

# ■ Wheat (*Triticum aestivum*) cultivar response to chlormequat chloride (Manipulator<sup>®</sup>) treatment

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PLSC 494.6

# Why did I choose this research topic?

- Field scale trials
- Benefit to local producers
- Lodging becoming more of a consistent issue
- Manipulator<sup>®</sup> was new to Canada
- Chance to work on a topic that has very little previous research



# Project Background

## Plant Growth Regulators

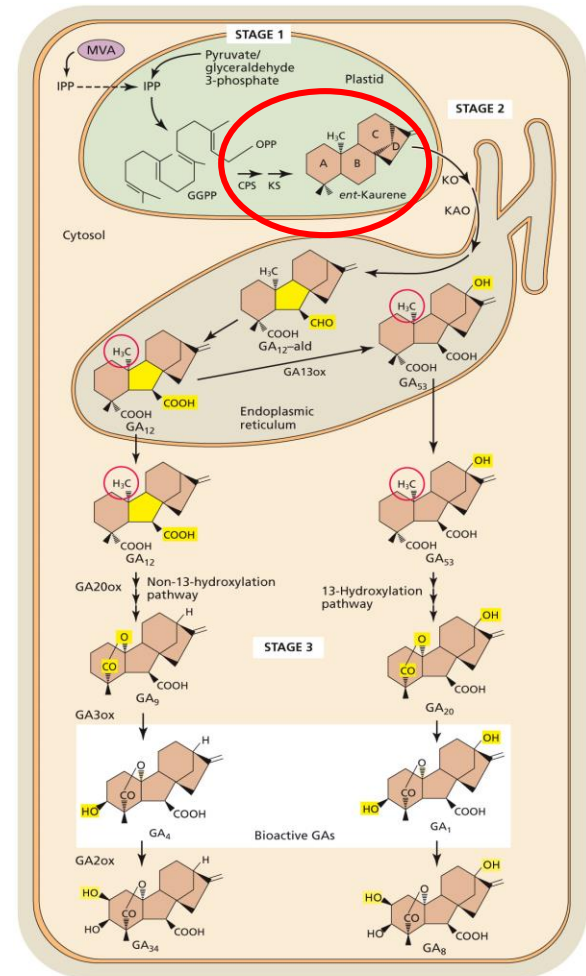
- Modify plant hormone balances (Espindula et al., 2009)
- Reduce shoot length in crop production (Shekoofa & Emam, 2008)
- Used for decades in intensive European cereal production (Rademacher, 2009)
- PGRs used extensively in horticulture industry (Taiz et al., 2015)



# Project Background

## Chlormequat chloride

- Inhibits the production of gibberellins (a plant hormone) (Tolbert, 1960)
- Specifically interrupts the activity of copalyl-diphosphate synthase and ent-kaurene synthase (Taiz et al., 2015)
- Reduces stem height (Shekoofa & Emam, 2008)
- Increases stem strength (Miranzadeh et al., 2011)



PLANT PHYSIOLOGY AND DEVELOPMENT 6e, Figure 15.20  
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# Objective & Hypothesis

- Analyze hard red spring wheat (*Triticum aestivum*) cultivar response to chlormequat chloride (Manipulator<sup>®</sup>) treatment
- Cultivars will respond differently and there will be a difference in a minimum of one of the seven parameters

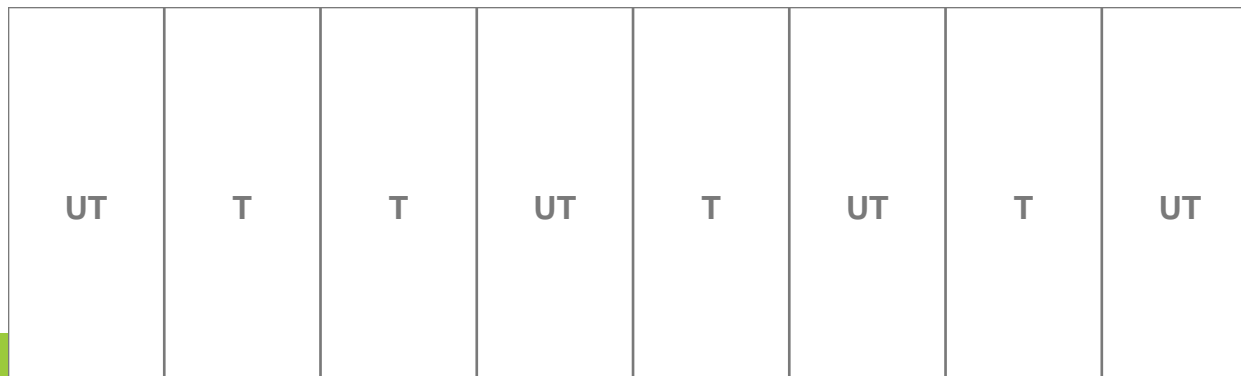
# Materials and Methods

## Wheat Cultivars:

- AC Carberry, CDC Morris, AC Harvest, AC Lillian, AC Elsa

## Design:

- Randomized complete block at field scale with one treatment compared to a control
- 4 replicates of each treatment in randomized strip pattern
- 3 sites at different locations for each cultivar



# Materials and Methods

## Treatment:

- 174 g ae ha<sup>-1</sup> (0.7 L/ac) chlormequat chloride @ 94 L/ha water volume

## Stage:

- ZS 30-32

## Measurements:

- Grain yield, plant height at maturity, lodging score, protein content, moisture content, test weight and overall grade

