

Let's Make Wheat Great Again!

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According to the Guinness Book of World Records, what is the Greatest Wheat Yield?

- A) less than 150 bu/ac
- B) greater than 200 bu/ac
- C) less than 225 bu/ac
- D) greater than 250 bu/ac



D) 249.68 bu/ac from 29.39 acres

Eric and Maxine Watson, New Zealand
February 2017 (Winter Wheat)

High Yields are Achievable!

- 246 bu/ac – Northeast England in 2015
 - 277 bu/ac N fertilizer split in 4 apps., 165 lb/ac seeding rate, 4 fungicide applications, 4 PGR application
- 233 bu/ac – New Zealand in 2010

Northumberland grower breaks world wheat yield record

Monday 21 September 2015 15:43

David Jones

Northumberland grower Rod Smith has beaten the world wheat yield record by a whisker after an ideal growing season with plenty of sunshine and low disease levels.

Harvesting only 10 days after Tim Lamyman's record crop in Lincolnshire, Mr Smith recorded a yield of 16.52t/ha on his farm overlooking Holy Island on the Northumberland coast.

He achieved this bumper yield with inputs similar to those used commercially across the farm, which helped push his average winter wheat yields to above 14t/ha this summer.



Agrii agronomist Andrew Wallace (left), Rod Smith (centre) with Eric Horsburgh (Agrii)

High Yields are Achievable!

Shawridge Farms – Ontario

- Early seeding
- 7 inch rows
- Total 160 to 190 lb/ac N and 30 lb/ac S
 - 60 to 70% at stem elongation
- Two pass late fungicide system
- 154 bu/ac average

Hugh Dietrich - Ontario

- MAP at seeding
- Tile drainage
- Average 135 lb/ac N, 90 lb/ac at seeding
 - “Ramp up strips” – Early flag & when required
- Three fungicide system



Average Canadian and Sask. Wheat Yields

45.9 bu/ac

Canada

44.3 bu/ac

Saskatchewan

New Zealand vs. Ontario vs. Saskatchewan

What's Common

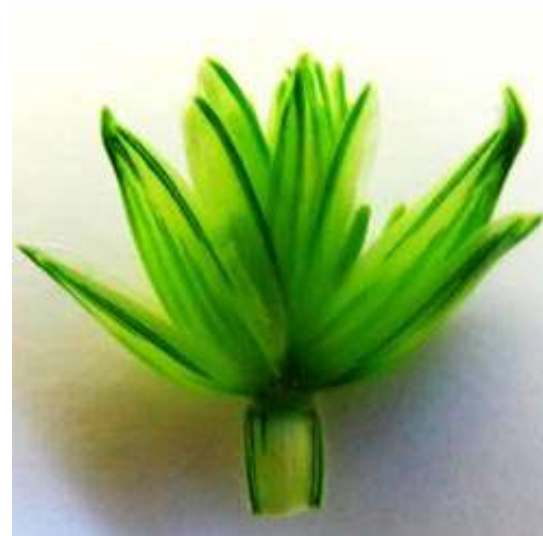
- Winter wheat/Early seeding
- Feed Varieties
- High Seeding Rates
- Focus on Head Development
 - Increased Nitrogen
 - Multiple Fungicide Passes

What's Different

- Water Availability
- Growing Season
- Plant Growth Regulator
- Intensive Management

Yield Components – Focus on Head Development

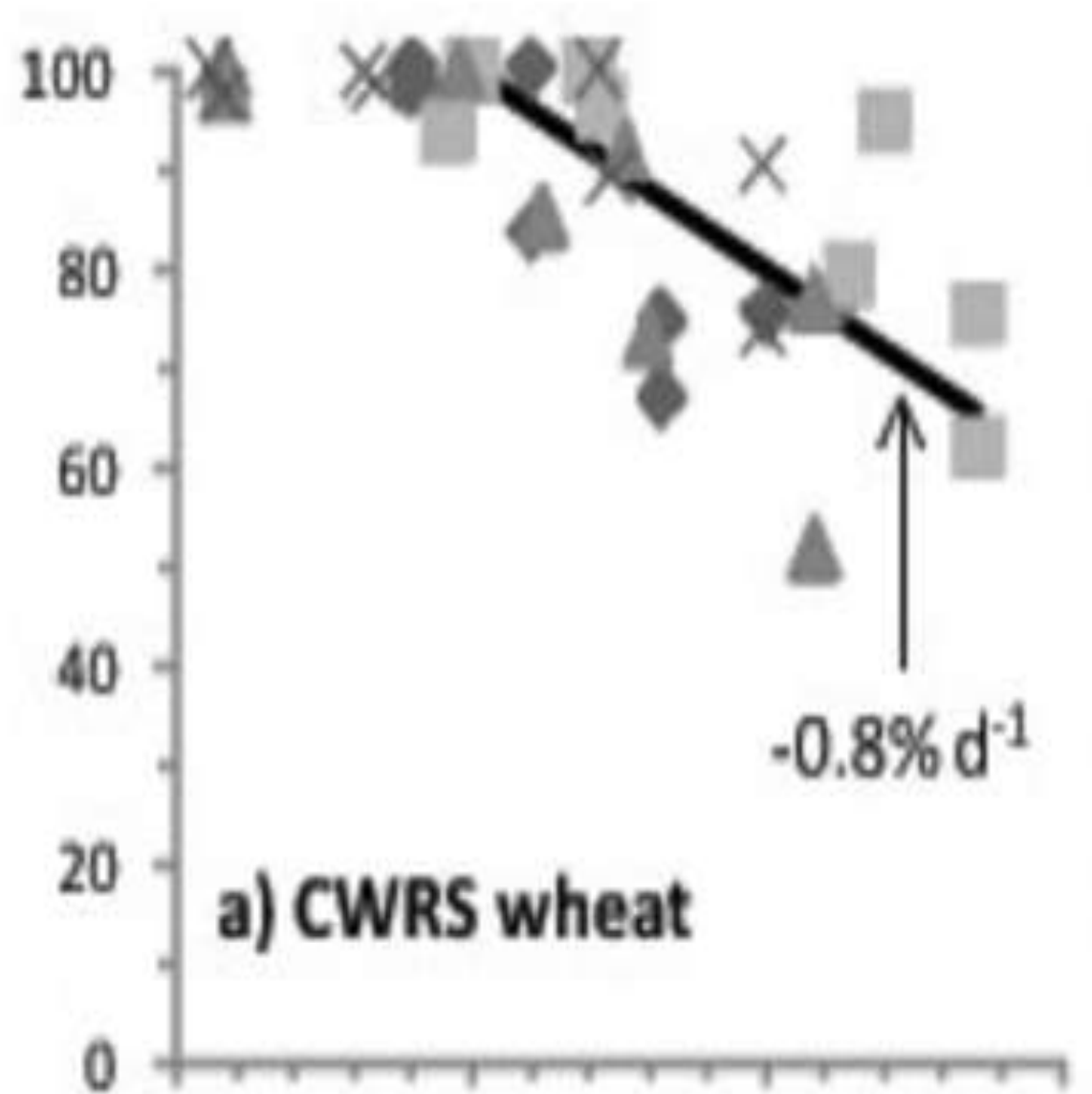
$$\frac{\textit{plants}}{\textit{m}^2} * \frac{\textit{heads}}{\textit{plants}} * \frac{\textit{florets}}{\textit{head}} * \frac{\textit{seeds}}{\textit{floret}} * \frac{\textit{g}}{1000 \textit{ seeds}} = \textit{Yield}$$



