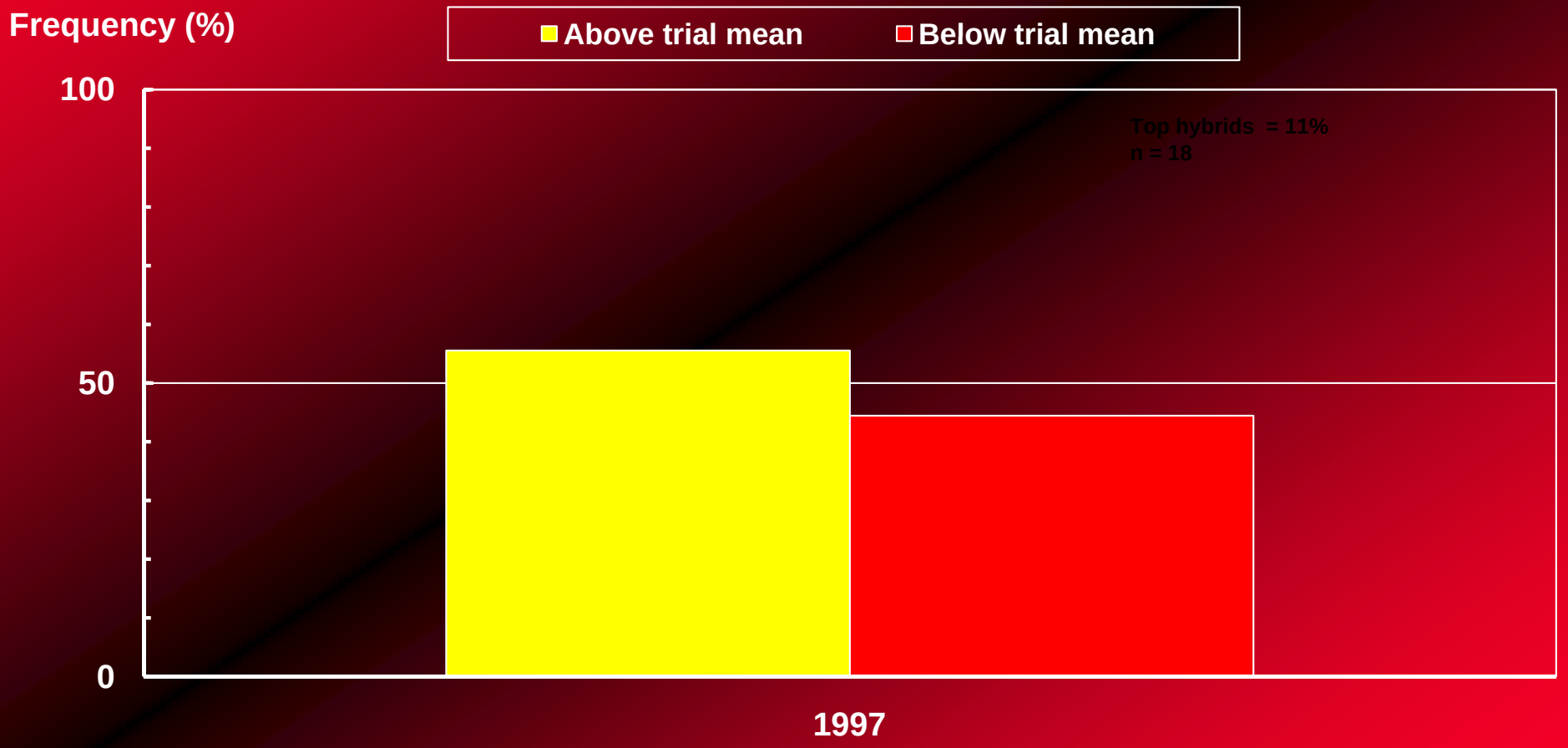
Yield of “Liberty Link” hybrids in Wisconsin



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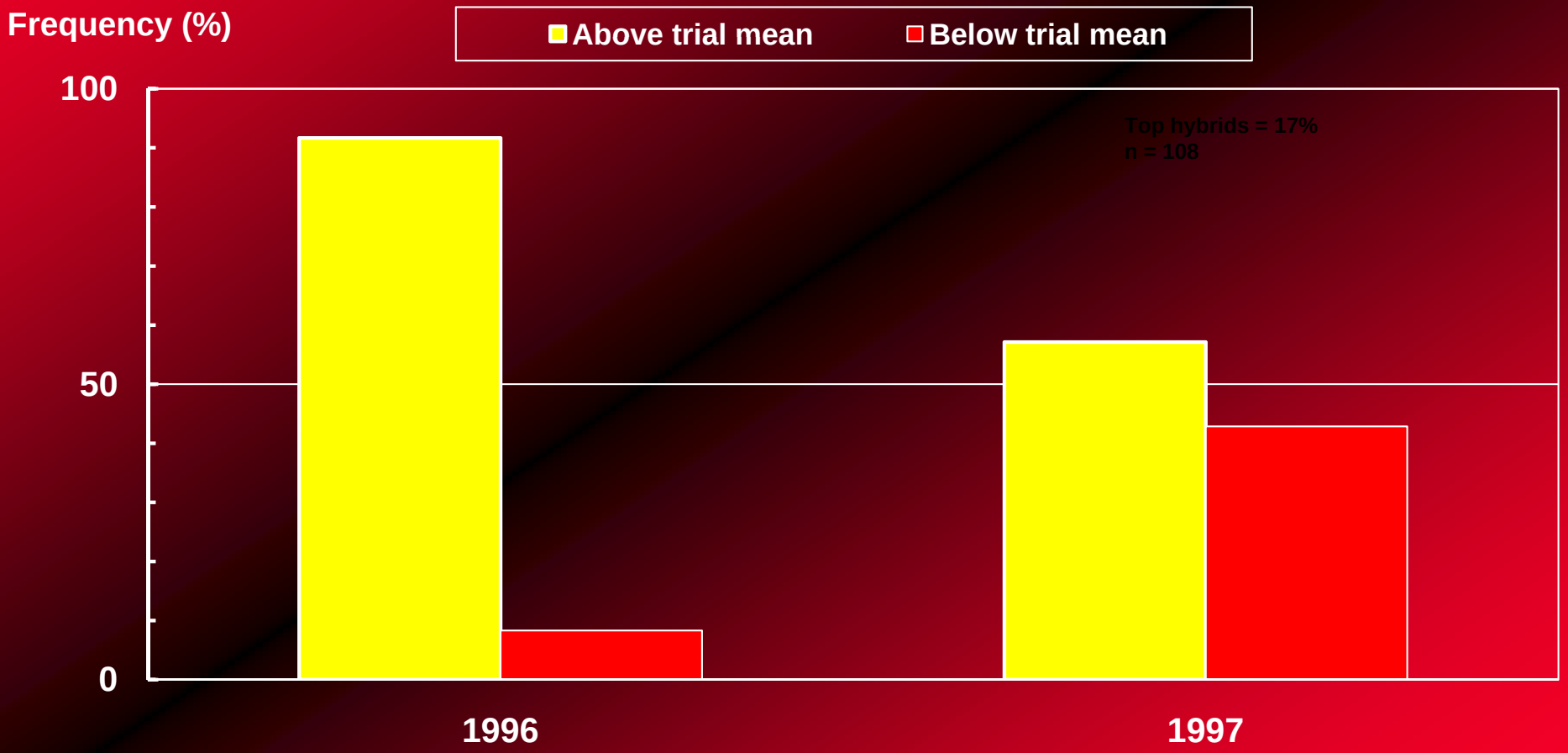
Yield of “Bt” hybrids in Wisconsin trials



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Bt corn registrations as of January, 1997

Company	Event	Protein	Brand	Refugia
Ciba/Mycogen	176	CryIA(b)	Maximizer NatureGard	Suggested
Northrup King	Bt11	CryIA(b)	YieldGard	Suggested
Monsanto	MON810	CryIA(b)	YieldGard *	Agreement 5% acres
DeKalb	DBT418	CryIA(c)	Bt-Xtra	5% acres
PGS/AgrEvo	Pending	Cry9(c)		

* Supplemental distributors: Cargill, DeKalb, Golden Harvest, ICI/Garst, Pioneer

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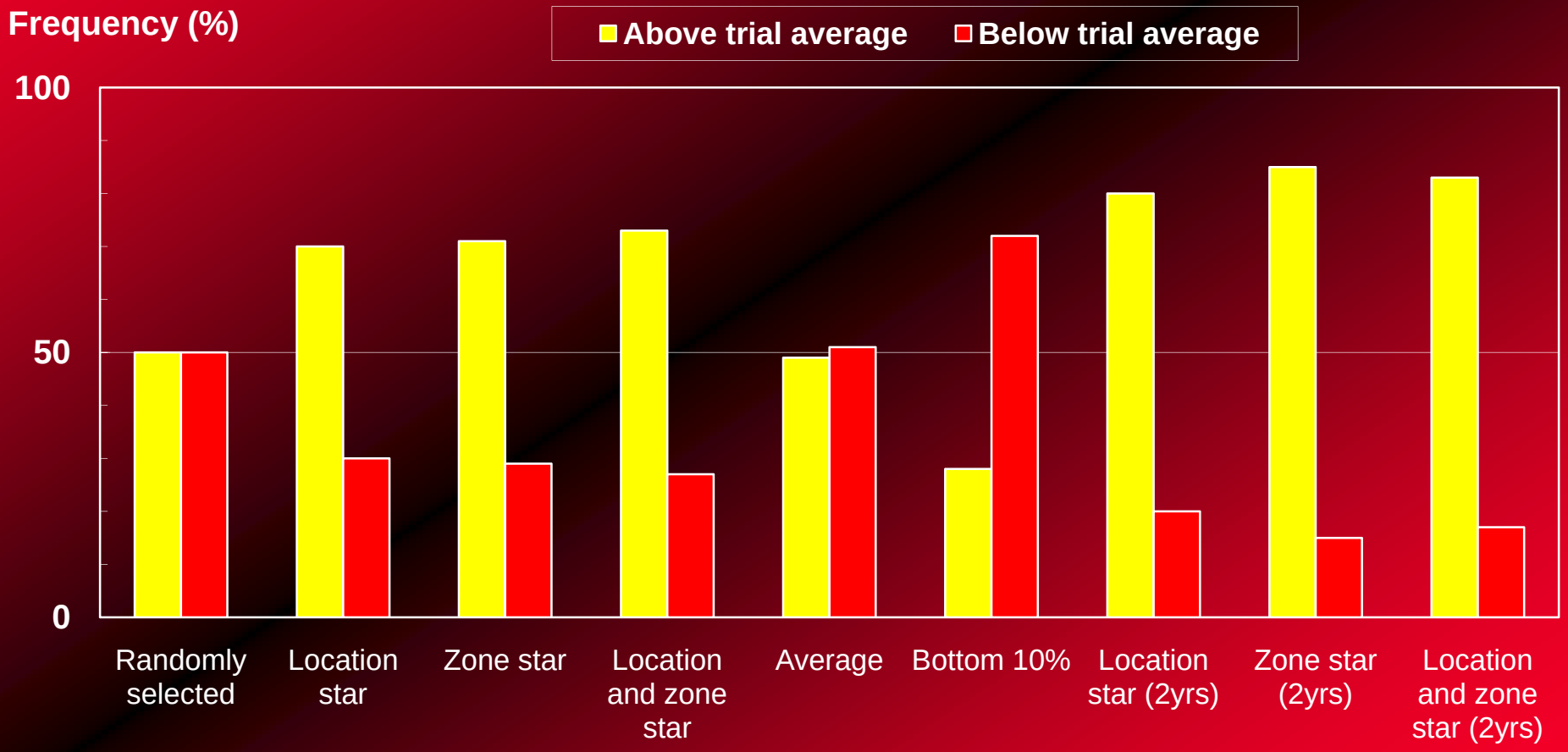
How good are you at picking top corn hybrids?



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Hybrid Selection Decisions

- Use **multi-environment** average data (wide range of locations and climates)
  - Begin with trials in zones nearest your farm
  - Compare hybrids with similar maturities within a trial
  - Compare performance in other unbiased trials
- Evaluate **consistency** of performance across environments
- Consider hybrid performance for other traits, i.e. standability, dry-down rate, grain quality, etc.
- **You are taking a tremendous gamble if basing your decision on one or two local test plots.**

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SELECT 97

A program for
choosing crop varieties

http://corn.agronomy.wisc.edu

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Use **Multi-Environment** information to evaluate:

- Grain yield
- Moisture and maturity
- Standability

Use **Single- Environment** information to evaluate:

- Consistency of performance
- Test weight
- Dry-down rate
- Grain quality
- Ease of combine-shelling or picking

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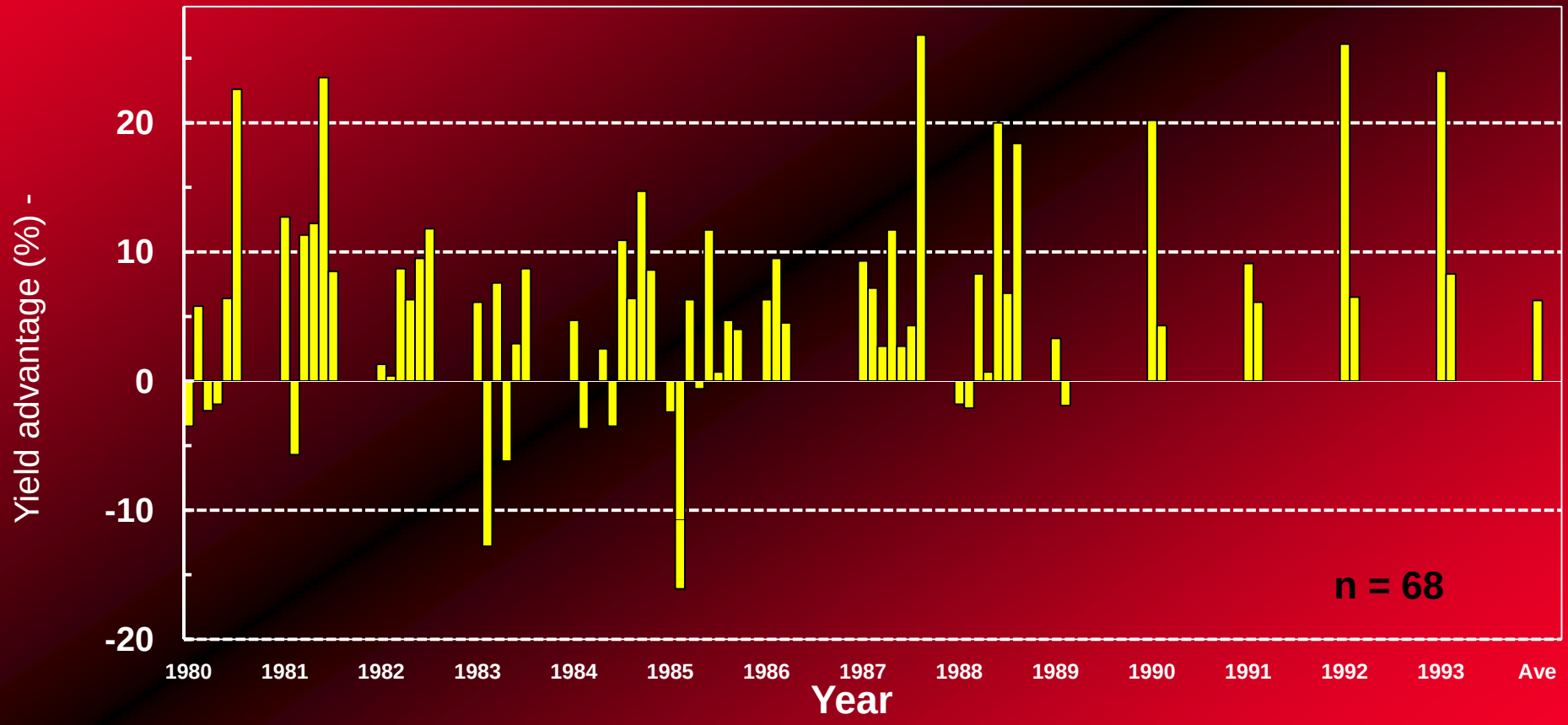
Yield advantage of moldboard and chisel plow over no-till in Wisconsin