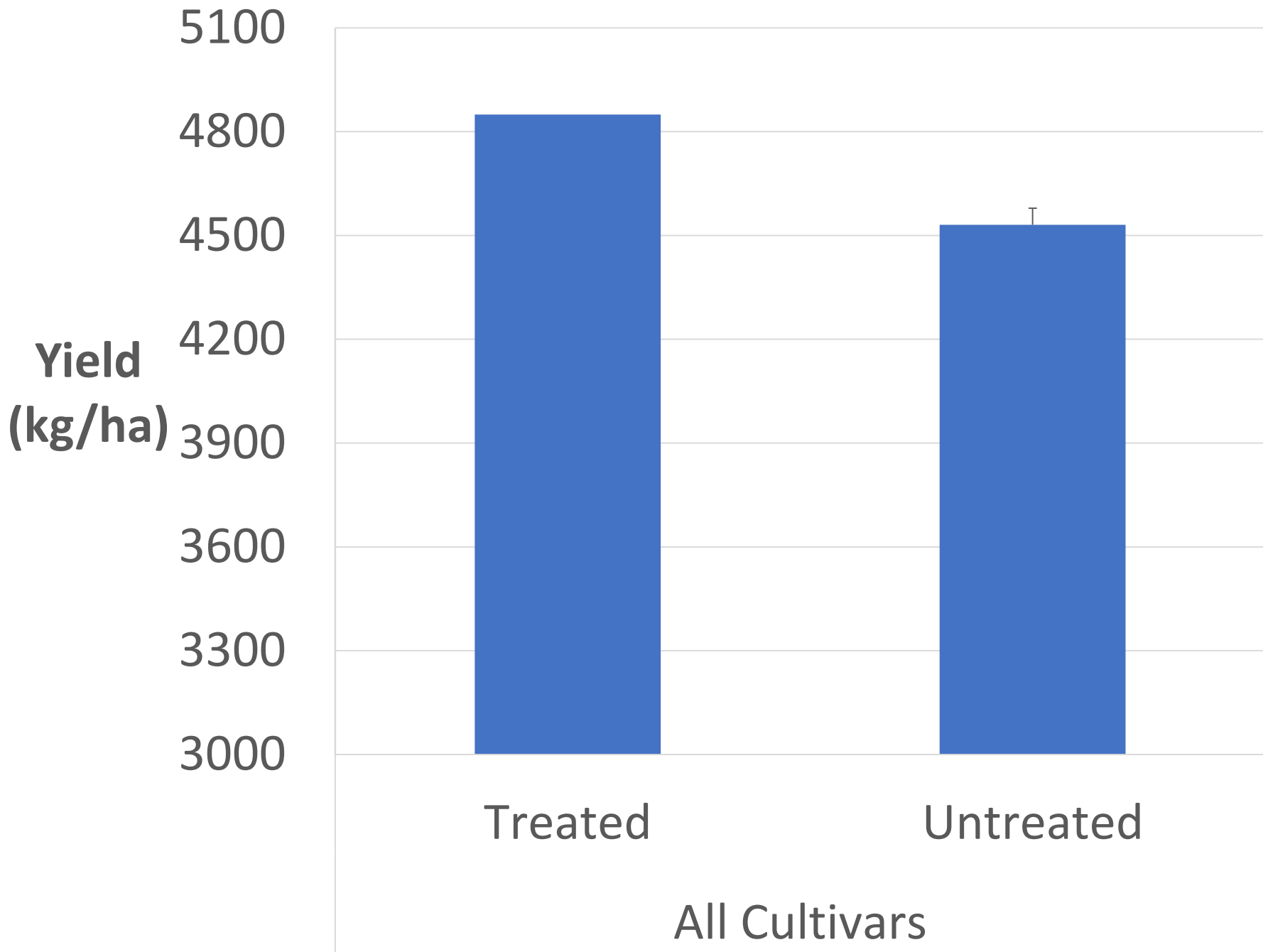


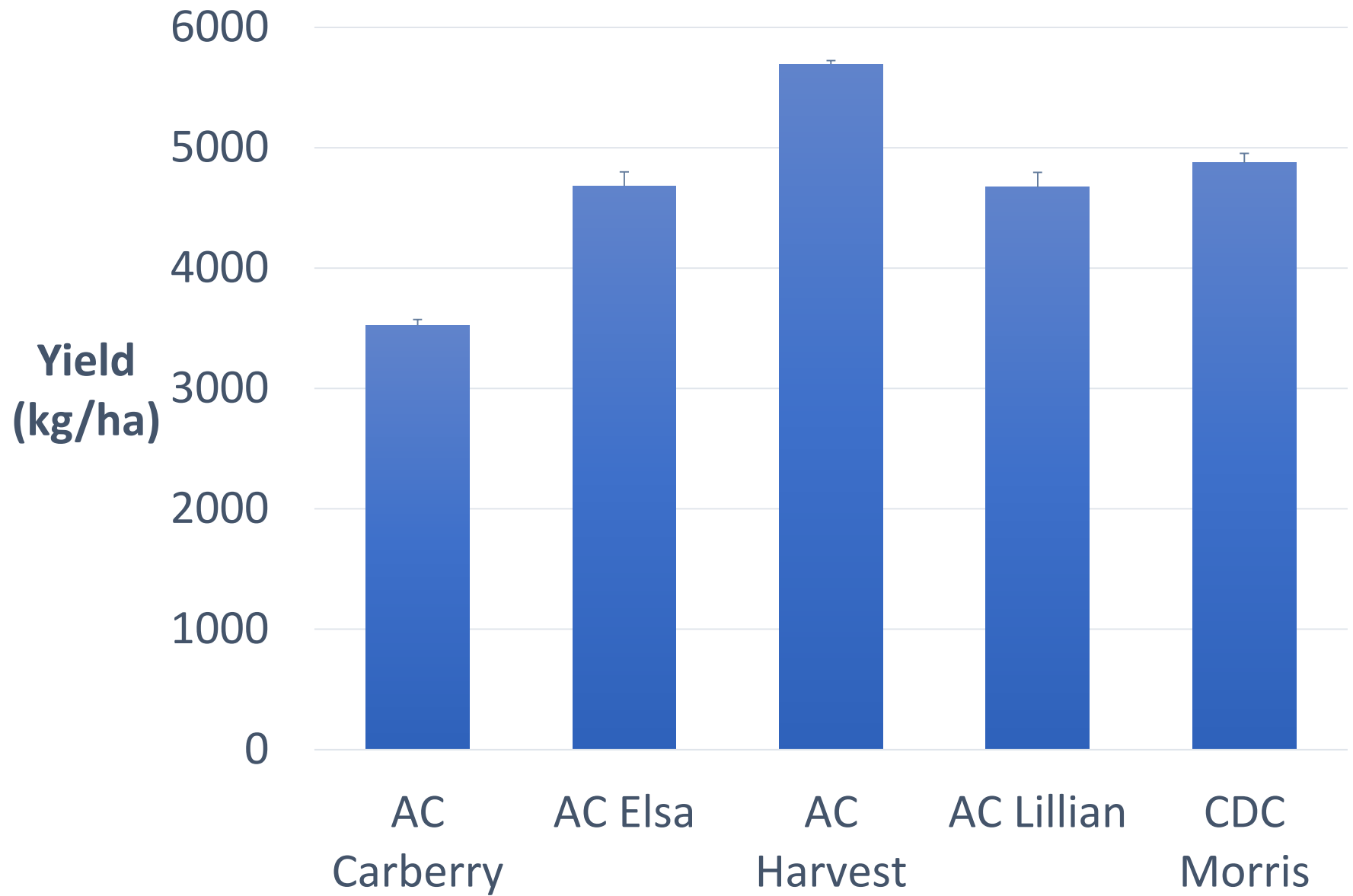
# Statistical Analysis

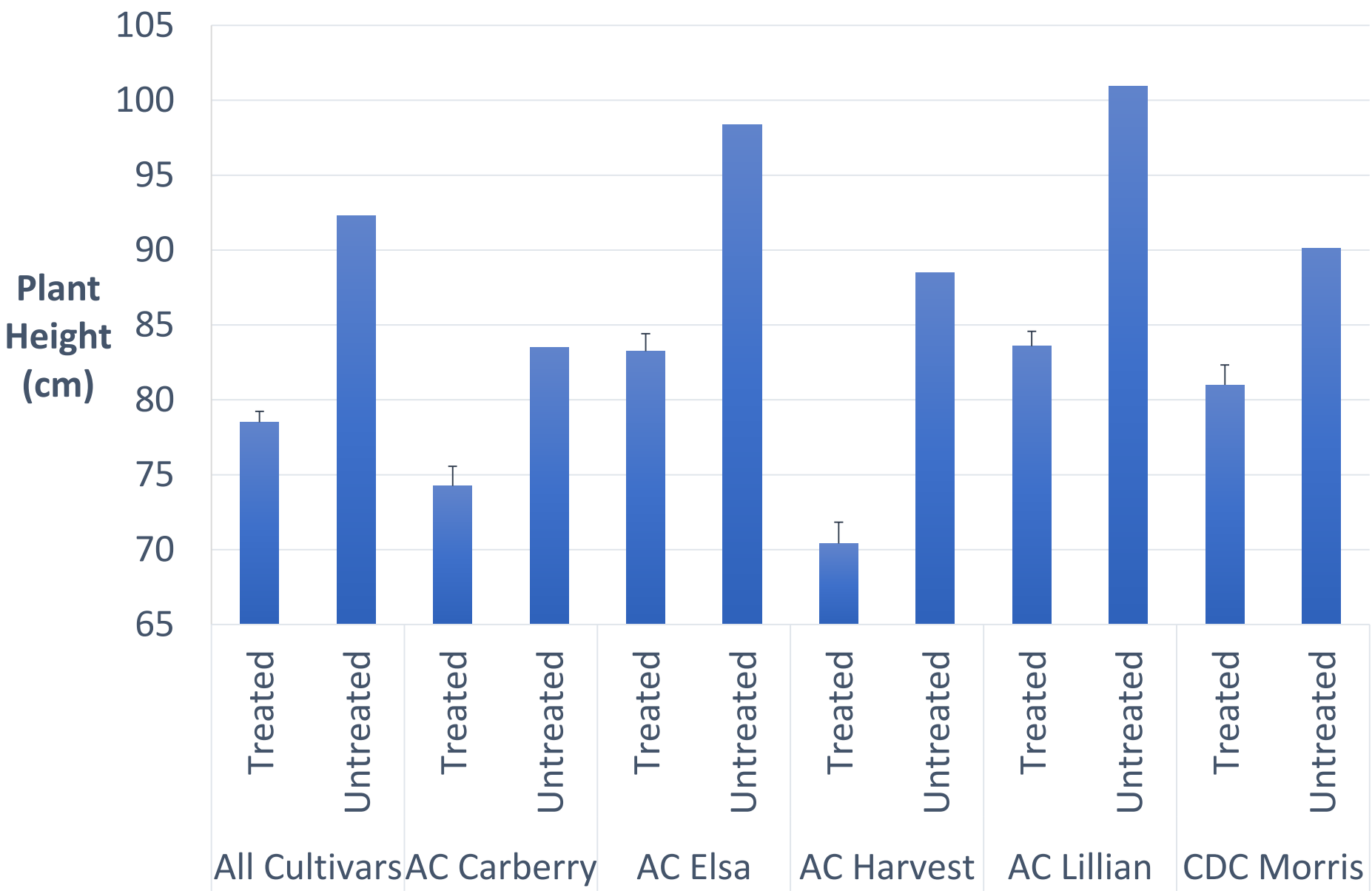
	Yield			Height			Lodging			Protein		
Parameter	DF	F Value	P Value	DF	F Value	P Value	DF	F Value	P Value	DF	F Value	P Value
Cultivar	4	28.97	<.0001	4	17.51	<.0001	4	14.57	<.0001	4	17.54	<.0001
Treatment	1	45	<.0001	1	354.11	<.0001	1	65.08	<.0001	1	20.05	<.0001
Cultivar x Treatment	4	1.65	0.1839	4	8.27	<.0001	4	3.42	0.0171	4	3.93	0.0089