Agri-ARM Update - January 11th, 2018

Early vs. Late Seeding

- Alberta Agriculture
- After April 30th
- -0.8% yield decrease per day
- Increased solar capture
- Flowering prior to intense heat
- Utilizing early spring moisture



Wheat Classes

Canada Prairie Spring (CPS)

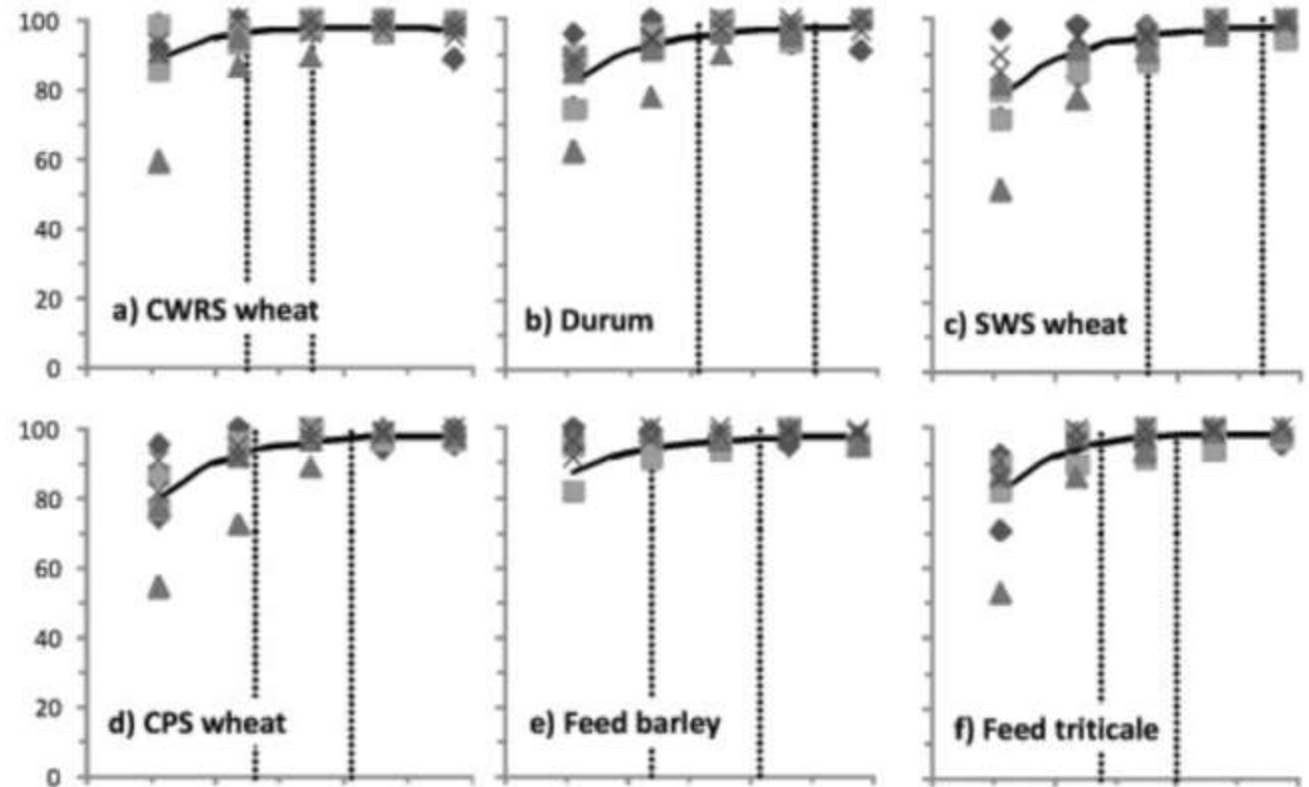
- Yields 20% higher than Canada Western Red Spring (CWRS)
- Medium protein
- Ethanol production

• Canada Western Soft White Spring (CWSWS)

- High yielding
- Low protein
- Cookies, flat breads, ethanol

Optimal to High Seeding Rates

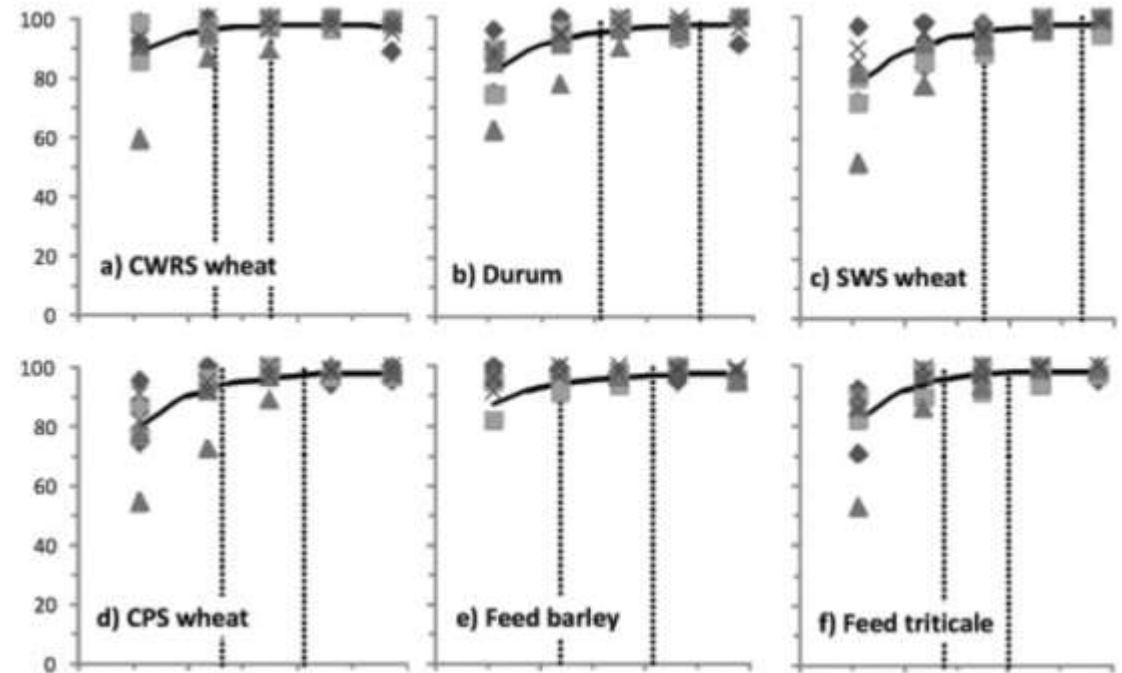
- CWRs Wheat
 - 200 to 300 seeds/m²
- CPS Wheat
 - 250 to 400 seeds/m²
- Soft White Wheat
 - 300 to 450 seeds/m²