Derived from unpublished data Mueller et al. and Carter et al. (1980 to 1993)

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Materials and Methods

- Fall Tillage
  - 1) Control: None
  - 2) "Zone-builder"
- Spring Tillage
  - 1) 1 coulter
  - 2) 2 coulters; chisel
  - 3) 3 coulters
- N Placement
  - 1) 2" x 2"
  - 2) 2" x 15"
- P & K Application Timing
  - 1) Fall injected
  - 2) Spring
  - 3) None

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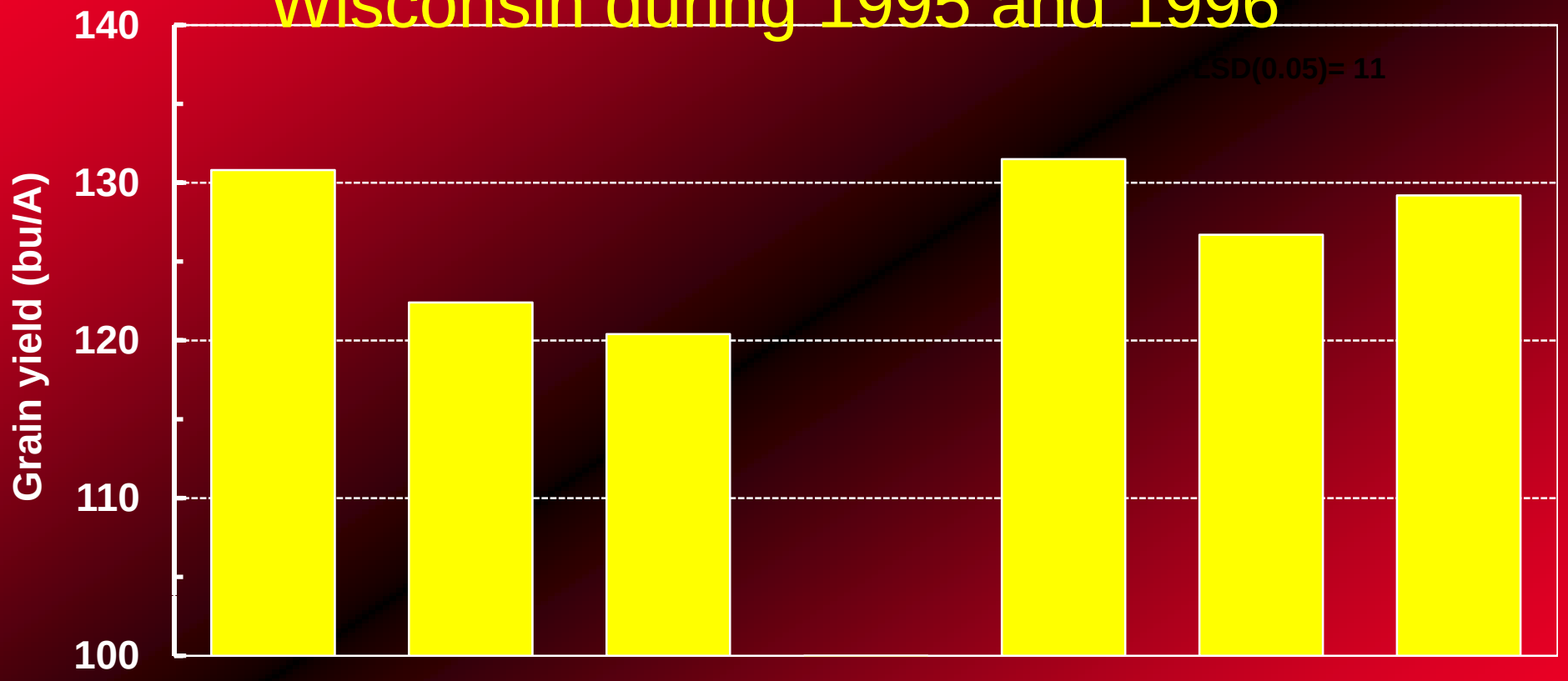
Grain yield response to fall and spring tillage in Wisconsin during 1995 and 1996



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Efficacy of Corn Seed Treatments

Disease	Captan	Maxim	Apron
Rhizoctonia	G	G	P
Fusarium	G	E	P
Pythium	P	P	E
Helminthosporium	G	G	P
Penicillium	G	G	P
Aspergillus	G	G	P

derived from Pedersen, U. of Illinois

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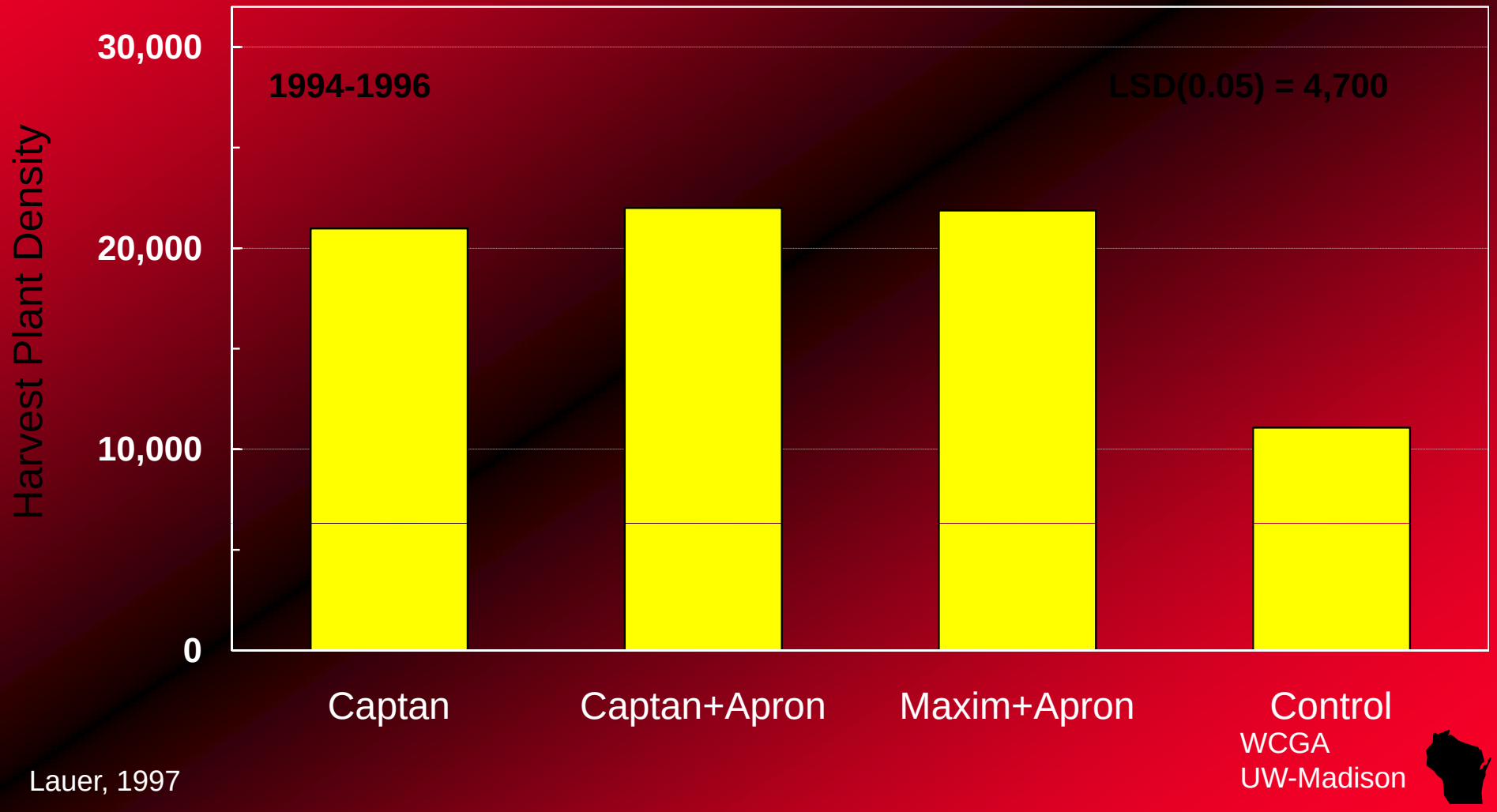
Seed Treatment Effect on Corn Plant Density After Initial Planting Rate of 32,000 seeds/A



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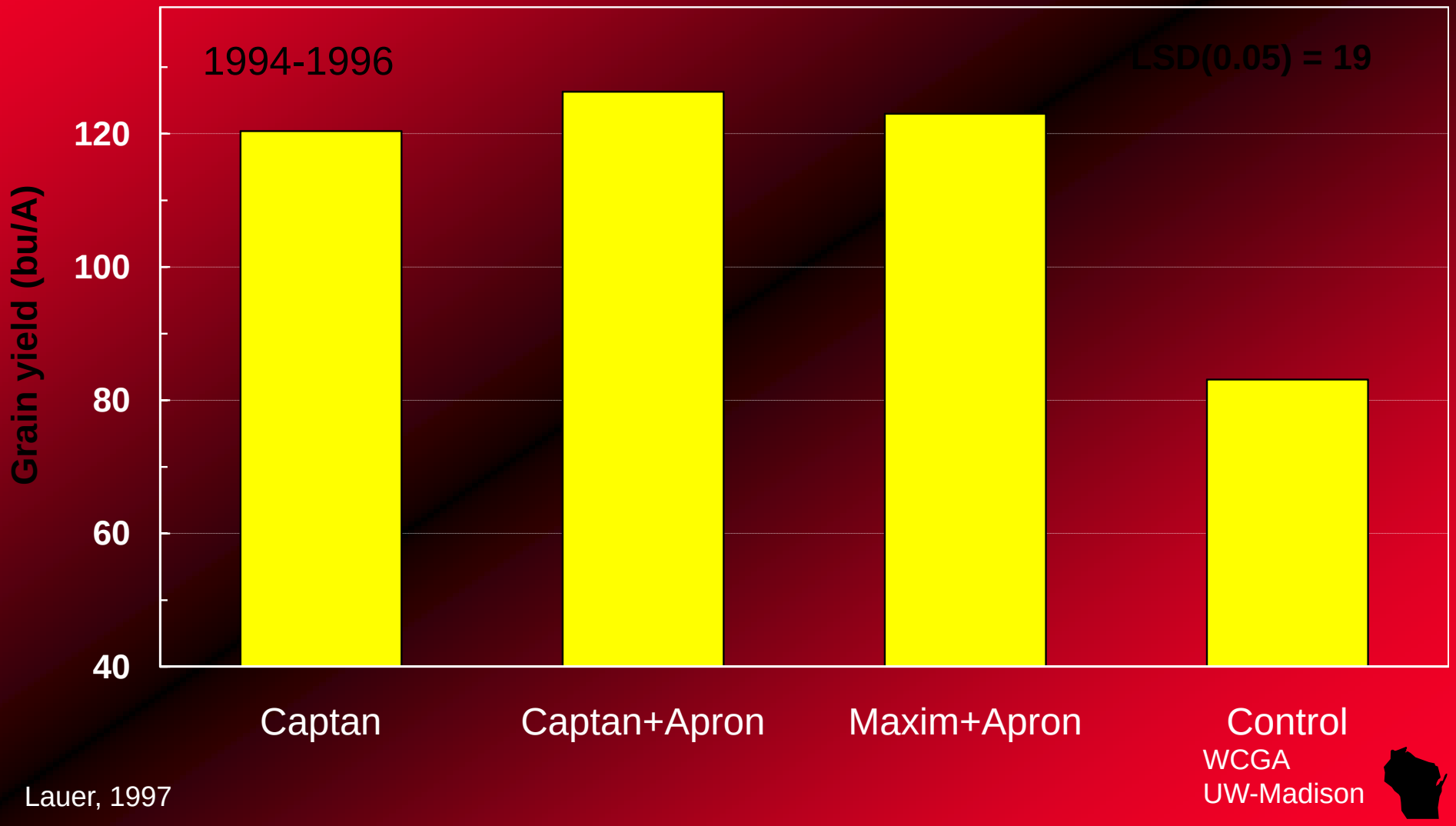
Corn Grain Yield Response to Seed Treatment



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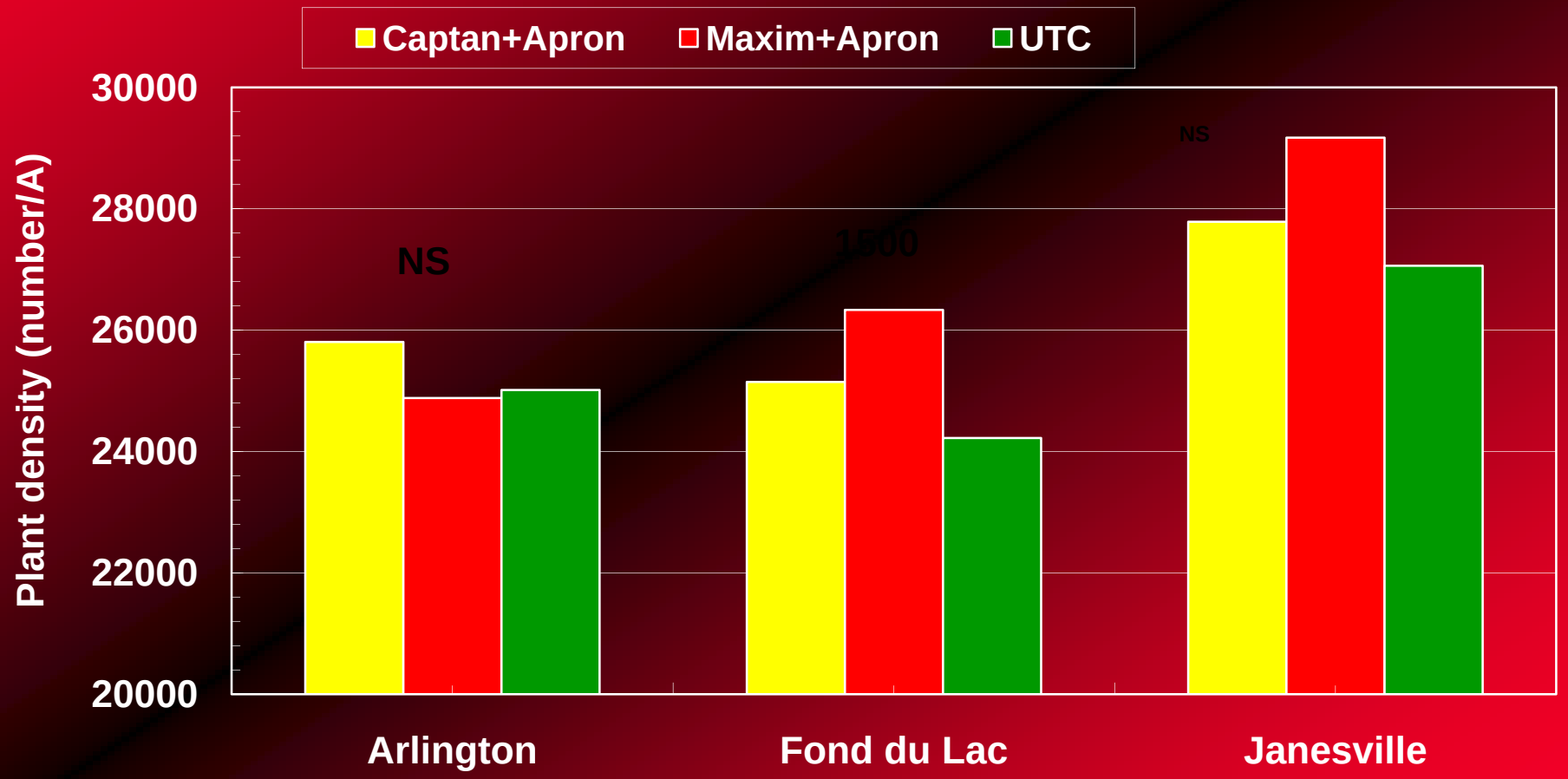
Corn seed treatment effect on plant density in 1997