	Moisture			Test Weight			Grade		
Parameter	DF	F Value	P Value	DF	F Value	P Value	DF	F Value	P Value
Cultivar	4	11.76	<.0001	4	22.04	<.0001	4	32.64	<.0001
Treatment	1	0.08	0.7823	1	1.51	0.2295	1	0.06	0.8098
Cultivar x Treatment	4	2.71	0.0441	4	0.98	0.4338	4	0.09	0.9864







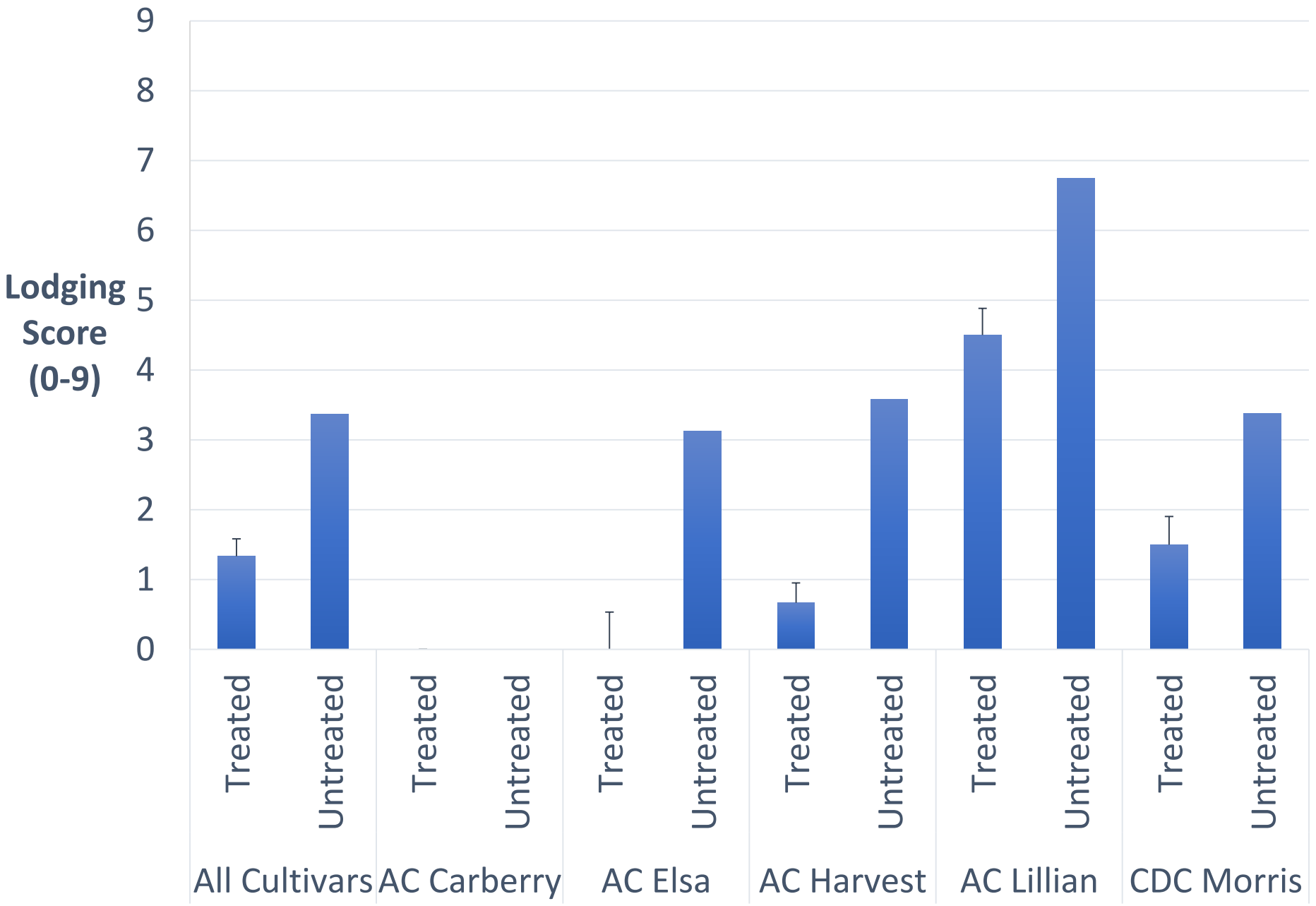






Treated

Untreated



# CDC Morris



# AC Harvest

Treated

Untreated





# AC Harvest

Treated

Untreated



AC Lillian