Govn't of Alberta

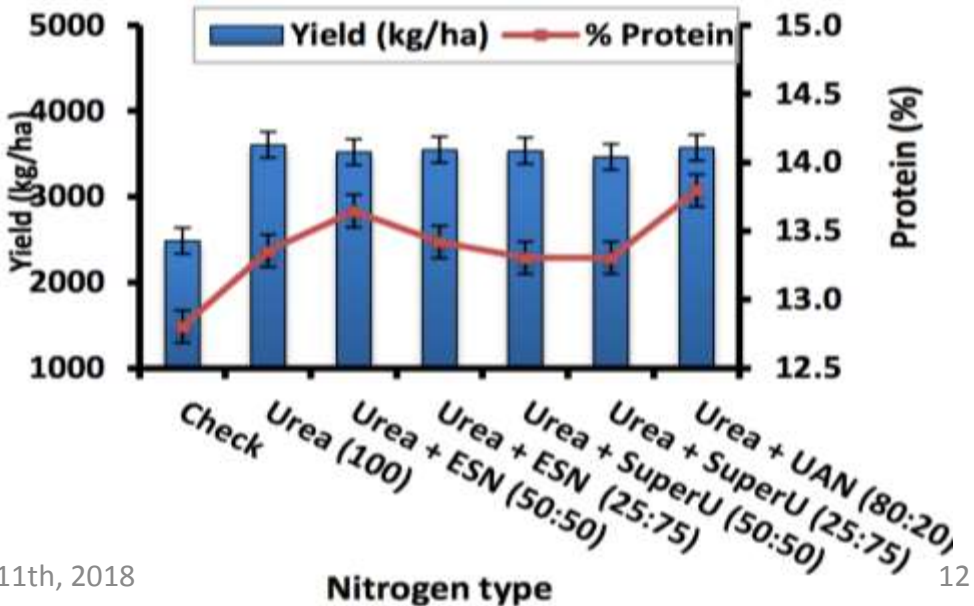
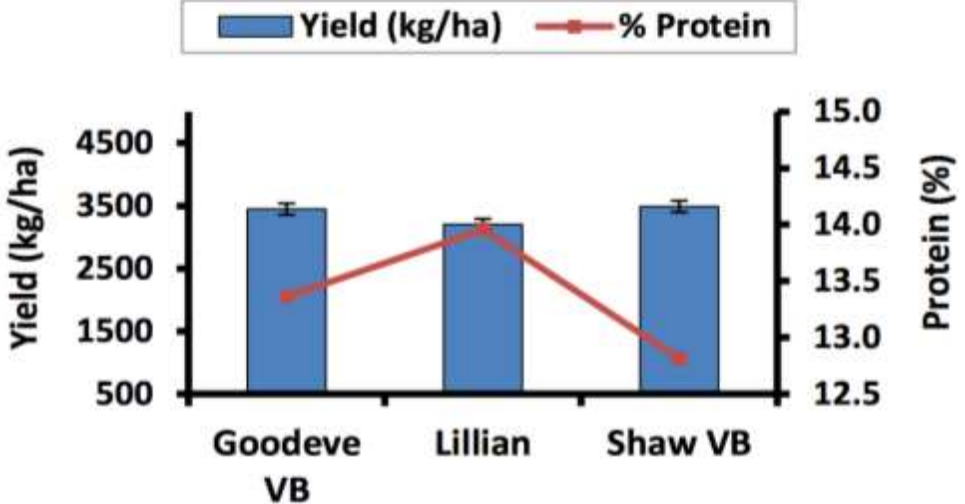
High Seeding Rates

- Reduced tillering
- Weed control
- Uniform growth staging
- Better solar light capture
- Know your TKW – it can make a huge difference!
 - 10, 000 seeds/lb at 150 lb/ac = 1.5 million seeds/ac
 - 15, 000 seeds/lb at 150 lb/ac = 2.25 million seeds/ac



Nitrogen Fertility & Cultivars

- Most effective strategy for increasing protein in wheat was choosing varieties that are low-yielding and have high protein ratings.
- There is no advantage for the CRNs when considering only yield. However, the CRNs could delay N availability until later in the season to increase % protein.



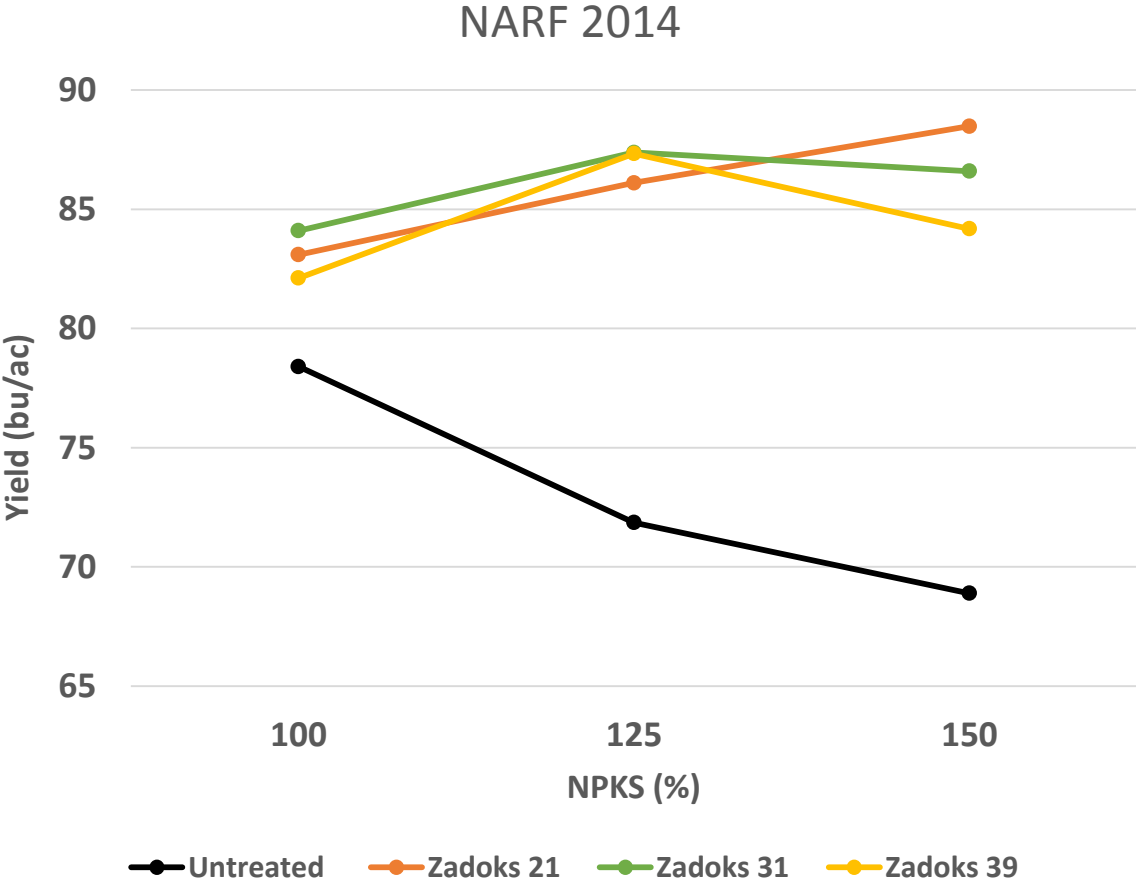
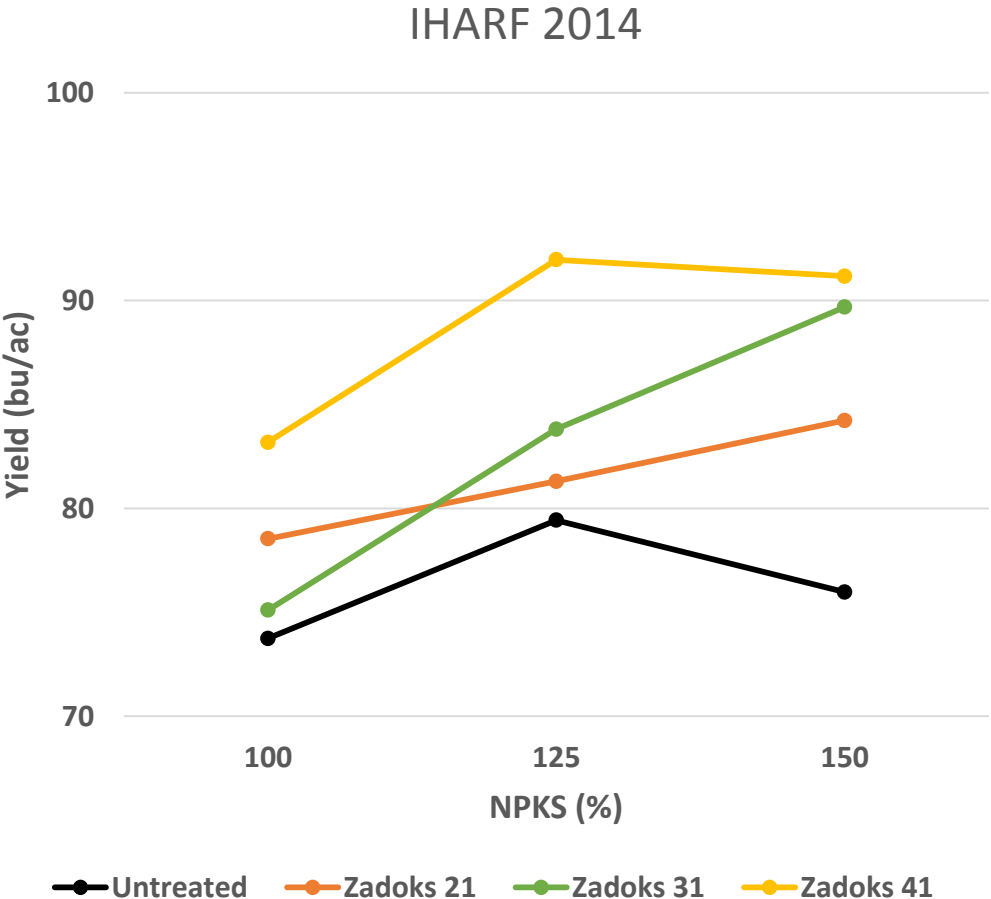
Fungicides & Cultivars – Leaf Disease