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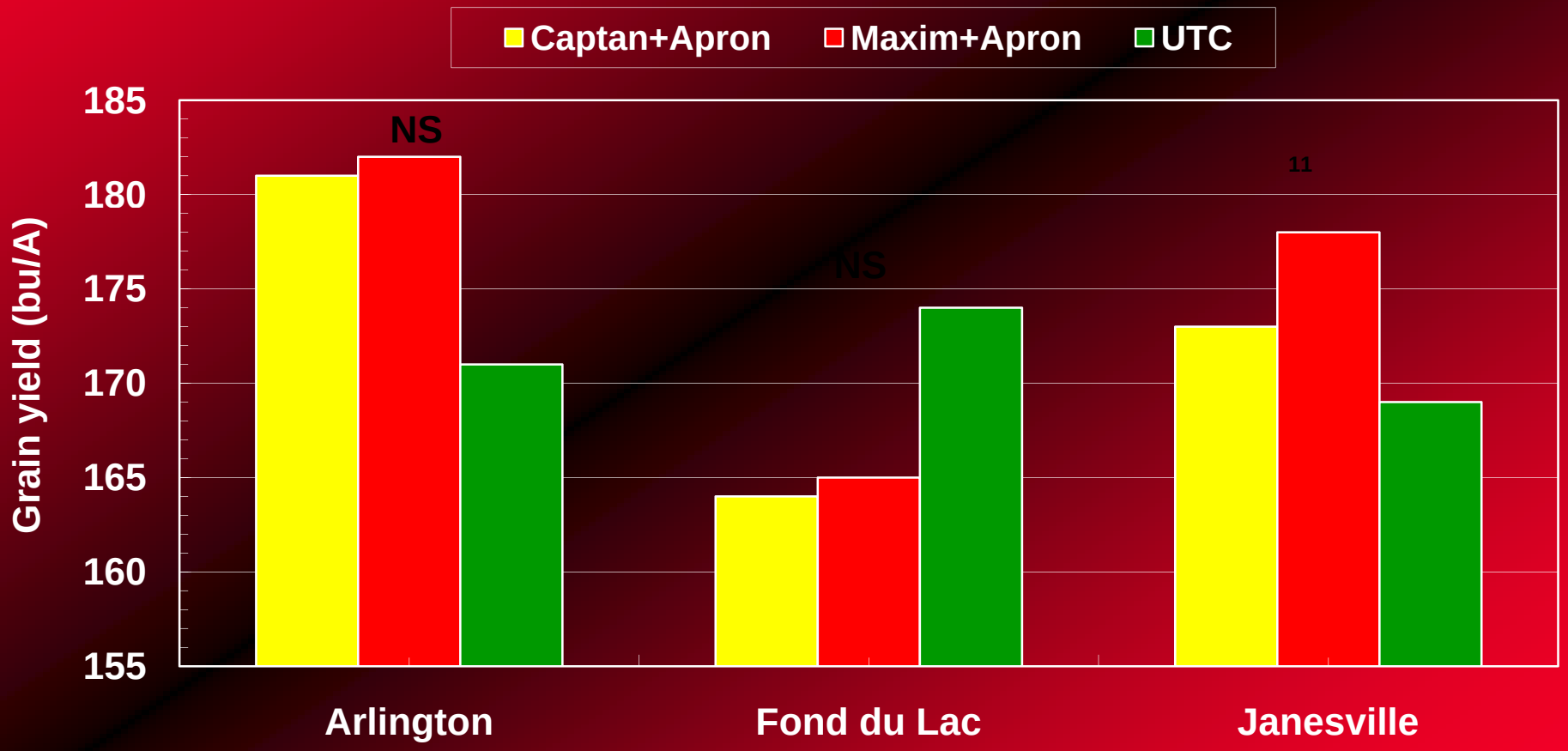
Corn seed treatment yield response in 1997



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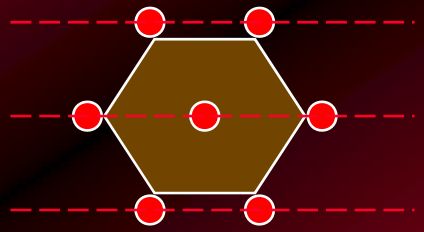
Plant Arrangement in the Field

Square



Hexagon

Between plants = 14.5 in
Between rows = 14.5 in
Plants per acre = 30,000

Between plants = 14.5 in
Between rows = 14.5 in
Plants per acre = 30,000

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Plant spacing for various plant densities and row spacings.

Plant	Row spacing		
density	30-in.	20-in.	Equidistant
plants/A	inches between plants		
25000	8.4	12.5	15.8
30000	7.0	10.5	14.5
35000	6.0	9.0	13.4

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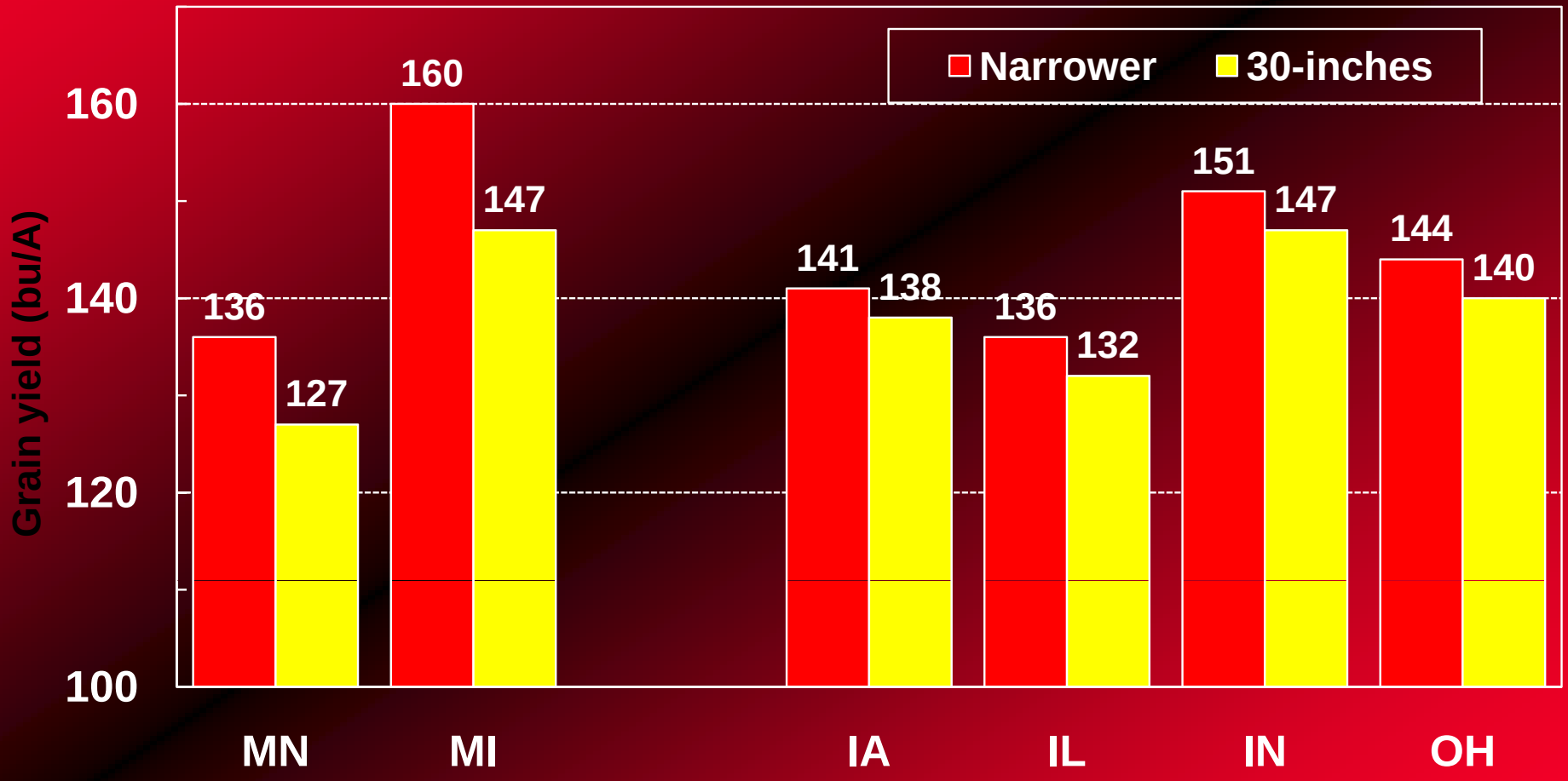
Corn Response to Row Spacing



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Why do narrow rows work?

Not clearly understood why narrower rows work, but the response is consistent in northern corn belt.

Equidistant spatial arrangement provides:

- Decreased competition among plants within row. Every plant has equal access to resources (e.g. light, water, nutrients)
- Reduced competition from weeds.
- Increased efficiency of water use by shading the soil surface earlier and by more completely utilizing sub-surface moisture.

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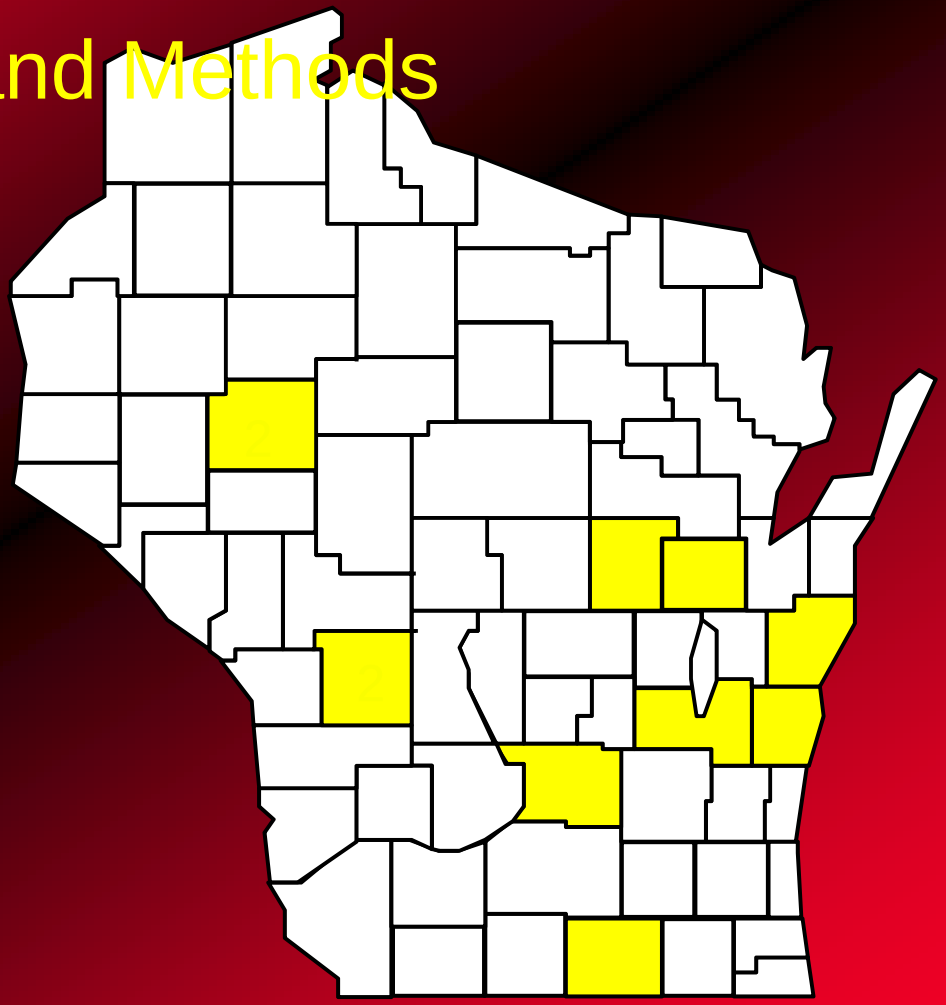
Materials and Methods

- Row spacing
  - Narrower: 15-, 20-, or 22-inches
  - 30-inches
- Plant density (plants/A)
  - 25000 (optional)
  - 30000
  - 35000
  - 40000 (optional)



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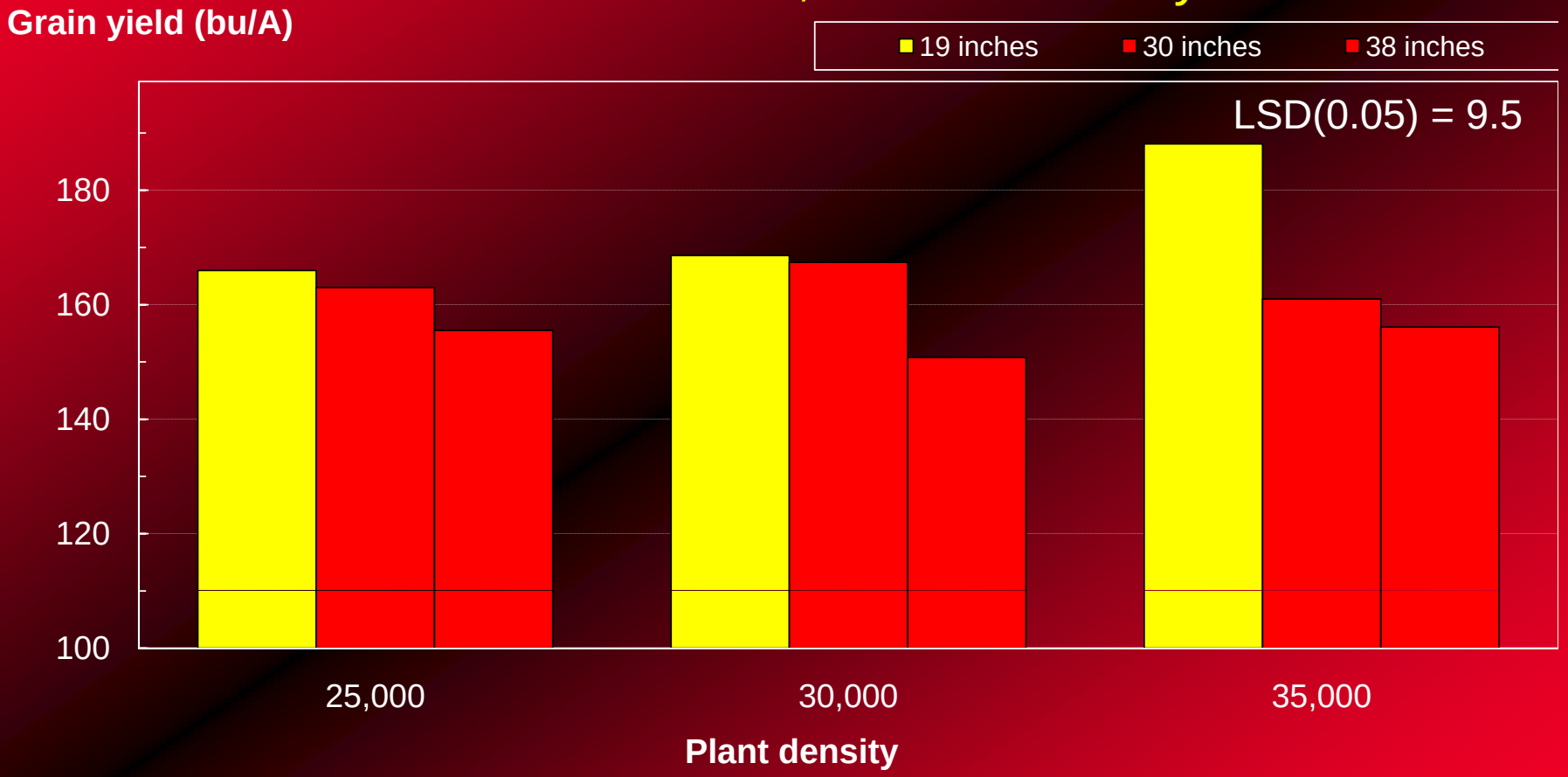
Corn response to row spacing & plant density in 1996 - Leverich, Monroe County.