Untreated

Treated



# AC Harvest



Untreated

Treated

# AC Lillian



Untreated

Treated



Untreated

Treated

# AC Lillian

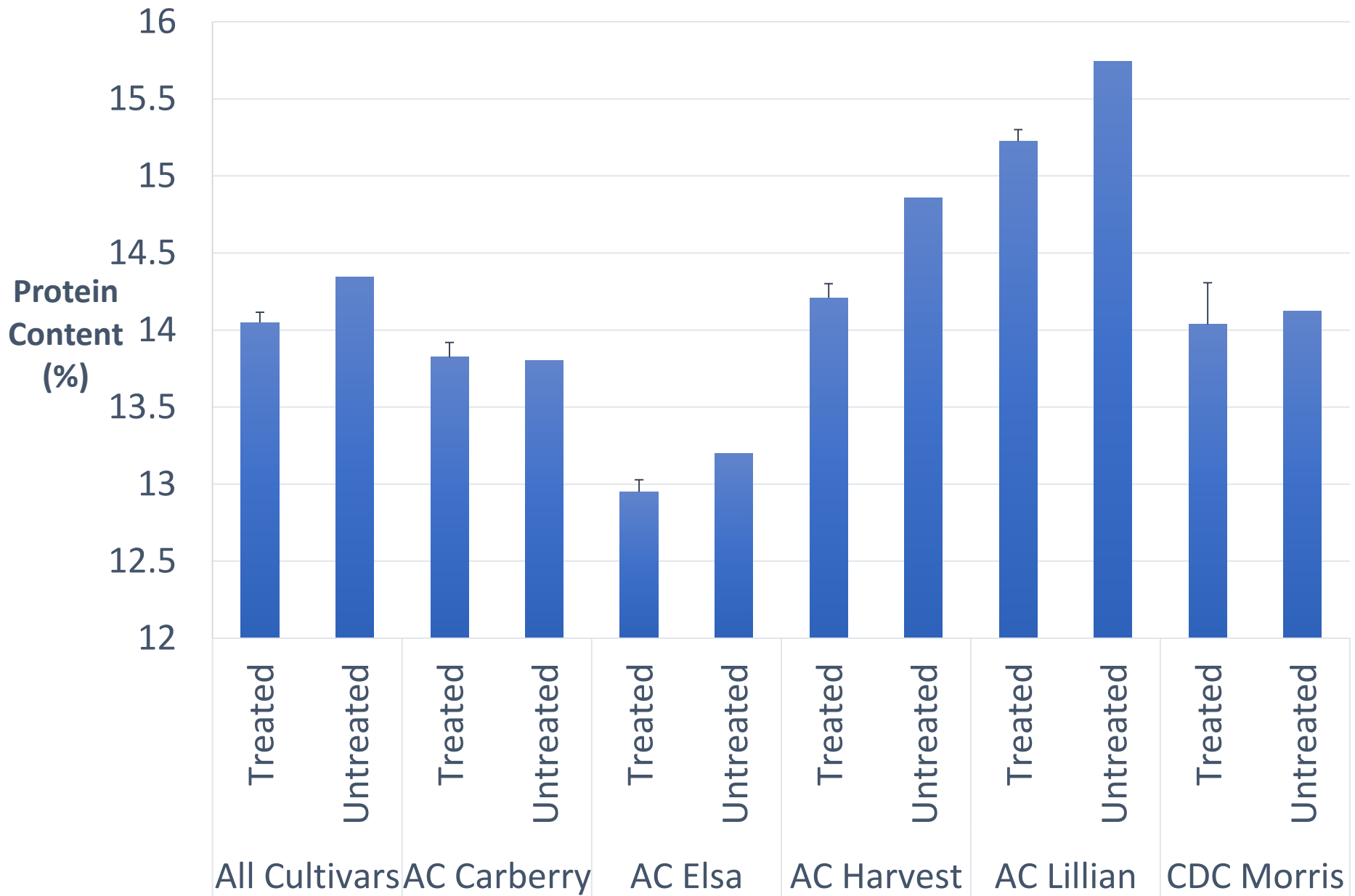


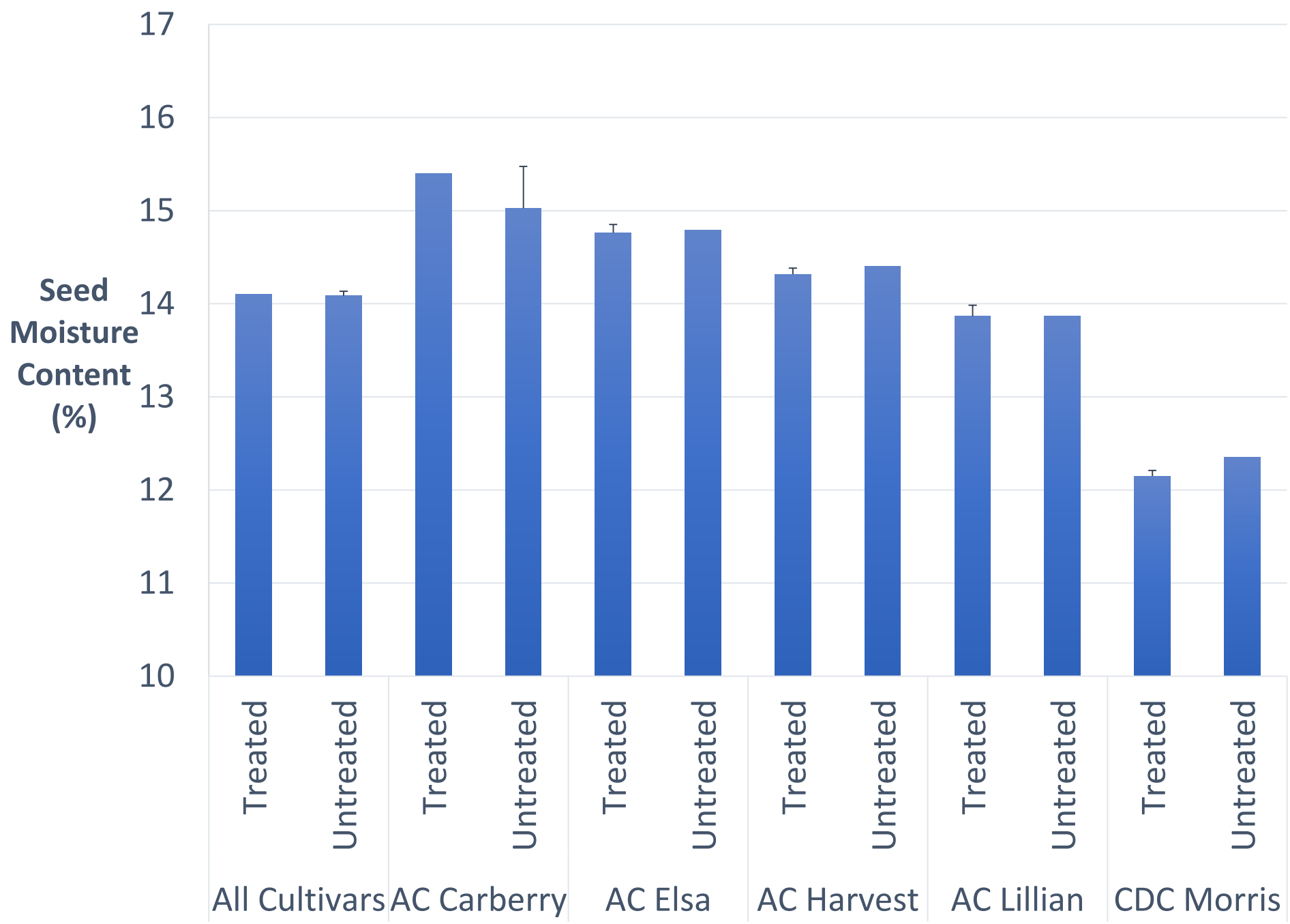
Untreated

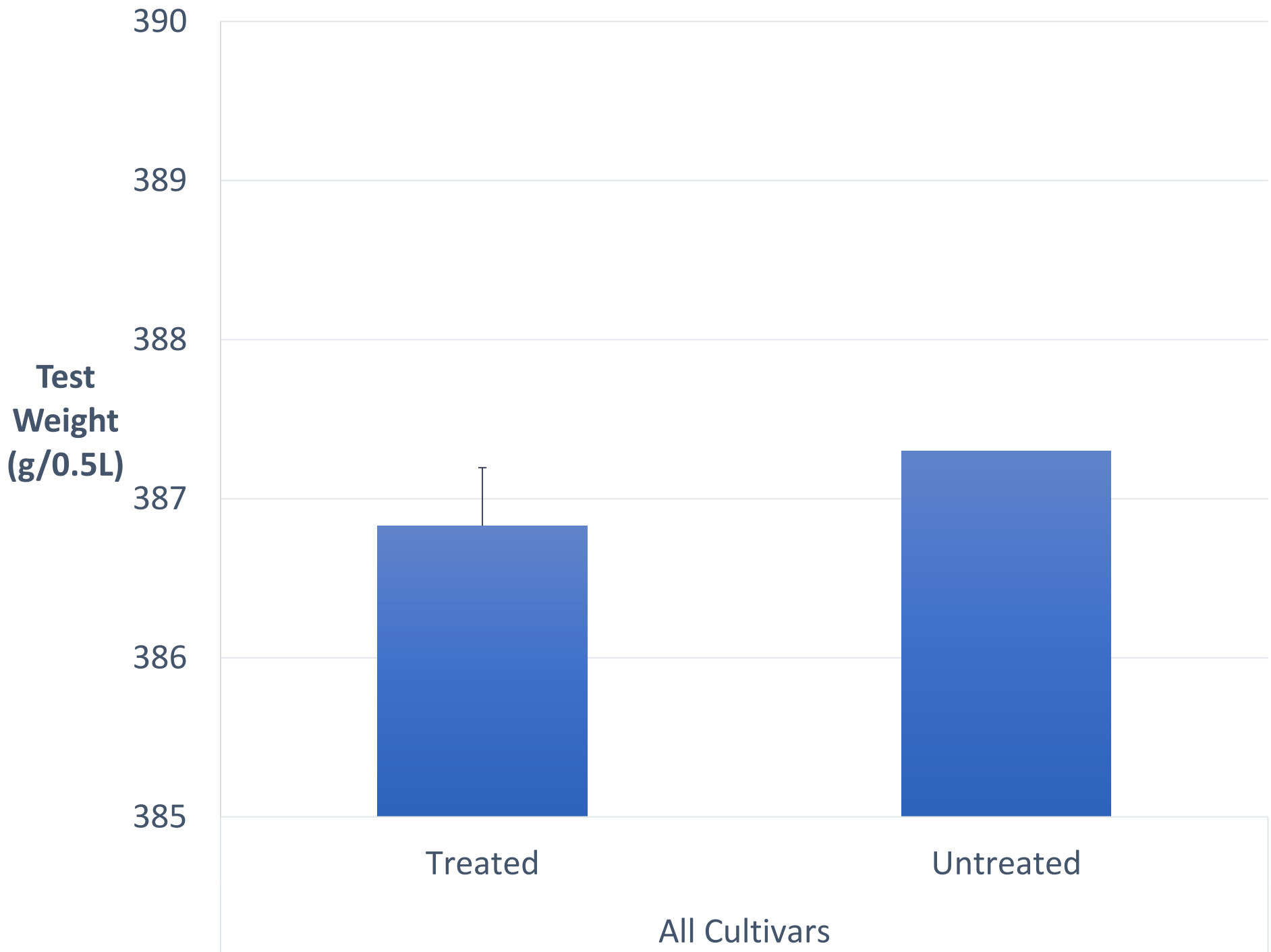
Treated

Untreated

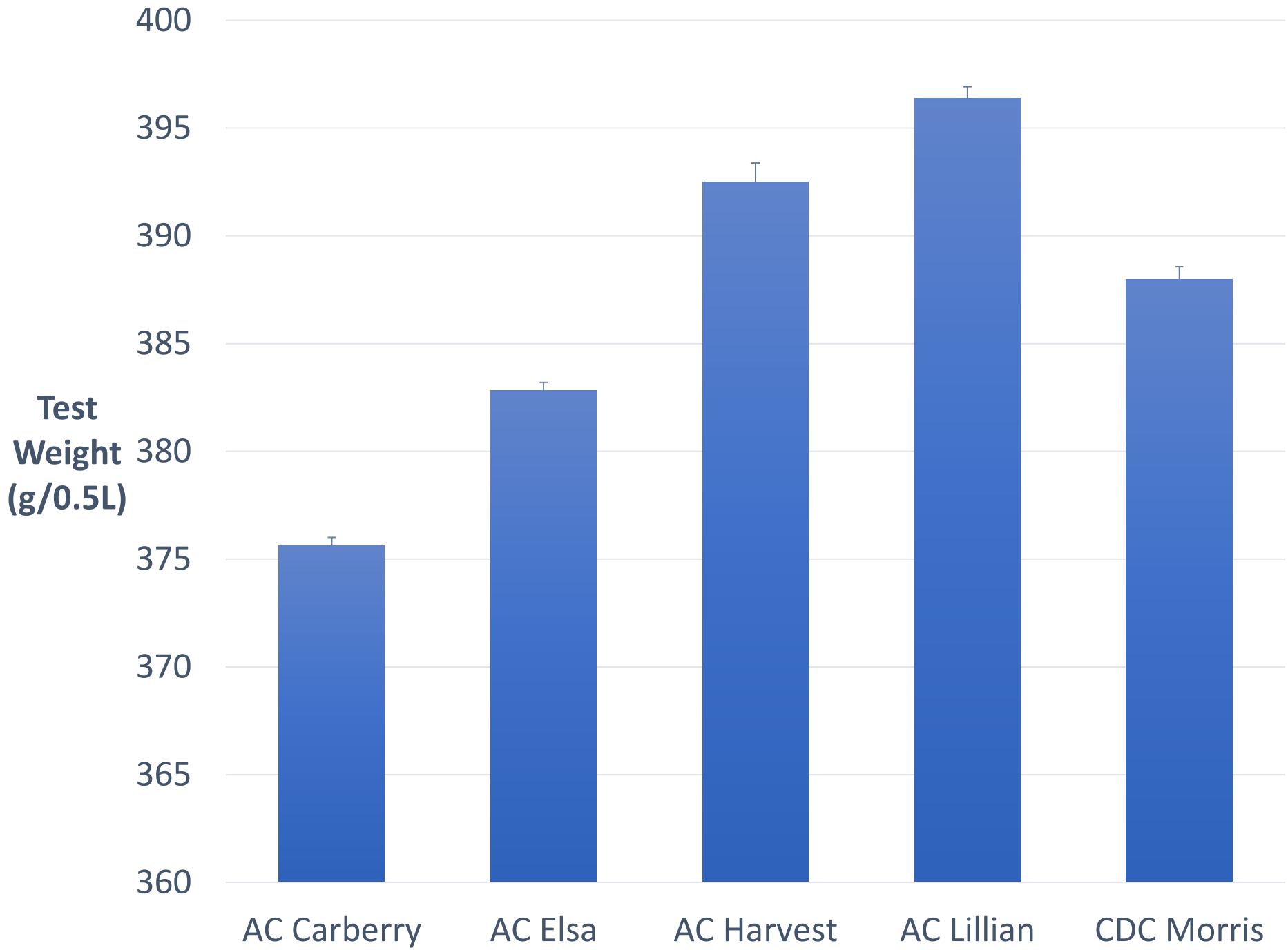
Treated

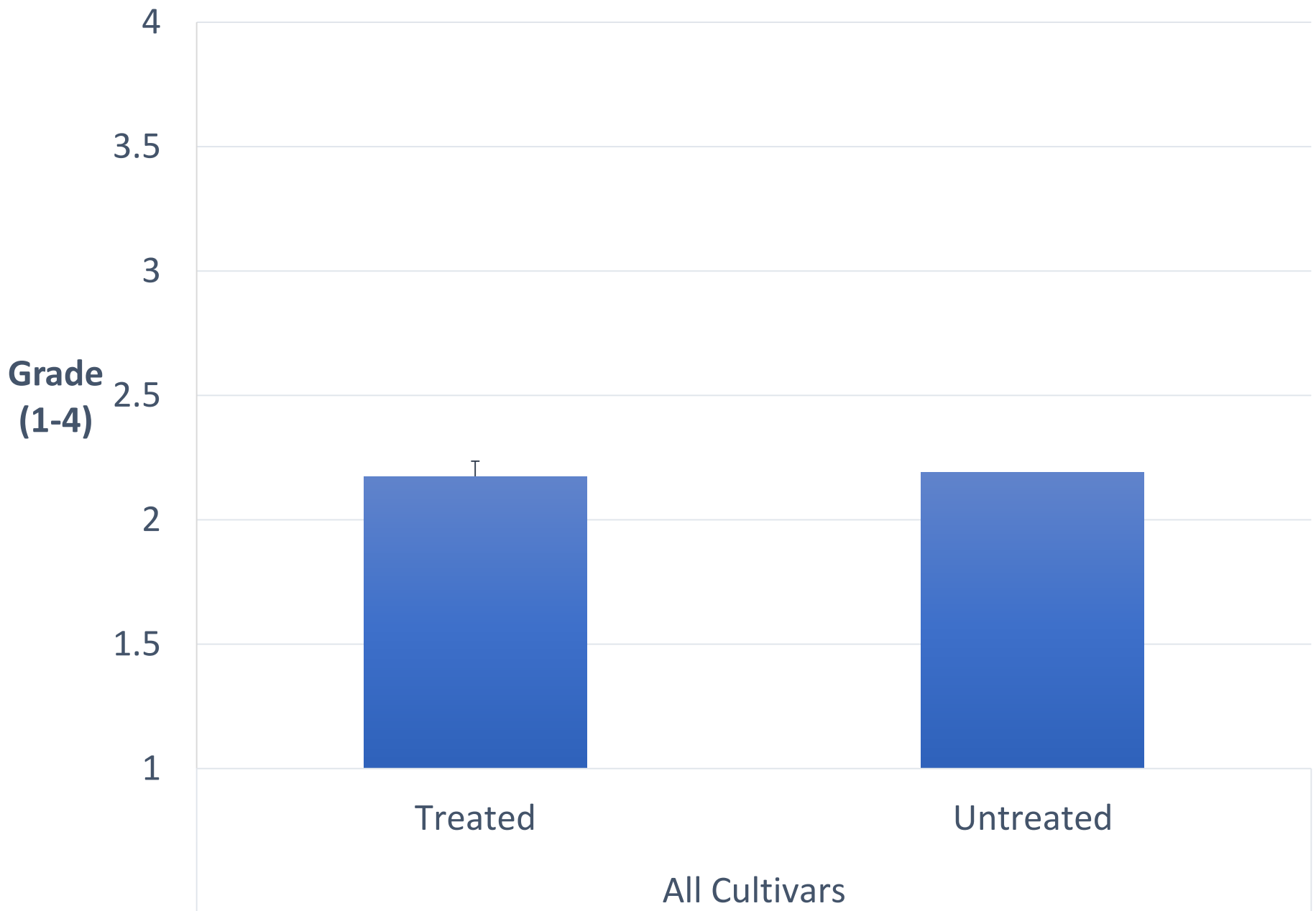


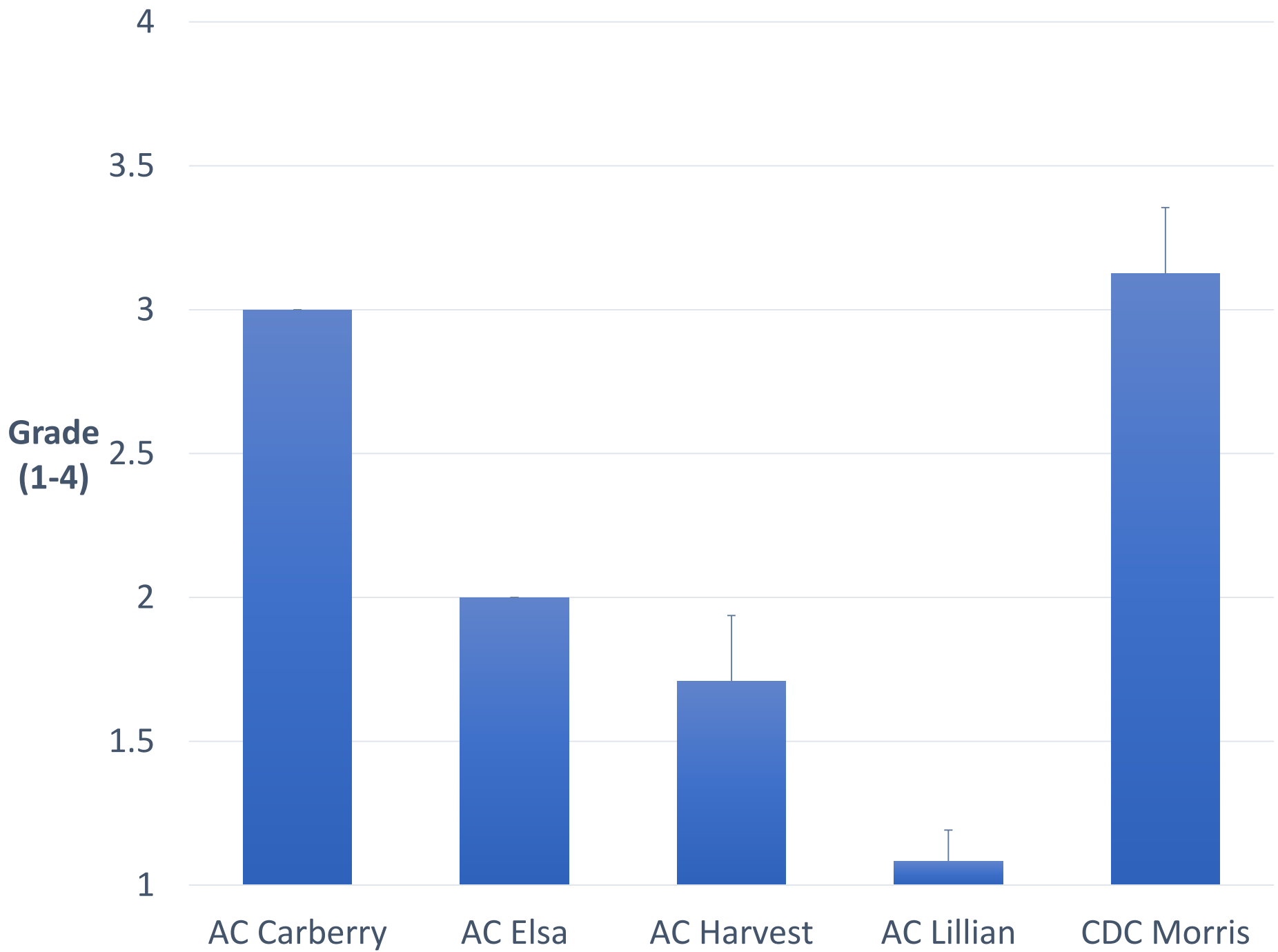