- Fungicide treatment was most beneficial on cultivars that were more susceptible to leaf spotting diseases.
 - AC Barrie and Infinity showed a benefit from fungicide application, whereas fungicide application on the more disease resistant variety (5603HR) was not required.
- These results indicate that choosing a disease resistant variety may reduce the need for fungicide application.

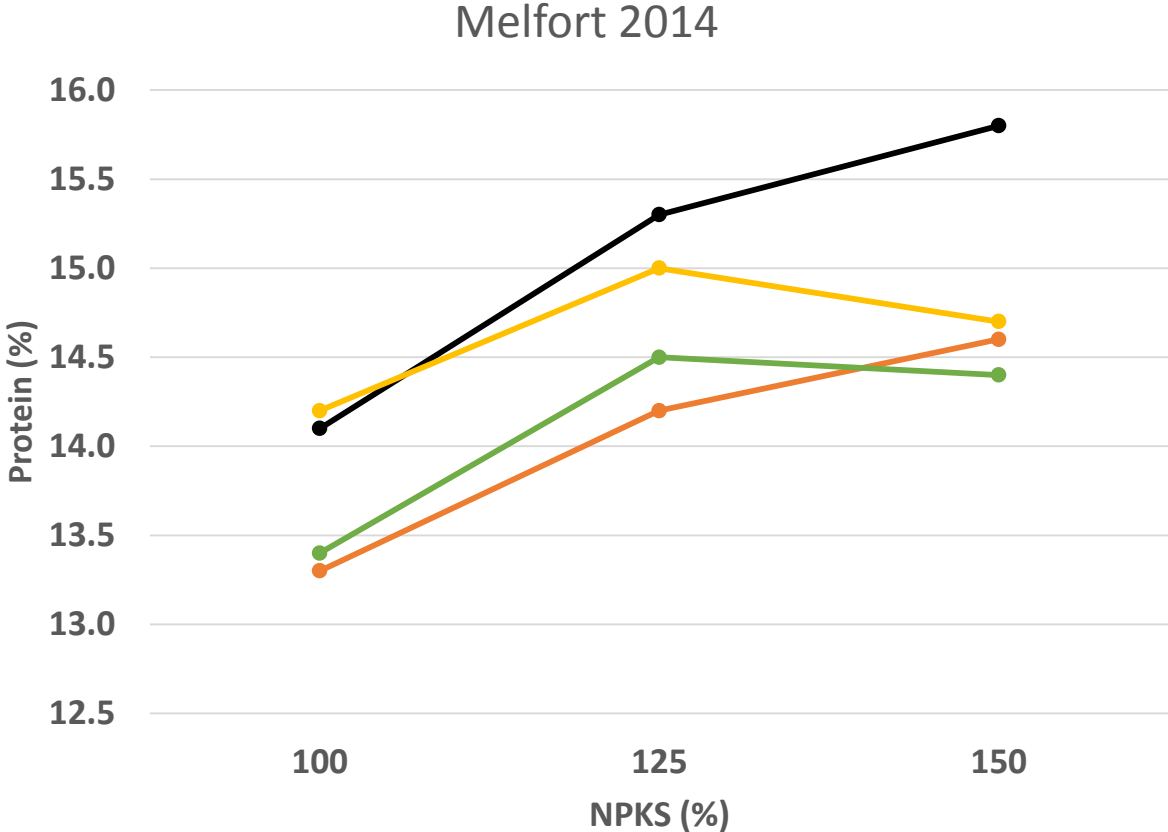
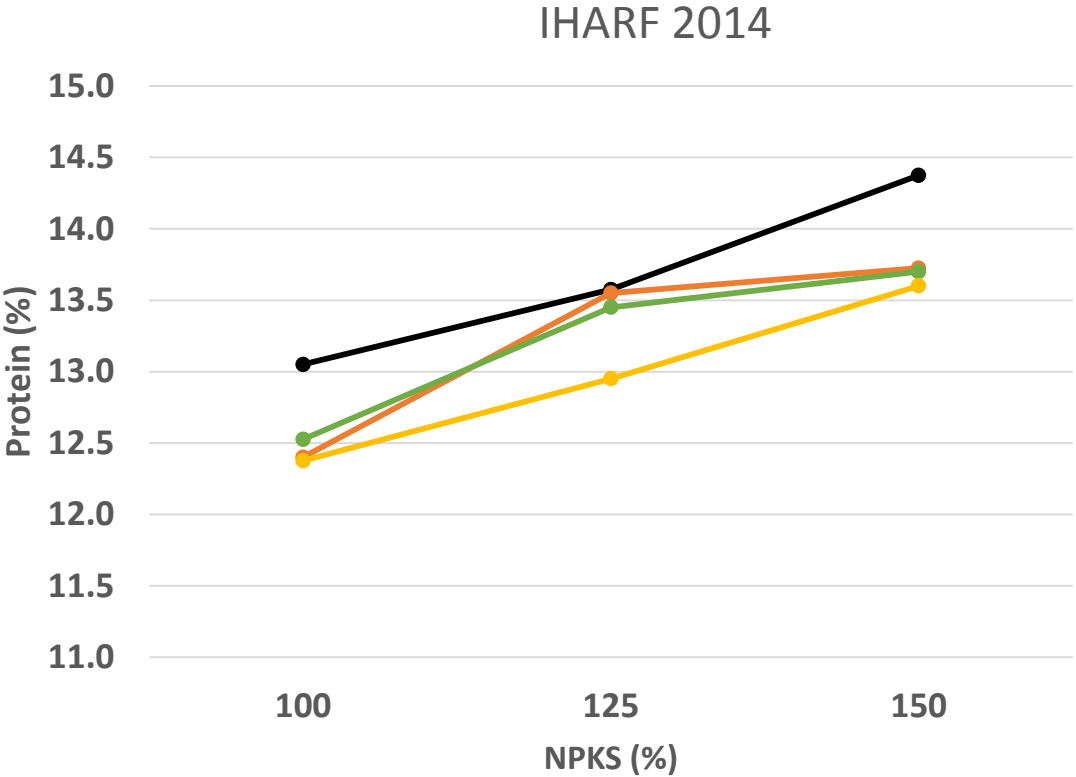
Wheat	Leaf Spot Severity (%)	Yield (bu/ac)
AC Barrie	poor	
Tilt	26.3	54.9
Headline	22.2	54.2
Check	39.6	50.3
Infinity	good	
Tilt	21.3	55.6
Headline	16.8	58.9
Check	37.1	52.2
5603 HR	good	
Tilt	21.7	64.6
Headline	22.8	68.4
Check	25.7	63.8