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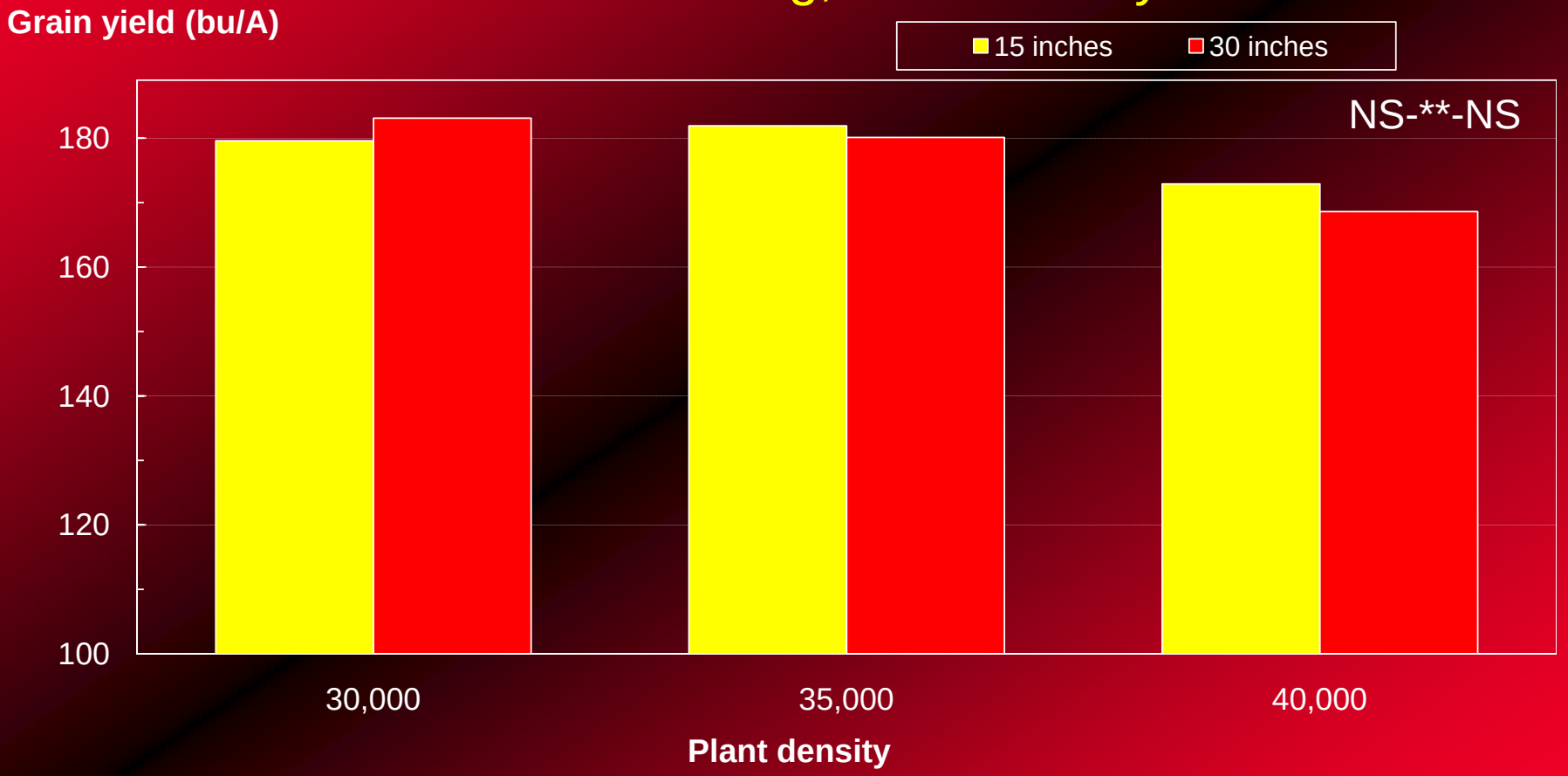
Corn response to row spacing & plant density in 1997 - Nehring, Rock County.



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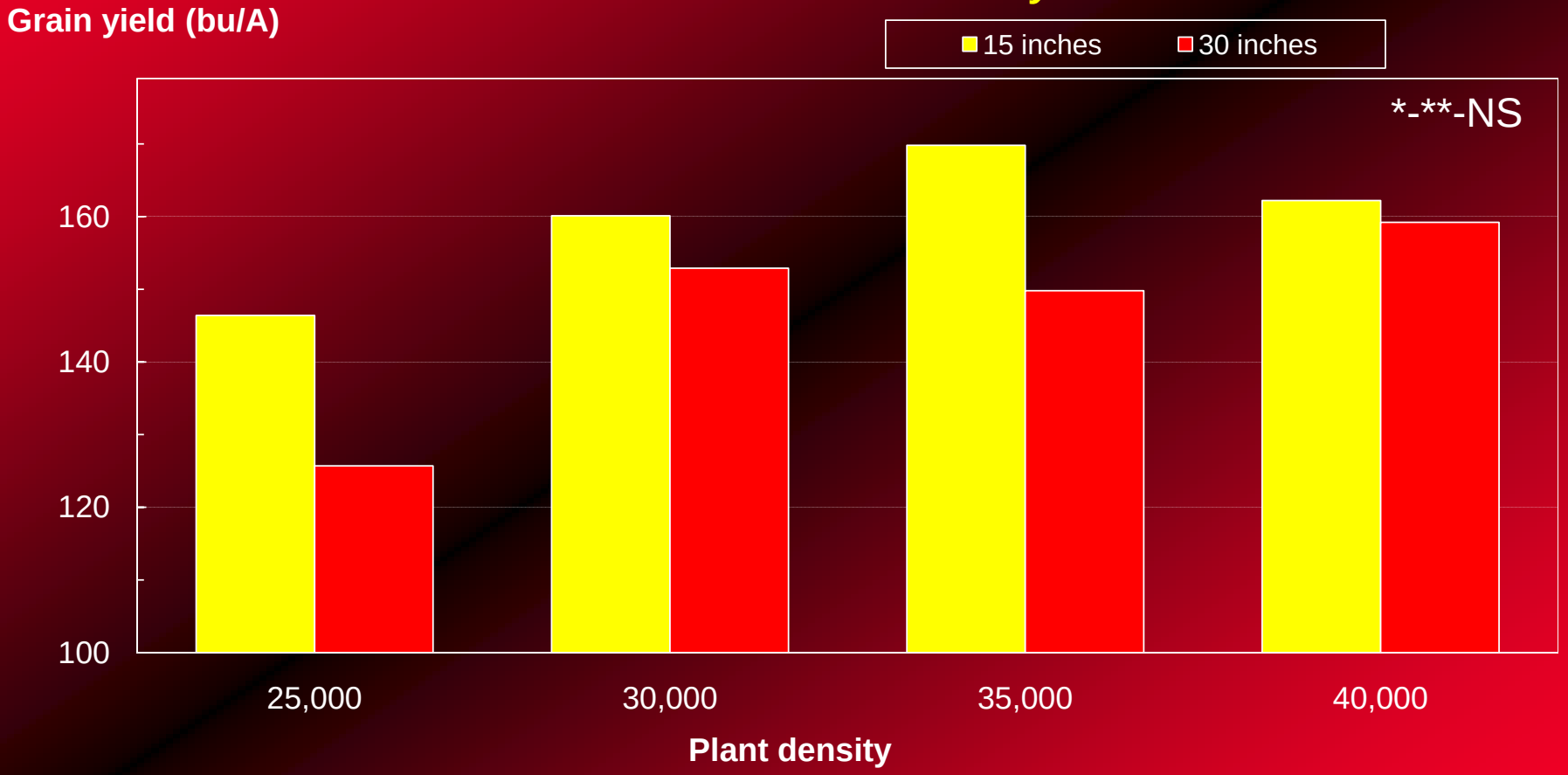
Corn response to row spacing & plant density in 1997 - Dane County.



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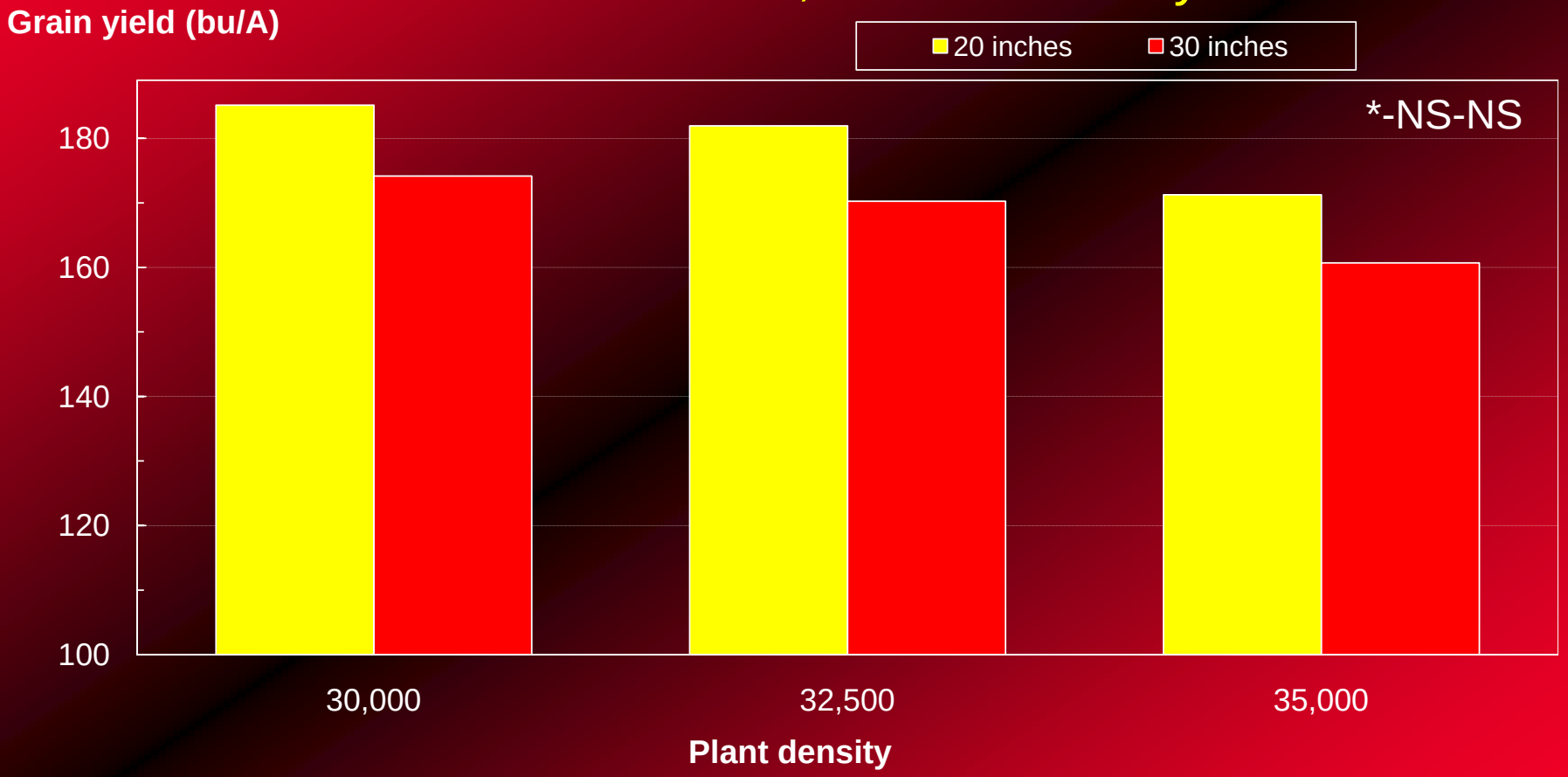
Corn response to row spacing & plant density in 1997 - Leverich, Monroe County.



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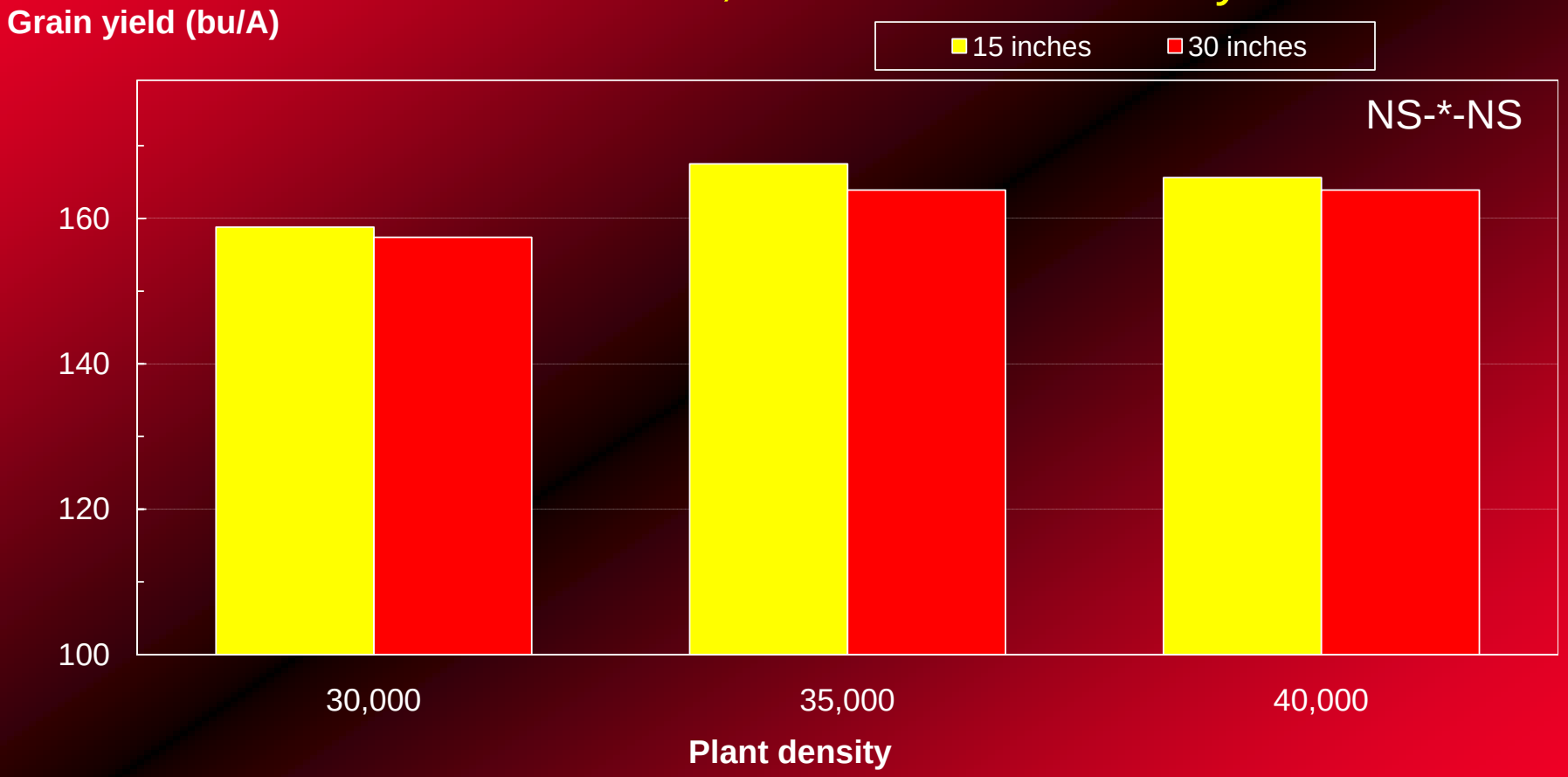
Corn response to row spacing & plant density in 1997 - Rankin, Fond du Lac County.