# Profitability

Cultivar	Yield Increase		Wheat Price		Revenue Increase		Application Cost		Net Profit	
	kg/ha	bu/ac	\$/kg	\$/bu	\$/ha	\$/ac	\$/ha	\$/ac	\$/ha	\$/ac
Lillian	527	7.9	0.24	6.50	125.86	51.35	46.95	19.00	78.91	32.35
CDC Morris	312	4.7	0.24	6.50	74.52	30.55	46.95	19.00	27.57	11.55
AC Elsa	308	4.6	0.24	6.50	73.56	29.90	46.95	19.00	26.61	10.90
Harvest	226	3.4	0.24	6.50	53.98	22.10	46.95	19.00	7.03	3.10
Carberry	221	3.3	0.24	6.50	52.78	21.45	46.95	19.00	5.83	2.45

# Conclusions & Relevance

- Chlormequat chloride response varied depending on wheat cultivar.
- Cultivar x treatment interaction observed for plant height, lodging severity, protein content, and seed moisture content.
- Significant differences occurred between treated and untreated for yield, plant height, lodging and protein.

# Conclusions & Relevance

- Economic benefit of chlormequat chloride was greatest when lodging was severe, but was profitable even when no lodging occurred.
- Intensive wheat production systems are most likely to benefit from the use of chlormequat chloride.

# References

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# Thank you!

- Grower Partners – Wayne Andres, Peter Unruh, Jason Feitsma, Nic Wiens
- EngageAgro – Phil Bernardin
- Wendland Ag Services Ltd
- Dr. Chris Willenborg & Eric Johnson



# Questions?