Fungicide on Flag Leaf

PGRs



PGRs



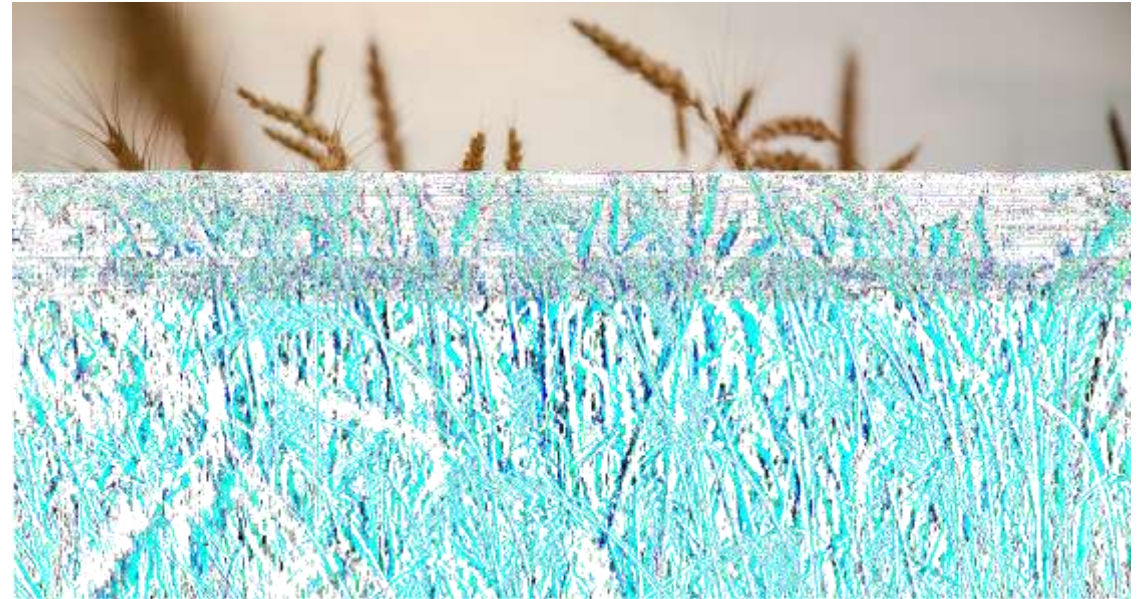
● Untreated
 ● Zadoks 21
 ● Zadoks 31
 ● Zadoks 41

● Untreated
 ● Zadoks 21
 ● Zadoks 31
 ● Zadoks 39

Why Not Intensively Manage Wheat?

- Poor economics?
- Not enough time?
- Logistic issues?

- Should different classes of wheat be managed differently?
- Does it differ between soil classes?
- Where are the best economic returns?



Input Study: Intensive Wheat Management

- To enhance wheat profitability by incorporating some or all components of intensive wheat management
- To identify how wheat classes and varieties are affected by enhanced wheat management
- To identify how these interactions vary in response to the various soil and climatic conditions across Saskatchewan
- To identify input combinations provide optimal yields and quality, while minimizing cost

Input Study: Intensive Wheat Management

- Indian Head, Melfort, Scott, Swift Current, and Yorkton
- RBCD with 4 replicates
- 2017, 2018, and 2019

- Data Collection
 - Plant Density
 - Days to Maturity
 - Yield
 - Quality (TKW, Bushel Weights, Protein, %FDK, DON)



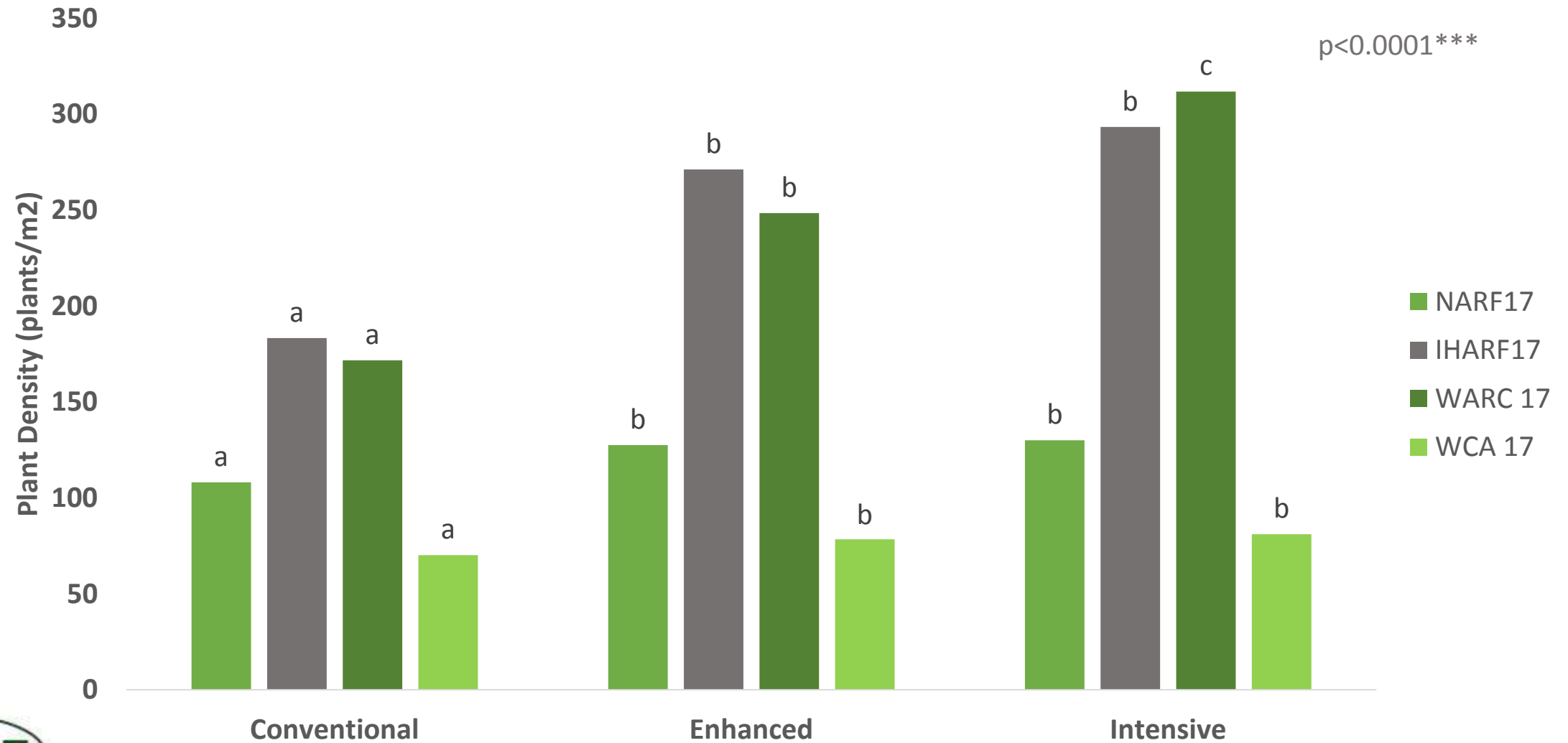
Intensive Study: Intensive Wheat Management