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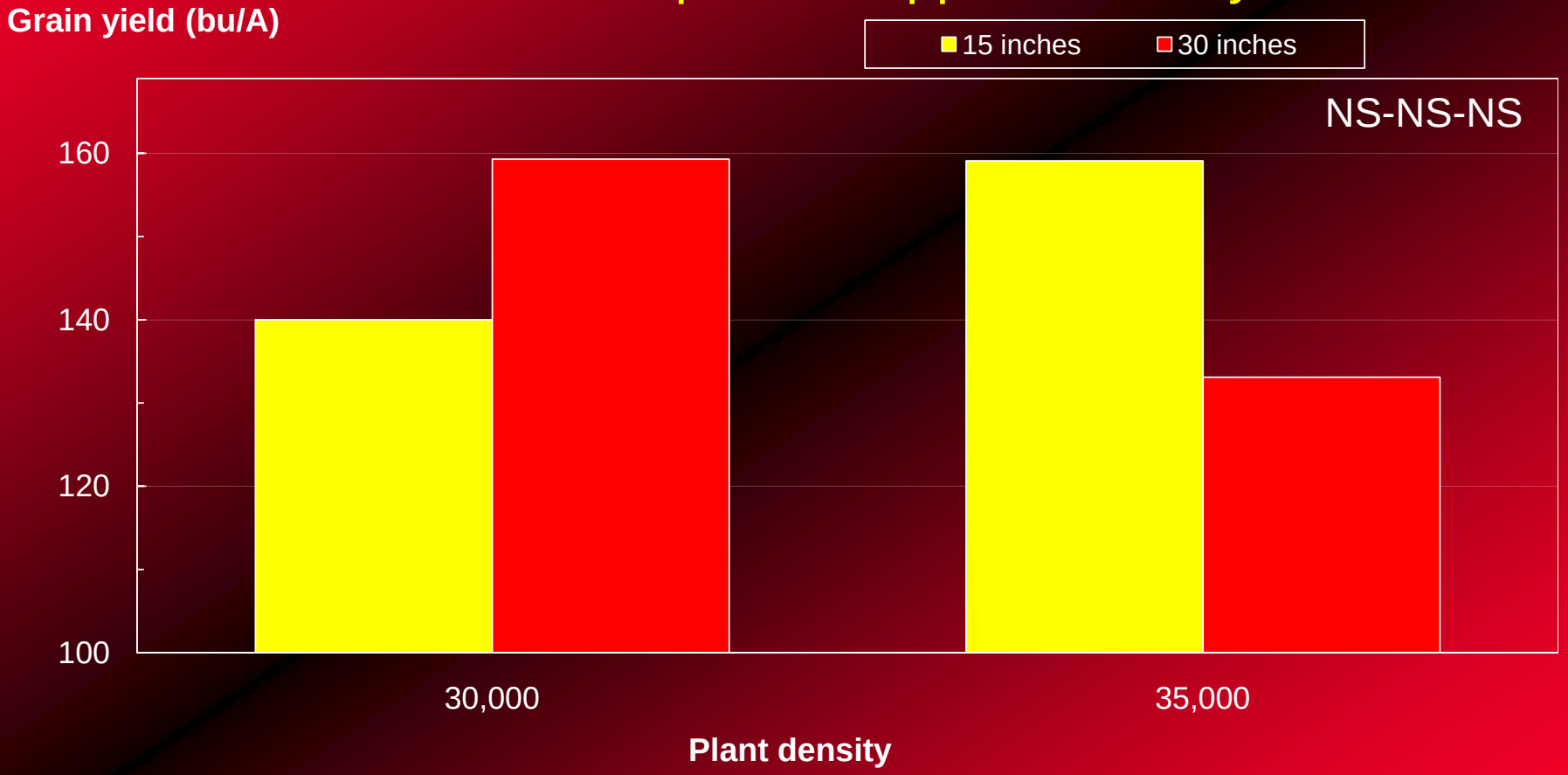
Corn response to row spacing & plant density in 1997 - Thompson, Chippewa County.



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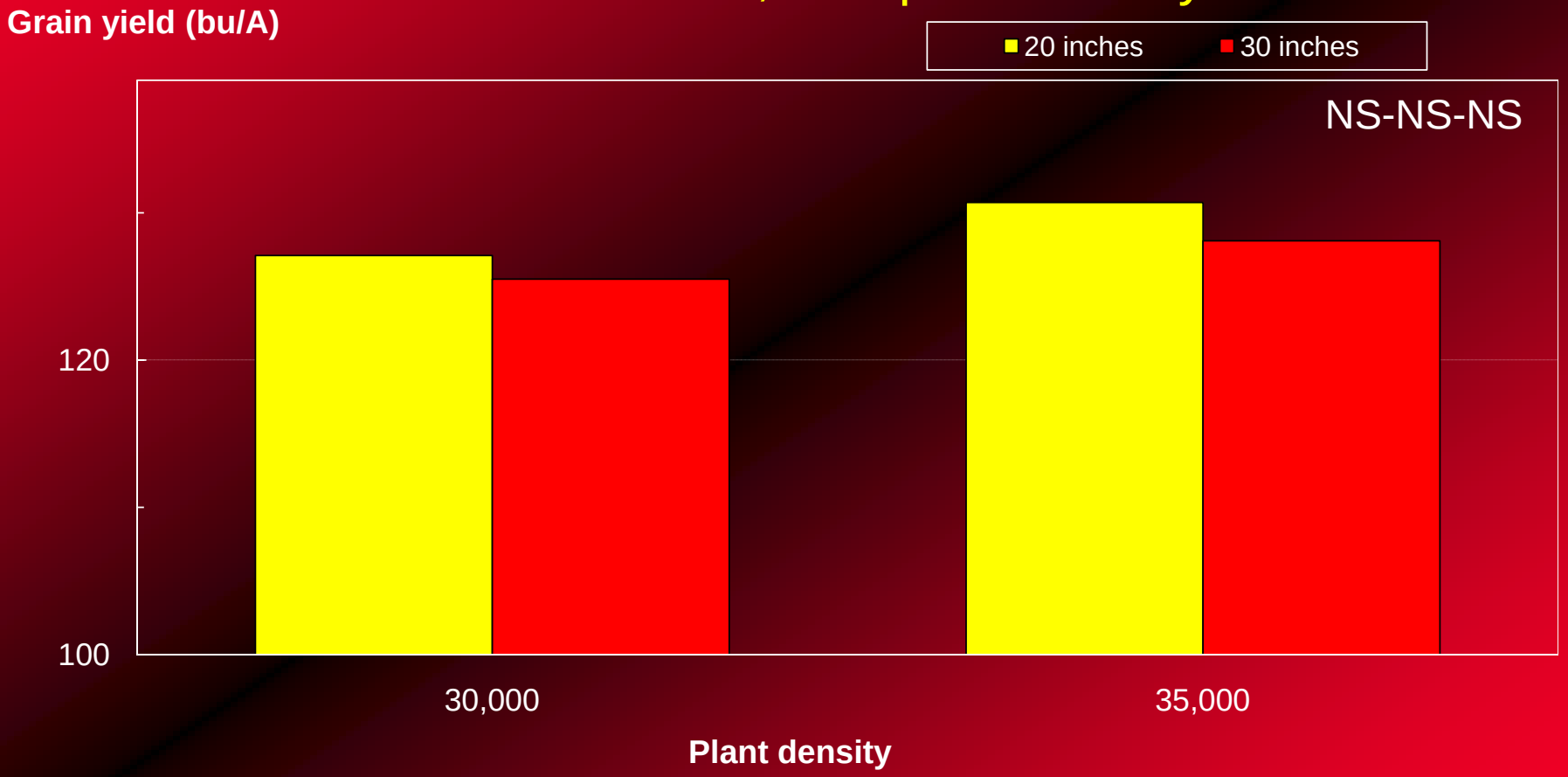
Corn response to row spacing & plant density in 1997 - Blonde, Waupaca County.



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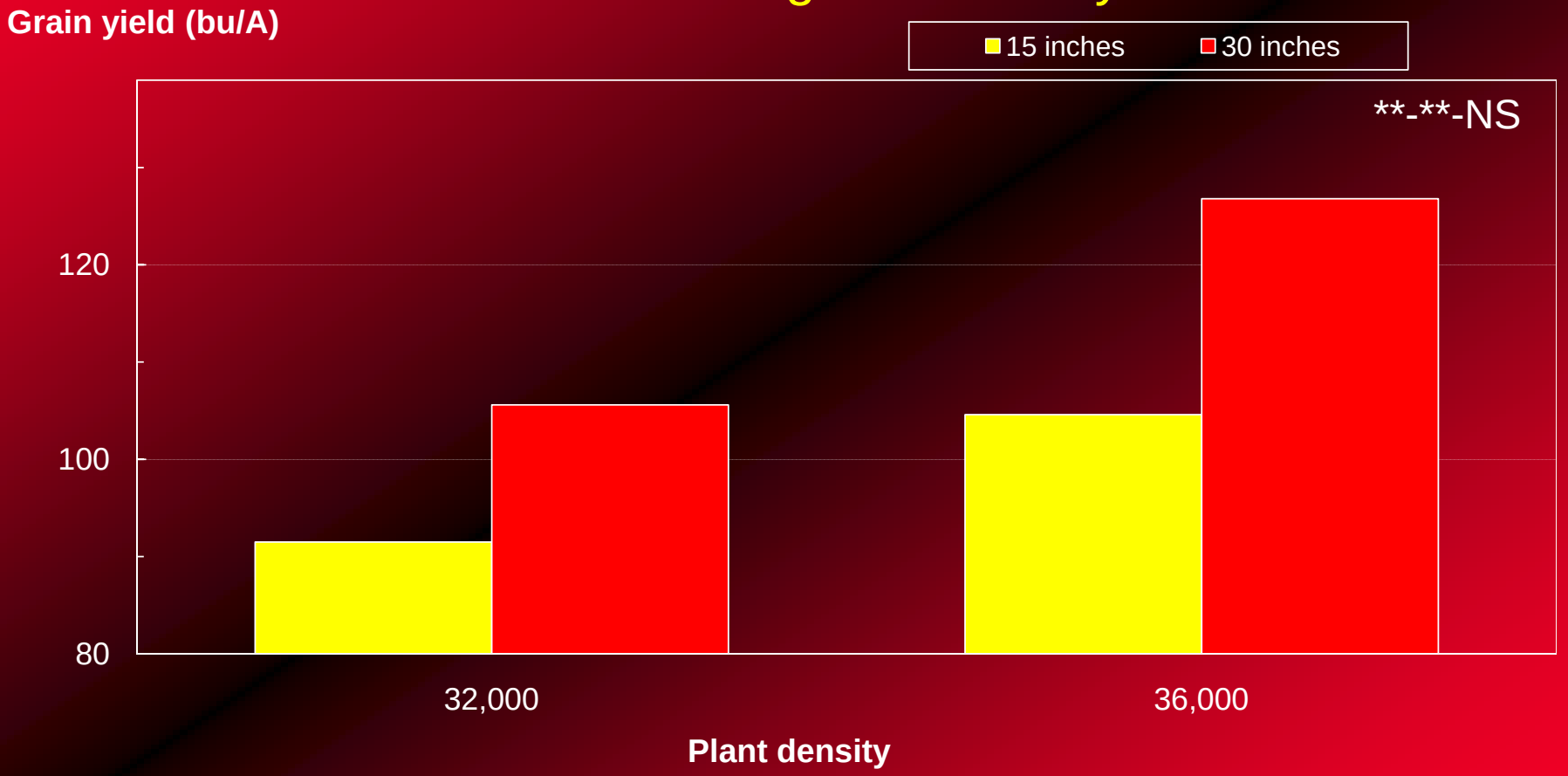
Corn response to row spacing & plant density in 1997 - Outagamie County.



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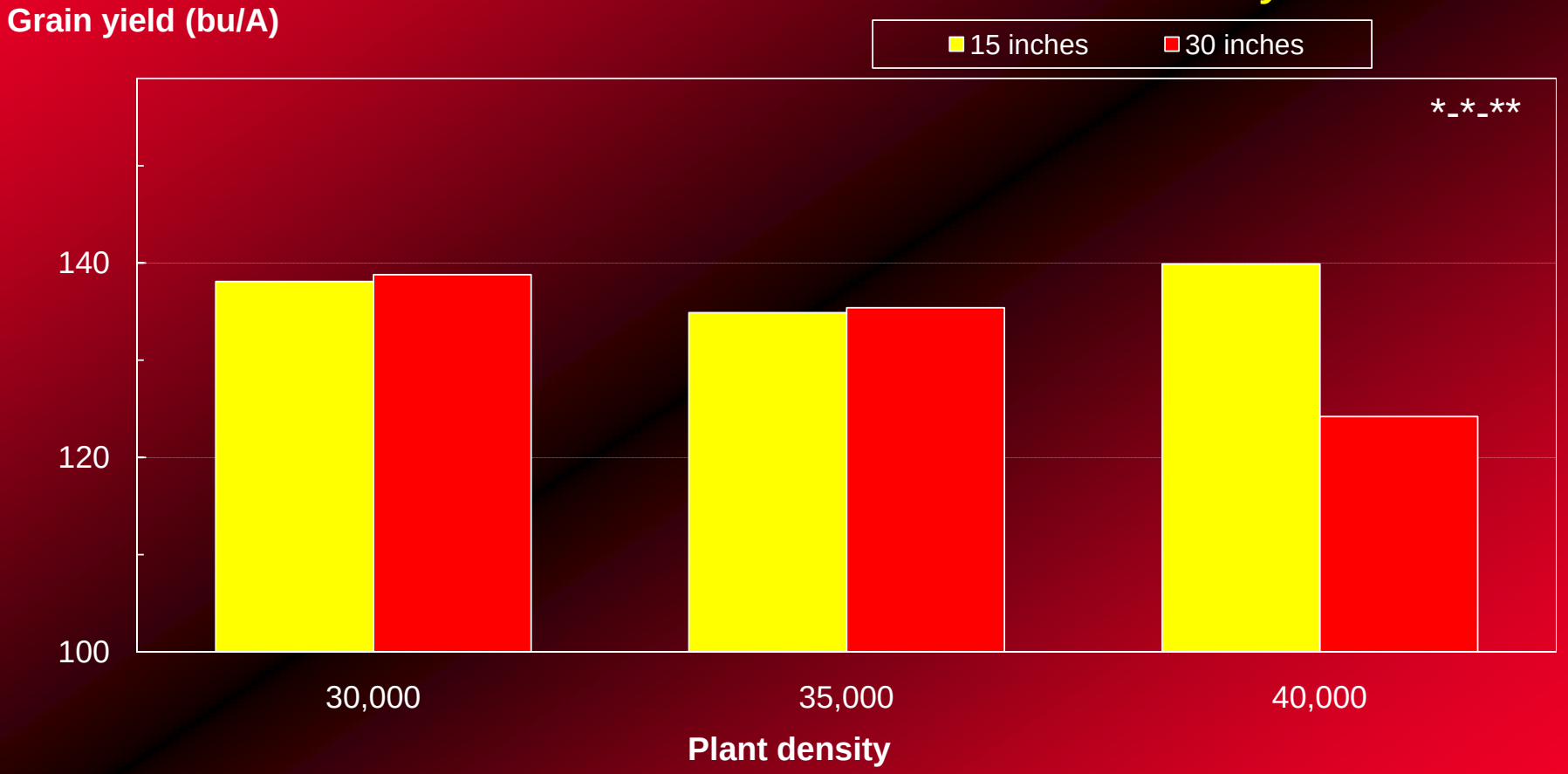
Corn response to row spacing & plant density in 1997 - Hendrickson, Manitowoc County.



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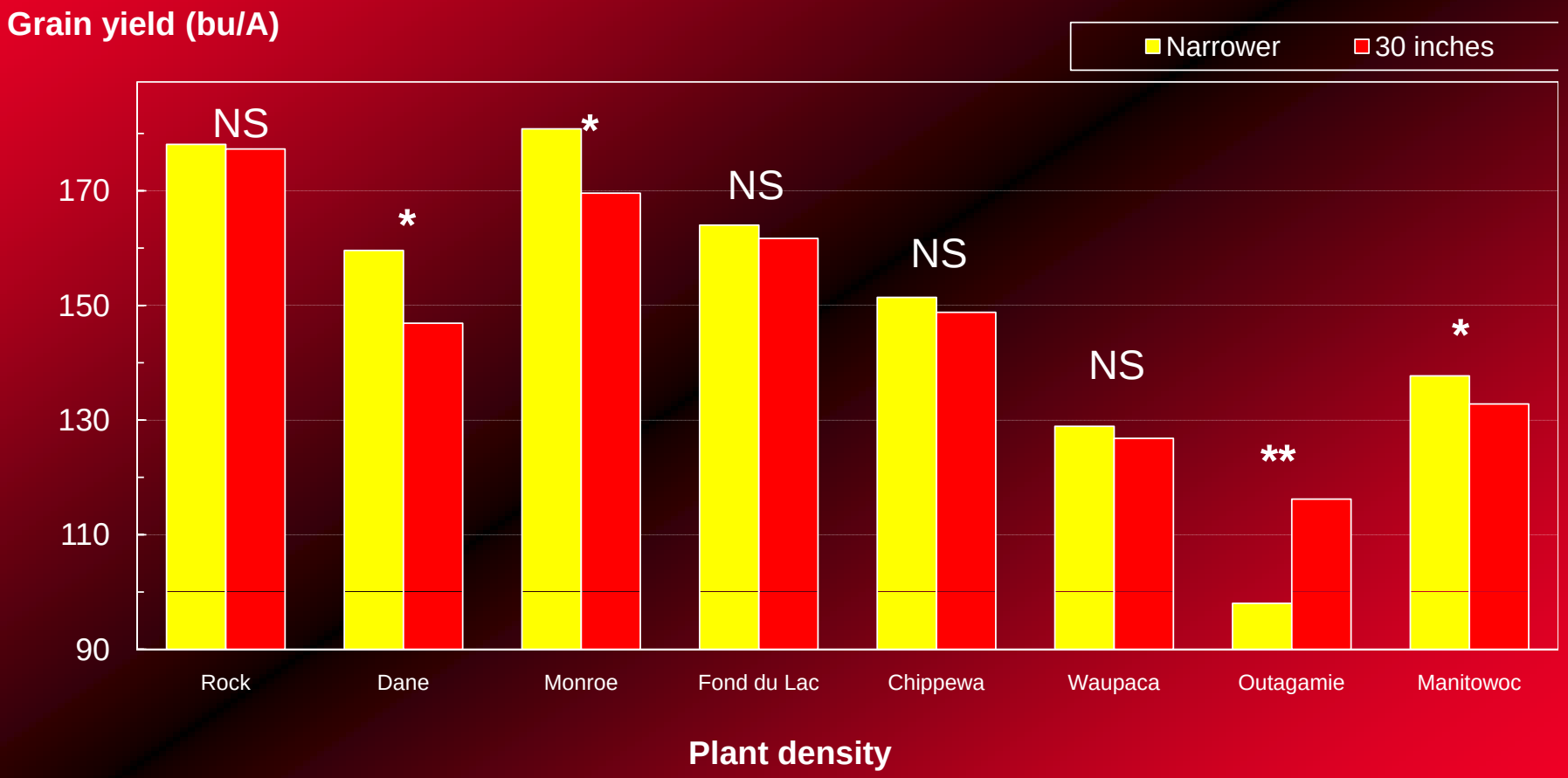
Corn response to row spacing & plant density in 1997.



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Disadvantages of narrow rows

- Equipment must be modified
  - Nature of corn production favors wider rows
  - Need narrow tractor tire size
  - Planter-cultivator-combine
- Under drought conditions, stress is observed earlier resulting in pollination problems
- Mechanical cultivation is difficult, if not impossible
- No-till residue management is difficult

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Equipment changeover costs to narrow rows

Replacing rims and tires	$4,800 to $8,000
Combine head	$1,200 to $1,600
Additional planter units	$3,000 to $5,000
Frame extensions & reinforcement	?
Variable costs (fertilizer, fuel, etc.)	$5 to 10 per A
Tillage using residue clearing	?
Requires more time at planting	?
Cultivation difficult or impossible	?

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Corn response to row spacing in 1997.

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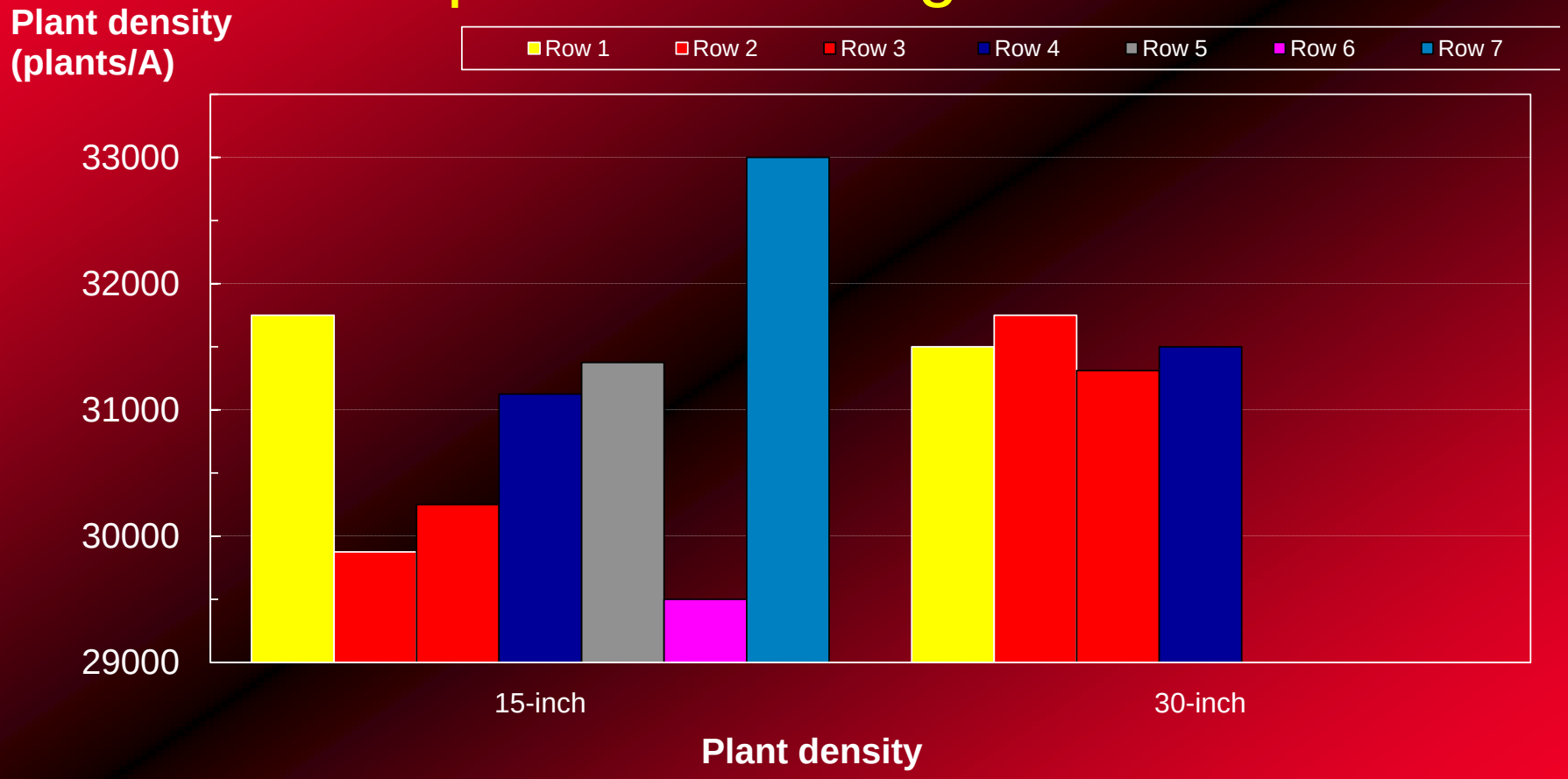
Corn plant density at each row position on a Kinze planter at Arlington in 1997.



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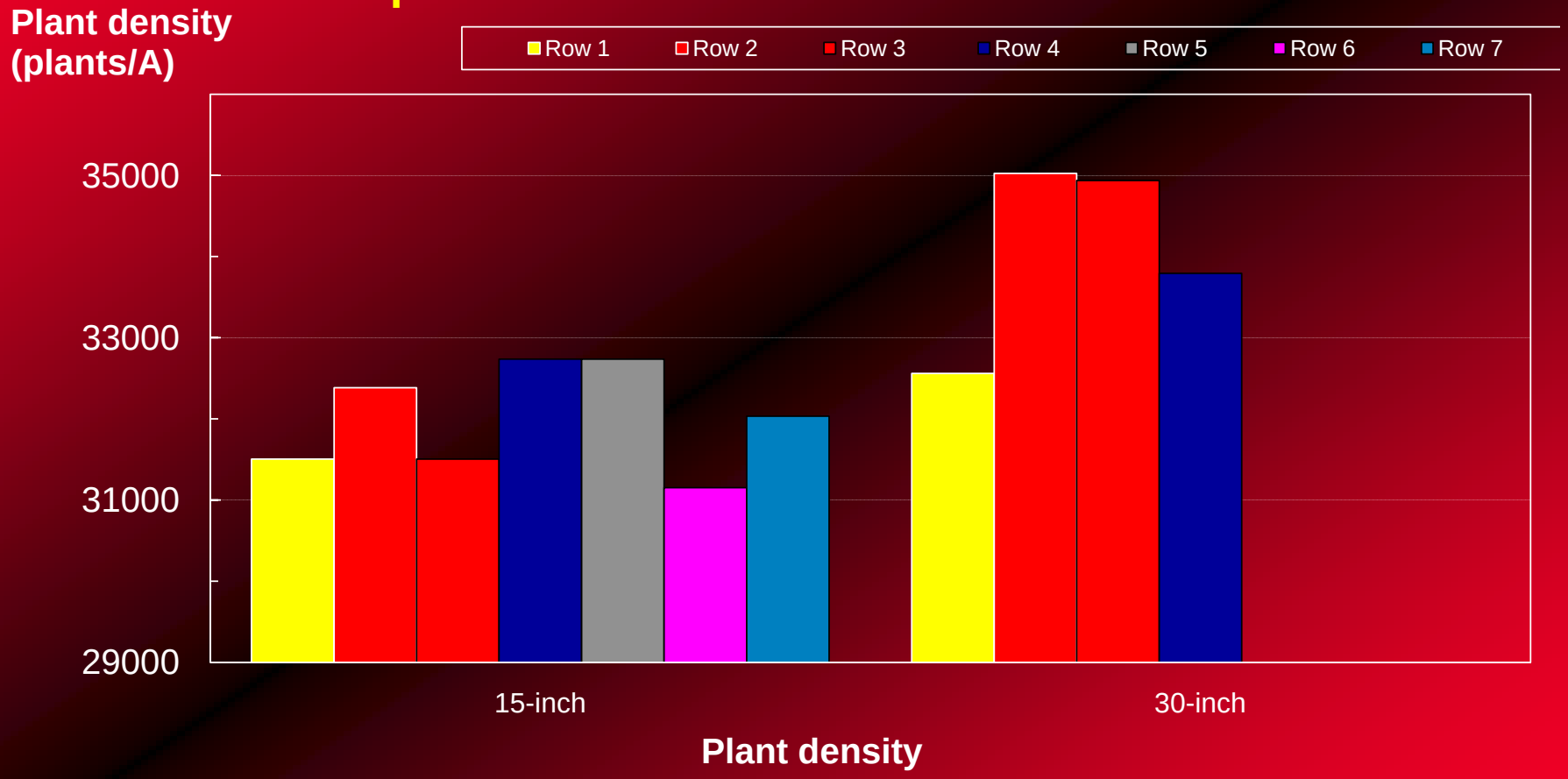
Corn plant density at each row position on a Kinze planter at Fond du Lac in 1997.



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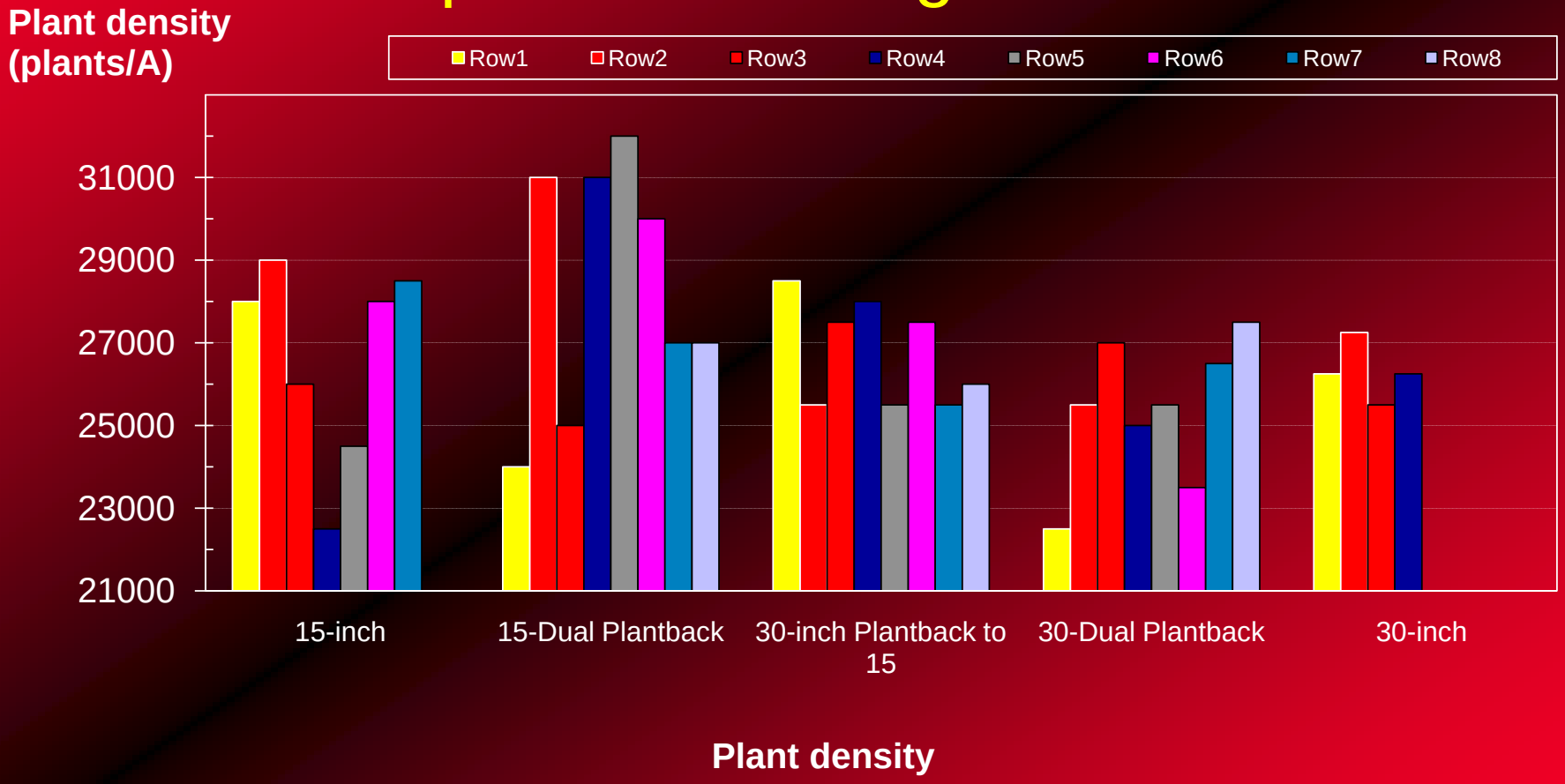
Corn plant density at each row position on a Kinze planter at Arlington in 1997.