Cultivar	Class	Fusarium Resistance	Lodging resistance	Maturity ^z	Yield ^z	Protein ^z
Carberry	CWRS	Marginally Resistant	Very Good	99	100	14.6
AAC Cameron VB	CWRS	Intermediate	Fair	-2	118	-0.7
CDC Utmost VB	CWRS	Marginally Susceptible	Fair	-2	112	-0.4
AC Andrew	CWSWS	Intermediate	Very Good	+2	137	NA
SY Rowyn	CPSR	Marginally Resistant	Fair	-1	107	-1.1
AC Ryley	CPSR	Marginally Susceptible	Poor	-2	110	-1.2

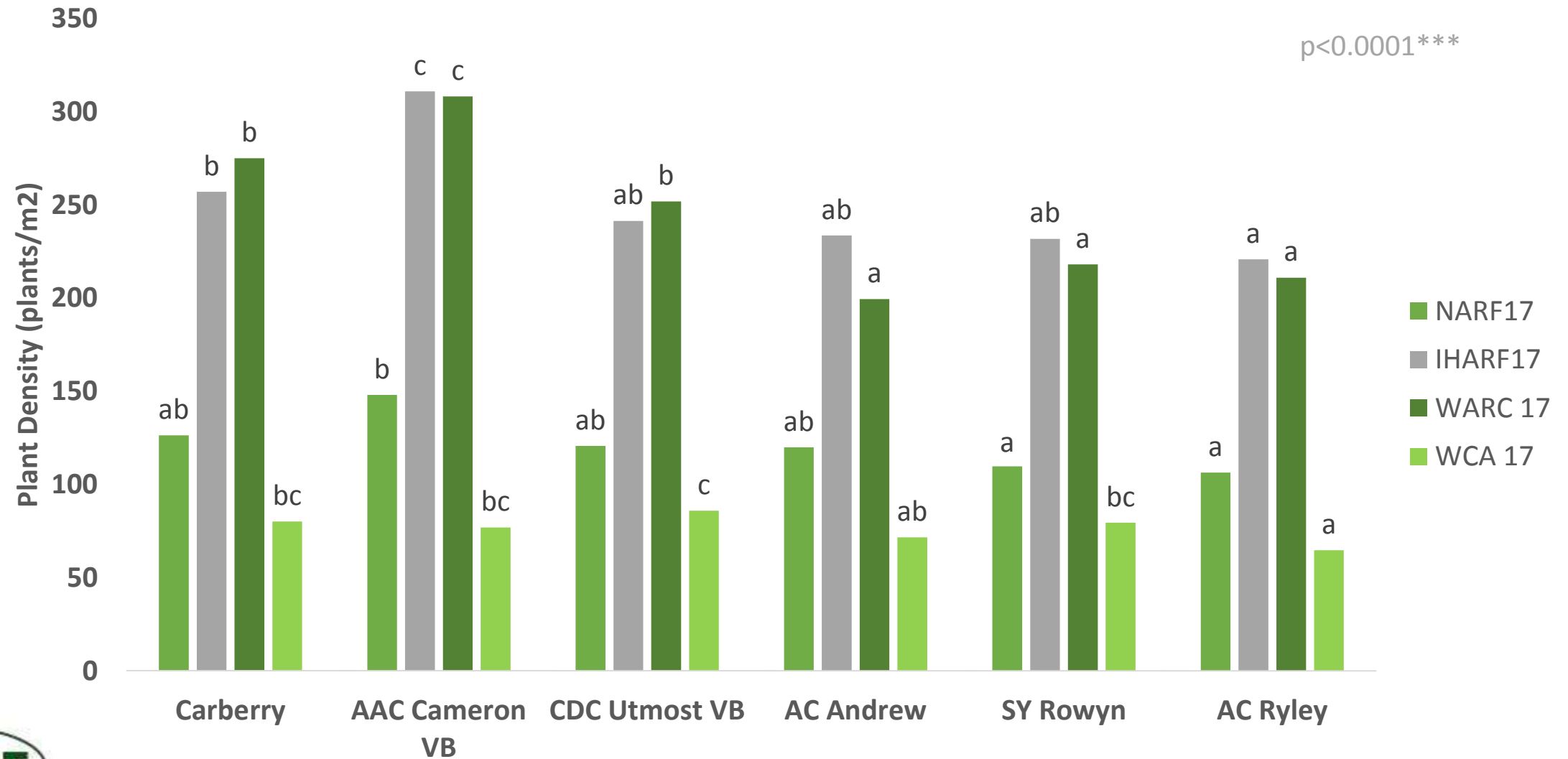
Intensive Study: Intensive Wheat Management

Management	Seed Treatment	Seeding Rate (viable seeds/m ²)	Nitrogen fertility (lb/ac N)	Phosphorus fertility (lb/ac P ₂ O ₅)	Fungicide at Flag Leaf	Fungicide at Anthesis	PGR Application
Conventional	No	200	75	25	No	No	No
Enhanced	No	300	98	33	No	Yes	No
Intensive	Yes	360	120	40	Yes	Yes	Yes

Plant Density - Management

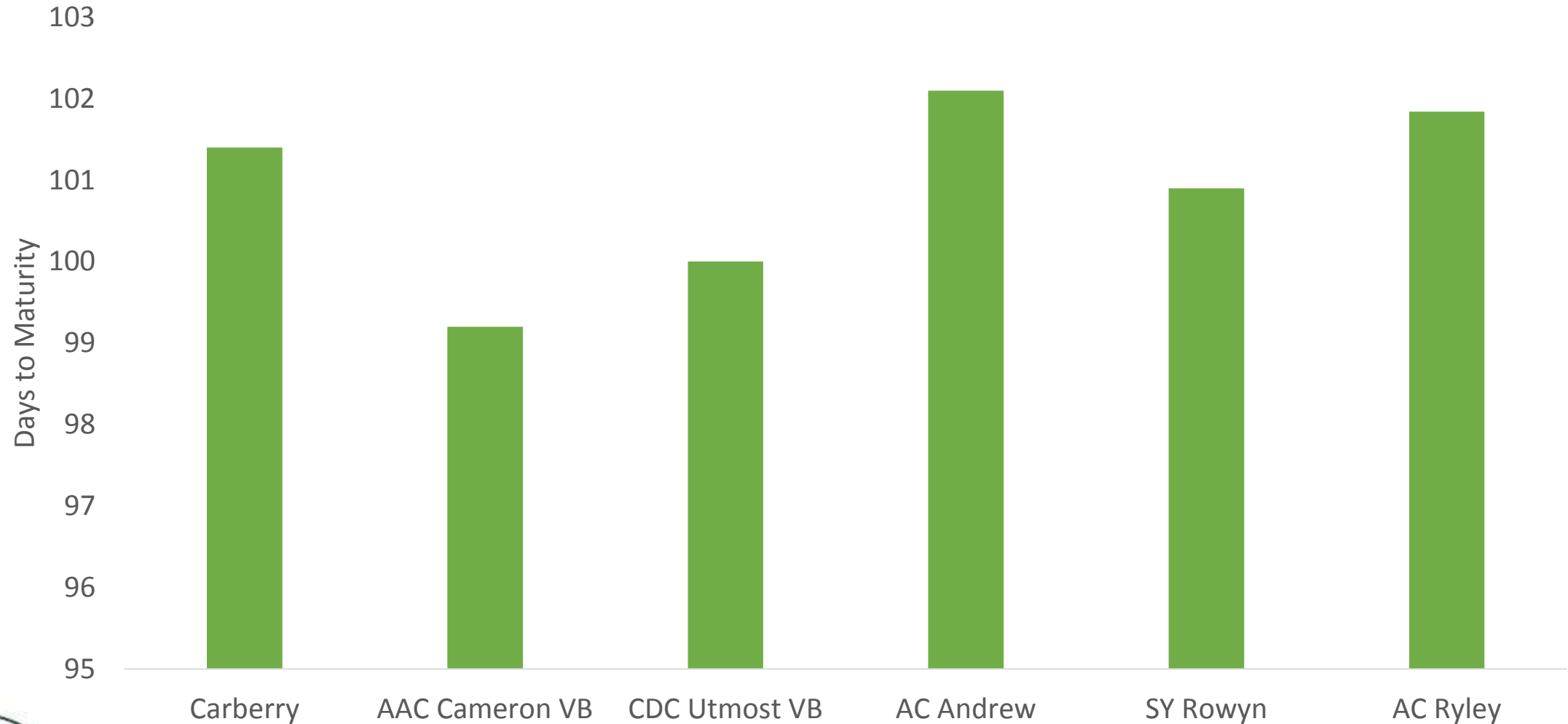


Plant Density - Variety



Maturity

Variety $p < 0.05513$
Management $p < 0.9837$
V*M $p < 0.1890$

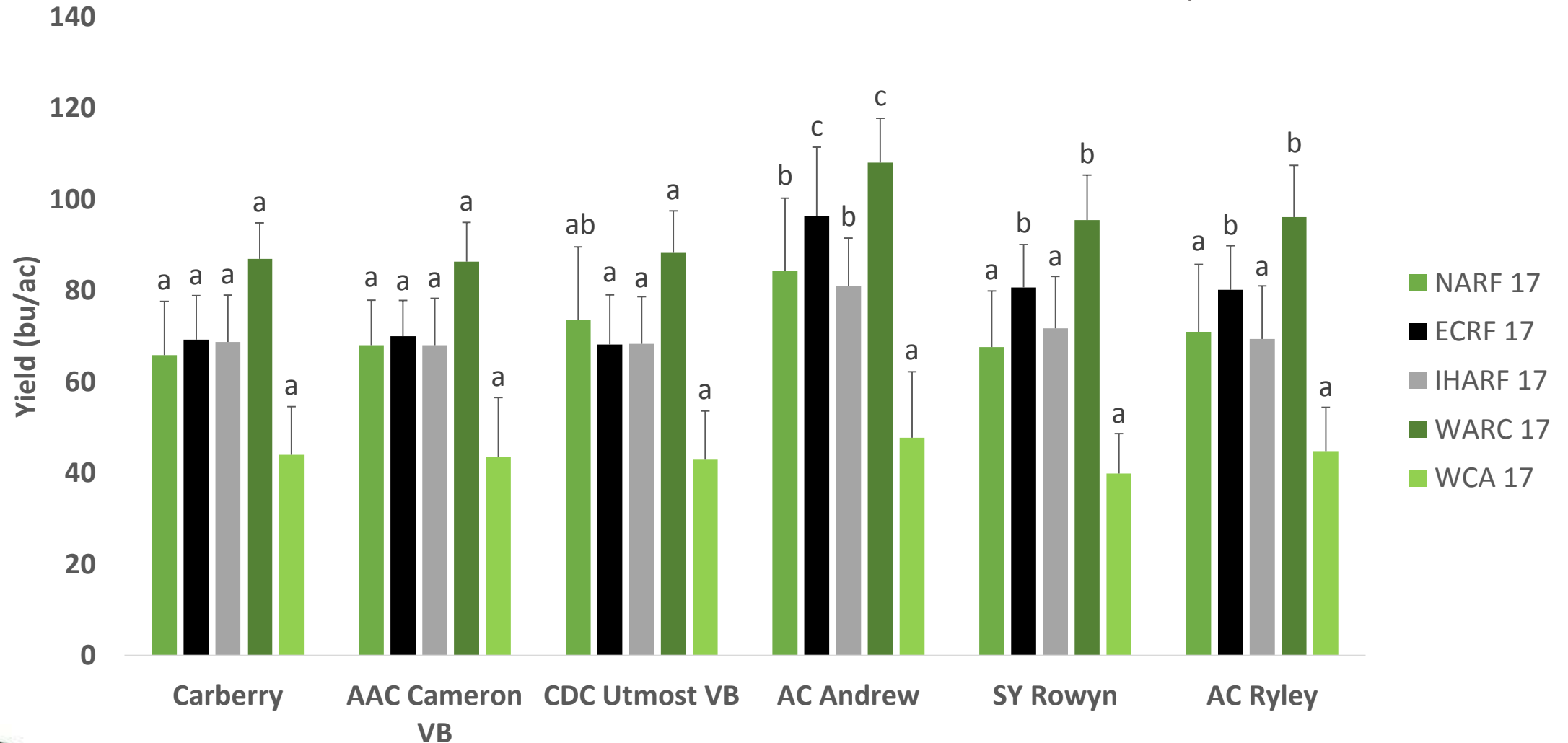


Yield - Variety