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Management interactions with row spacing

- Plant population
- Hybrid
- Weed control

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Materials and Methods

- Plant density (plants/acre) 18000, 24000, 30000, 36000, and 42000
- Corn hybrids selected for similar maturity, silage yield, and grain yield.
- Hybrids differed for silage quality traits

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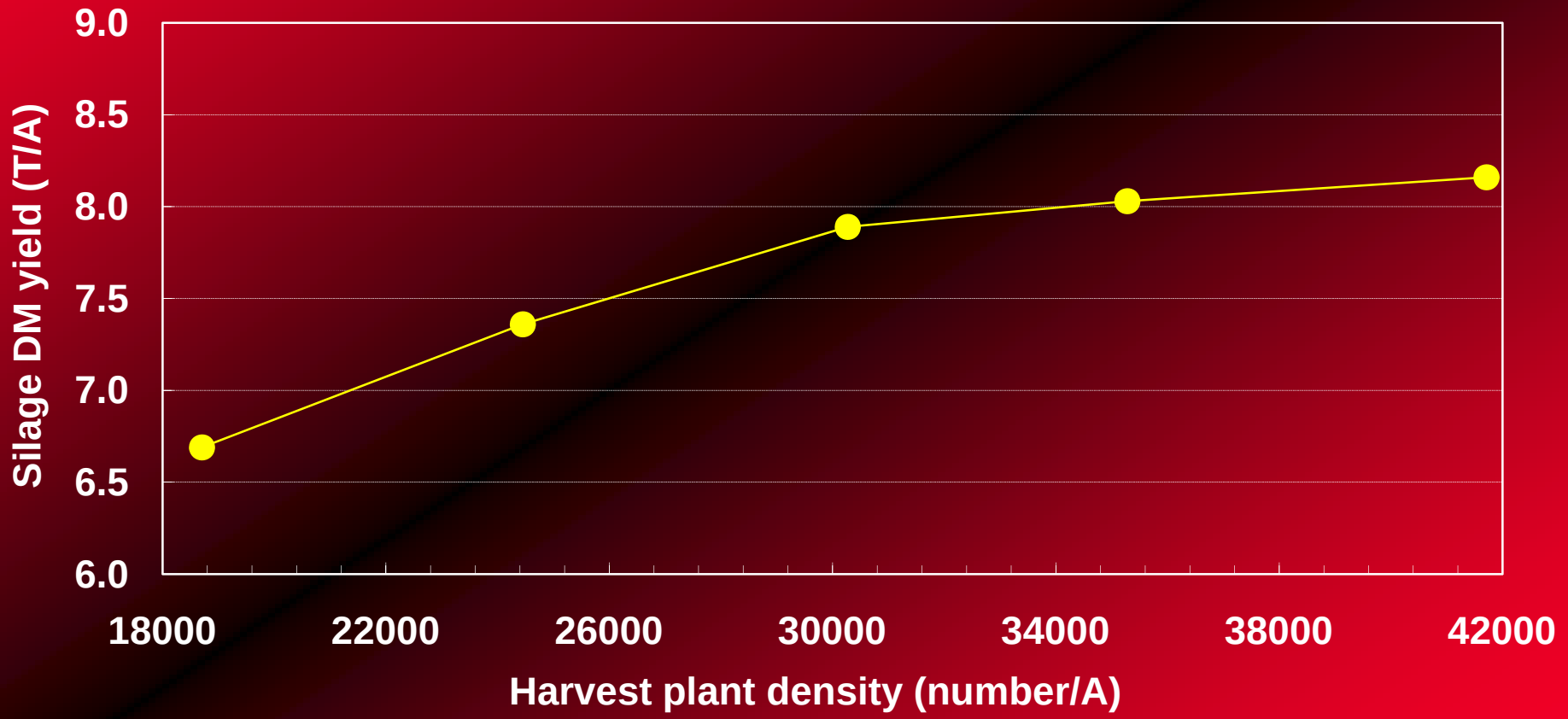
Relationship between corn silage yield and plant density between 1994 and 1996.



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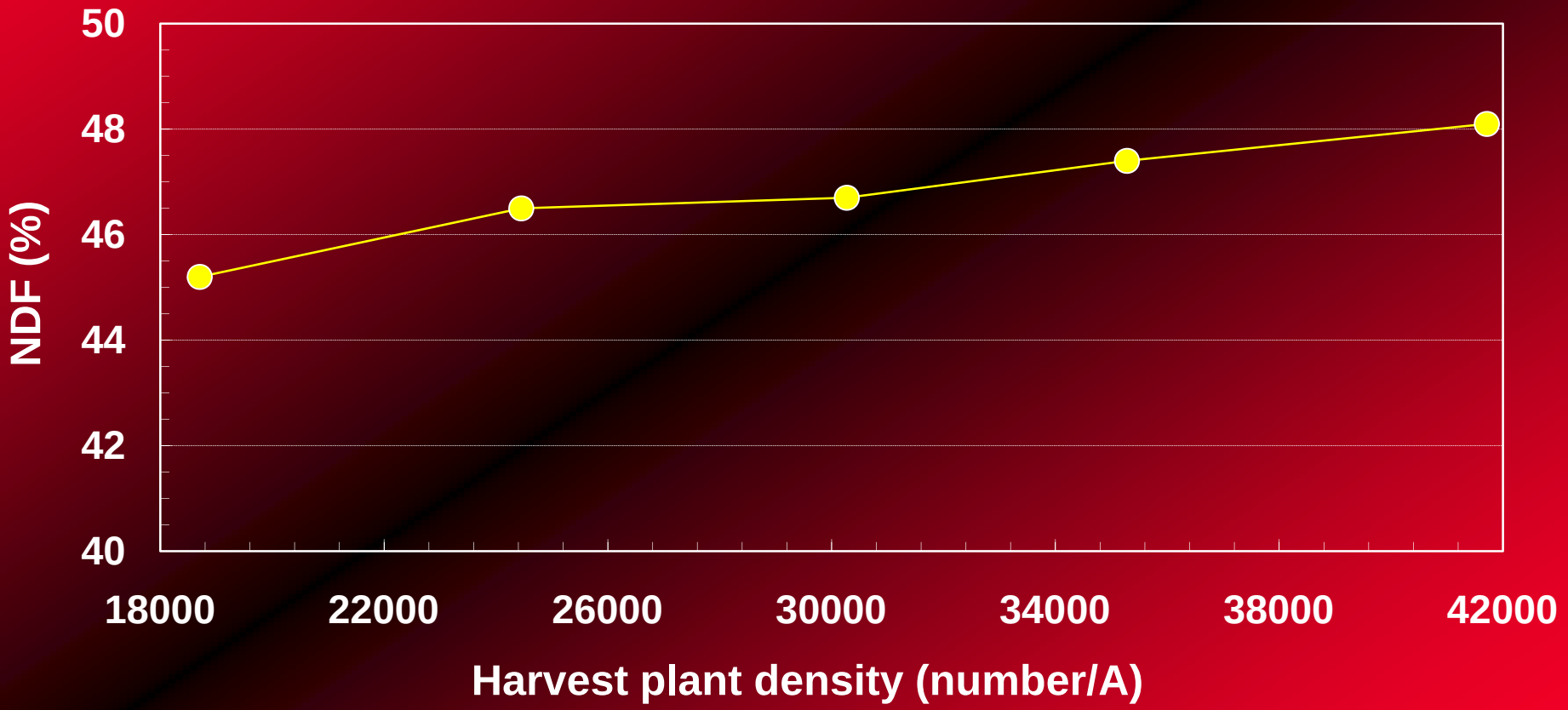
Relationship between corn silage neutral detergent fiber (NDF) and plant density between 1994 and 1996.



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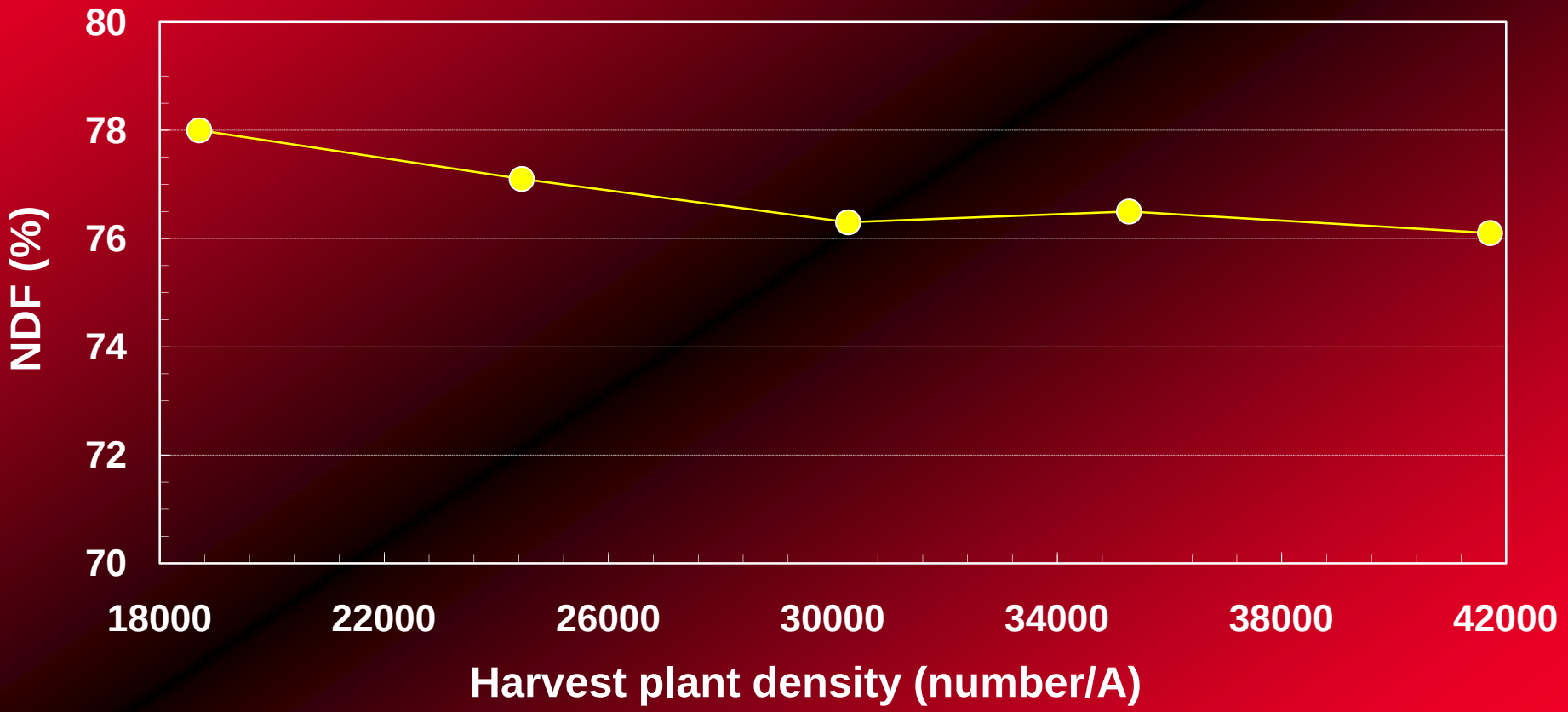
Relationship between corn silage *in vitro* digestibility (IVD) and plant density between 1994 and 1996



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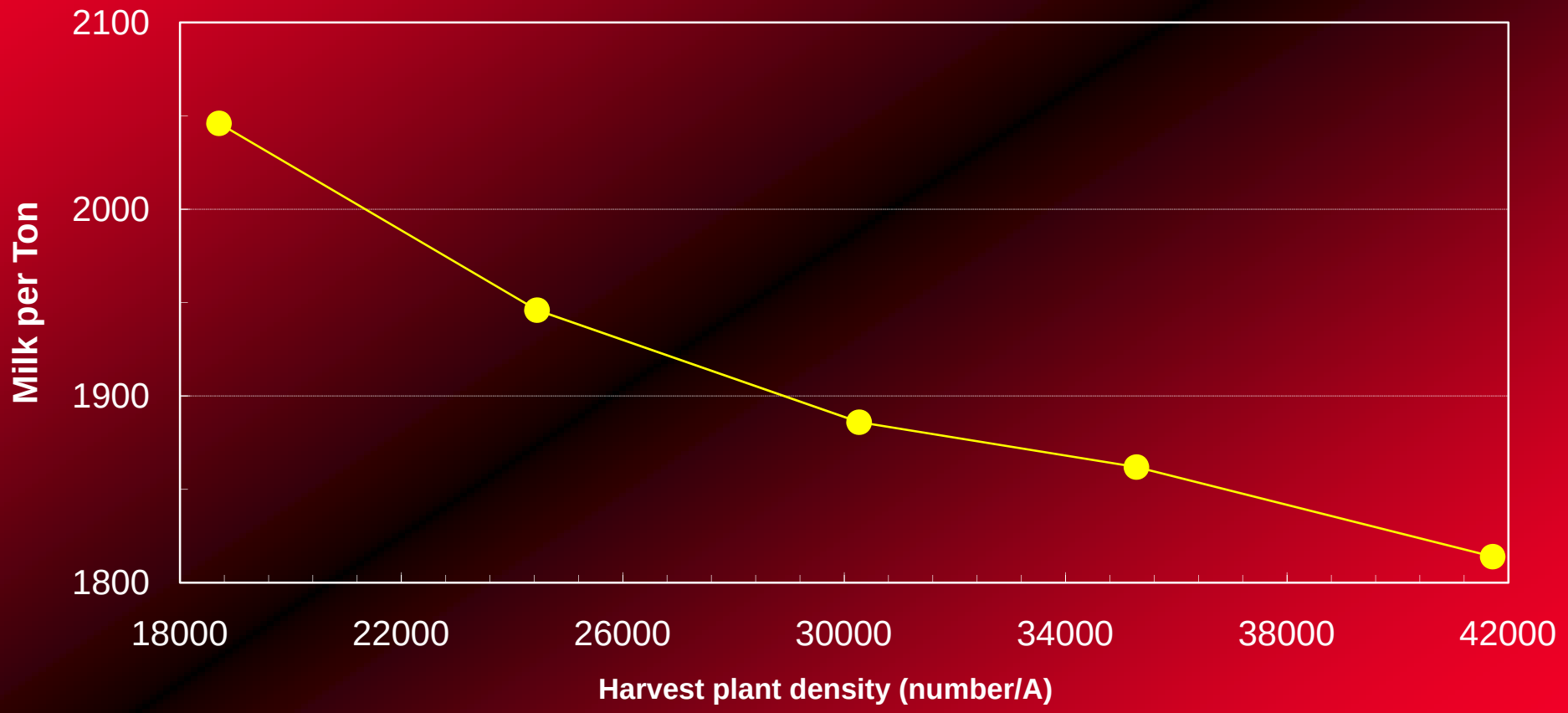
Relationship between corn silage Milk per ton and plant density between 1994 and 1996



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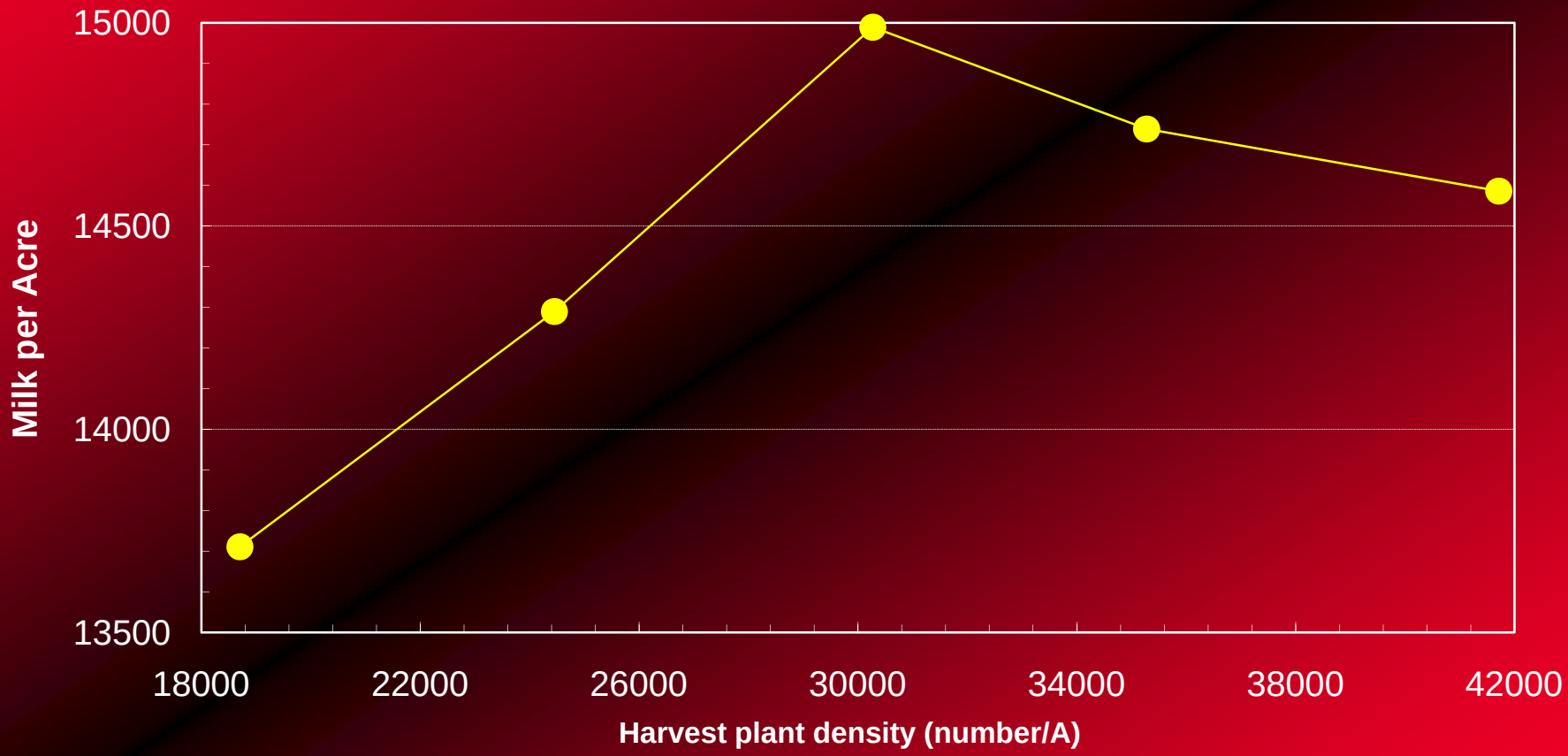
Relationship between corn silage Milk per acre and plant density between 1994 and 1996.



Lauer, 1997

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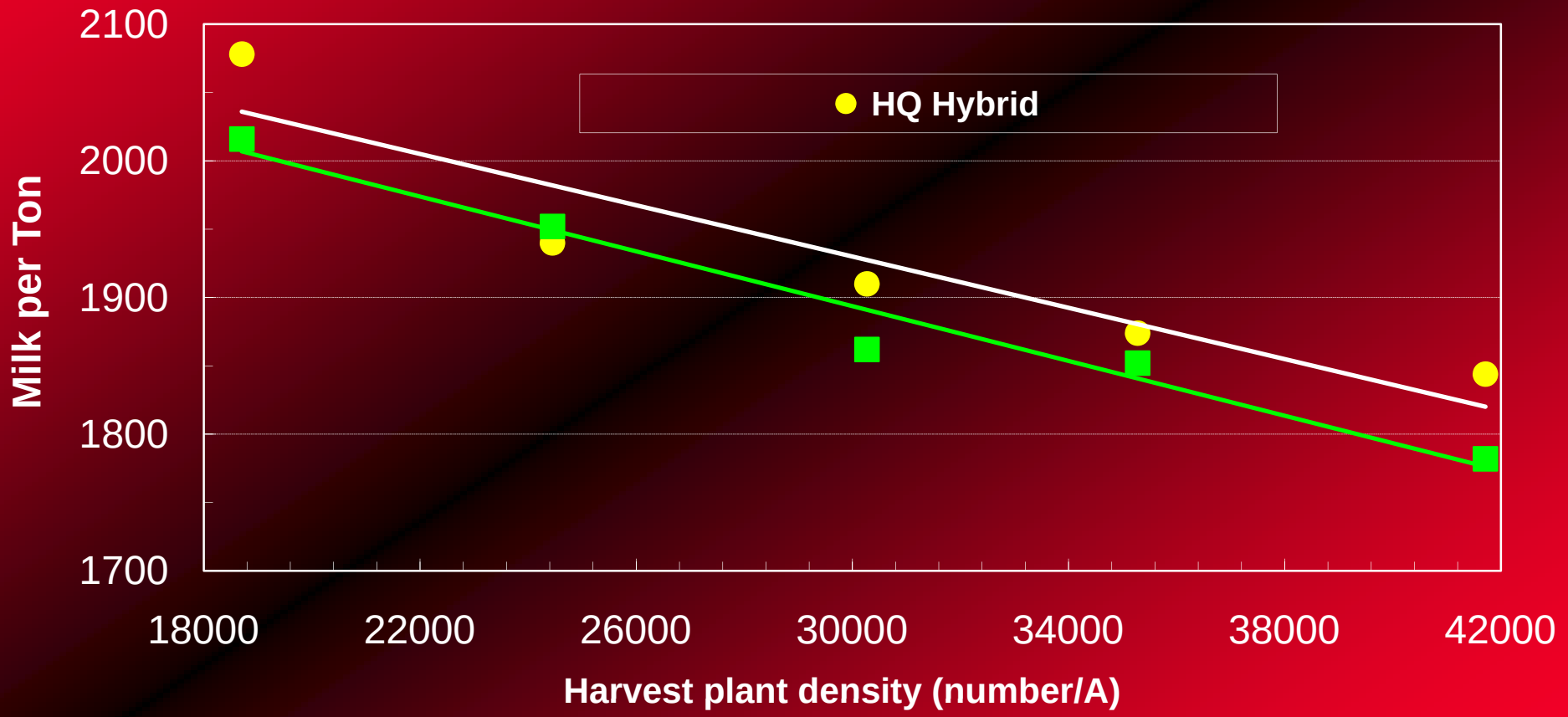
Relationship between corn silage Milk per ton and plant density between 1994 and 1996



Lauer, 1997

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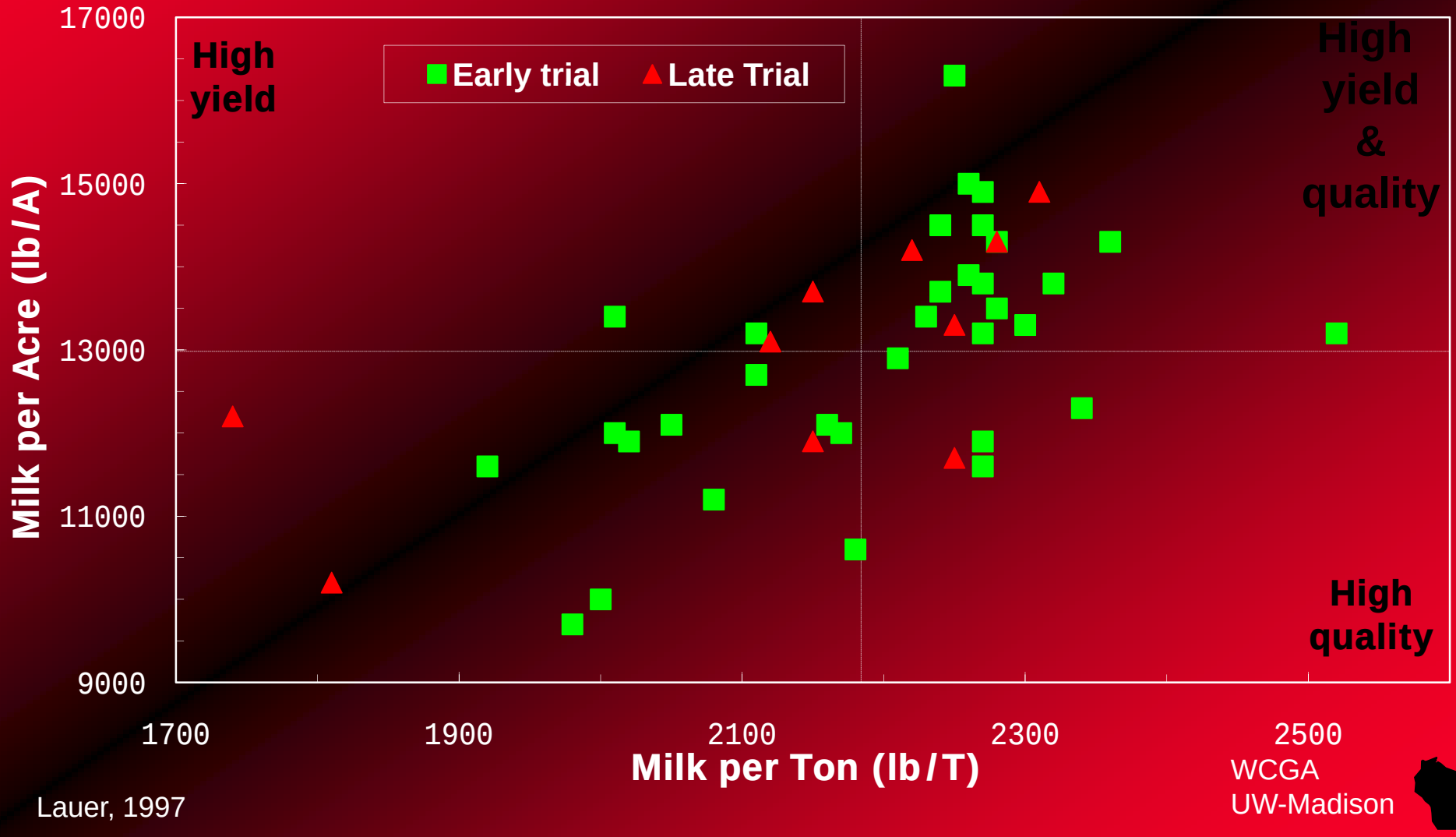
Corn hybrid silage yield and quality in the southern production zone of Wisconsin.



Lauer, 1997

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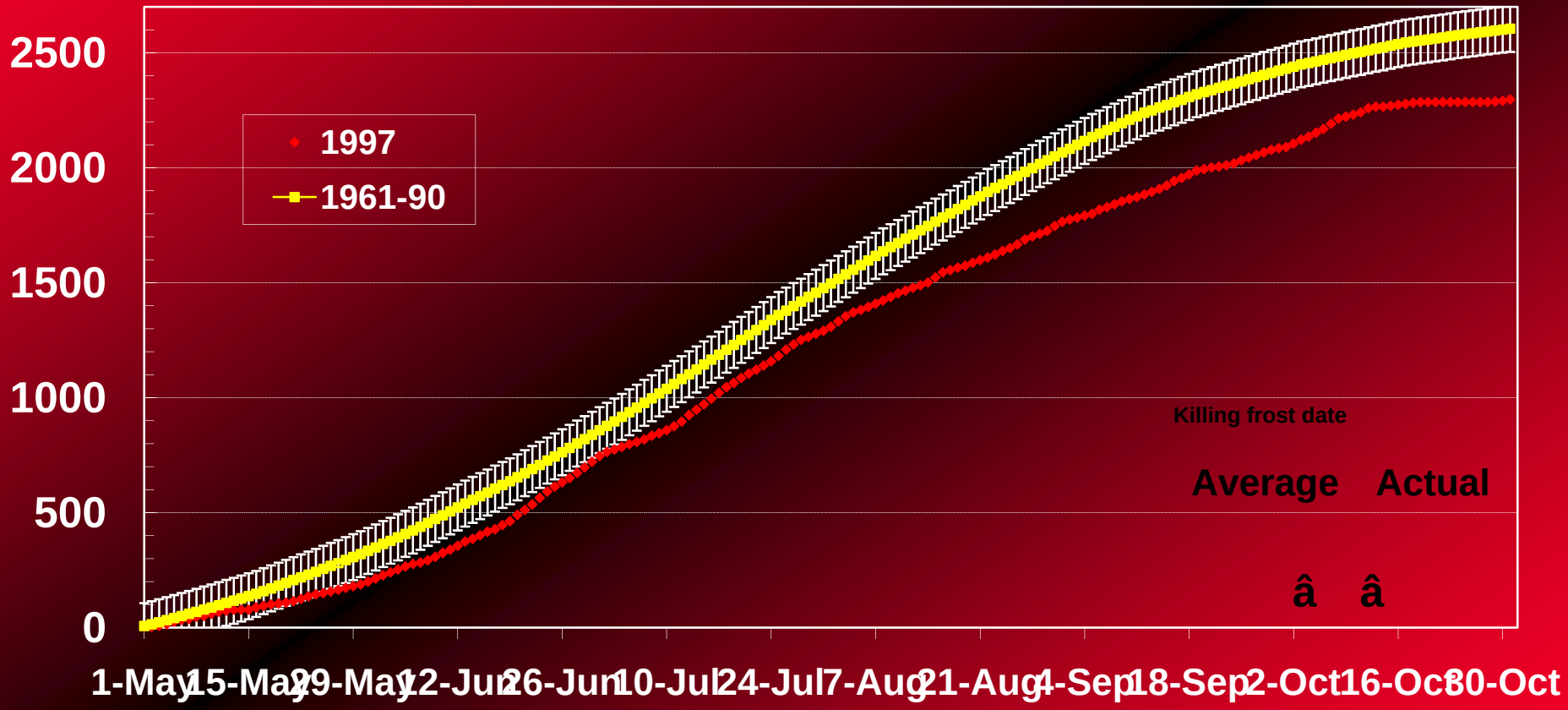
GDU Accumulation during 1997 at Arlington, WI. GDU bars around 1961-90 average occur 4 of 5 years



Lauer, 1997

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