NARF $p < 0.0003^{**}$

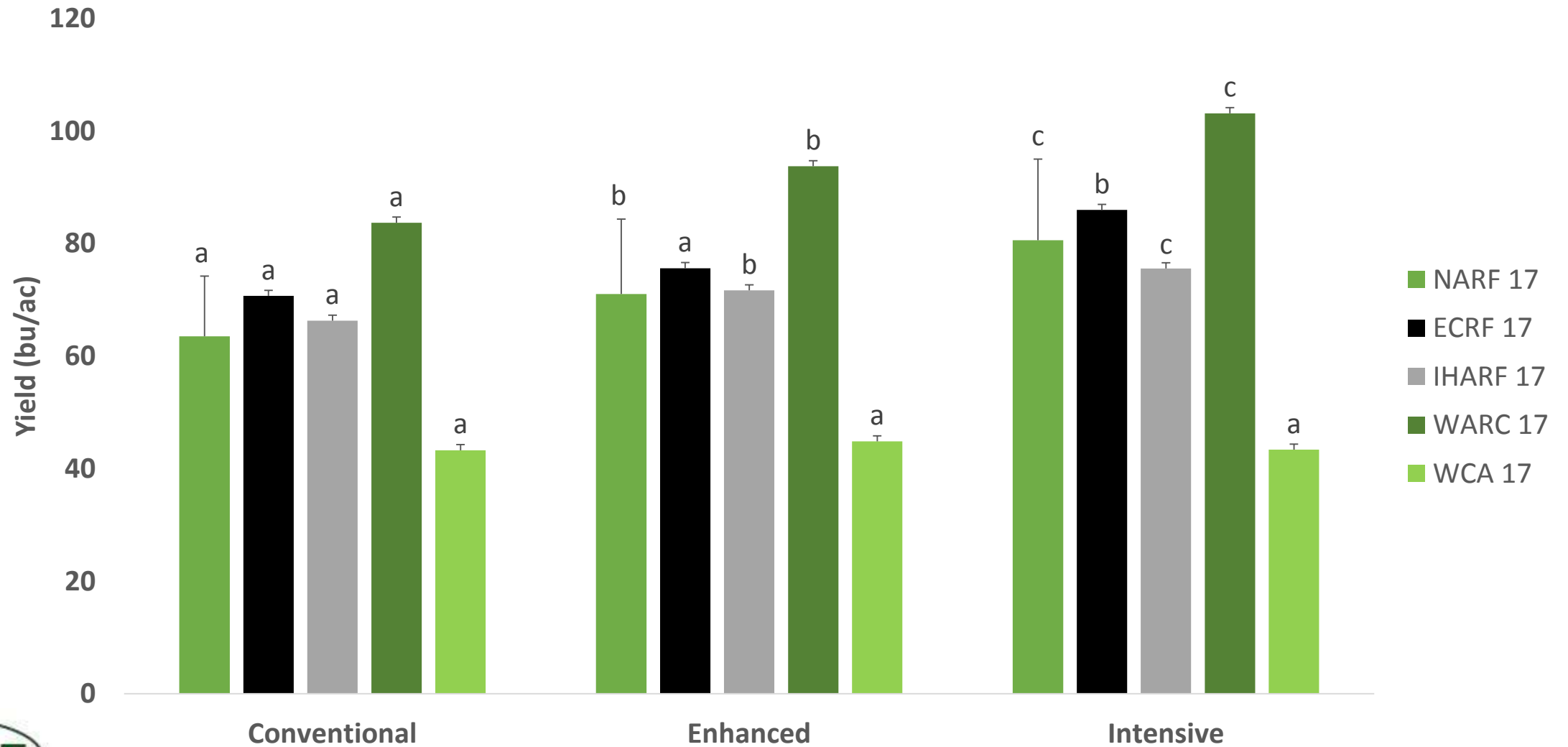
ECRF, IHARF, WARC $p < 0.0001^{***}$

WCA $p < 0.0593$

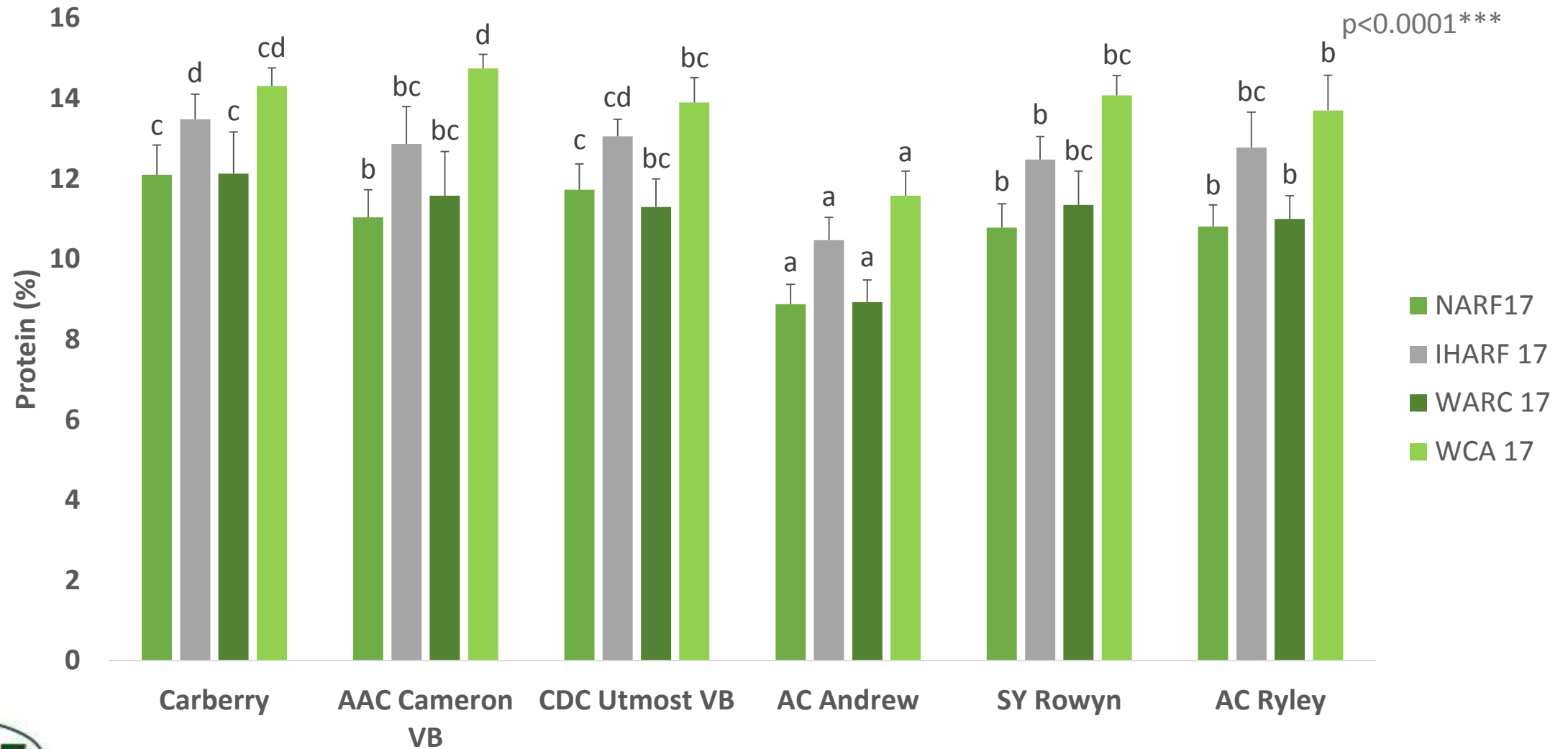


NARF, ECRF, IHARF, WARC $p < 0.0001^{***}$
WCA $p < 0.3302$

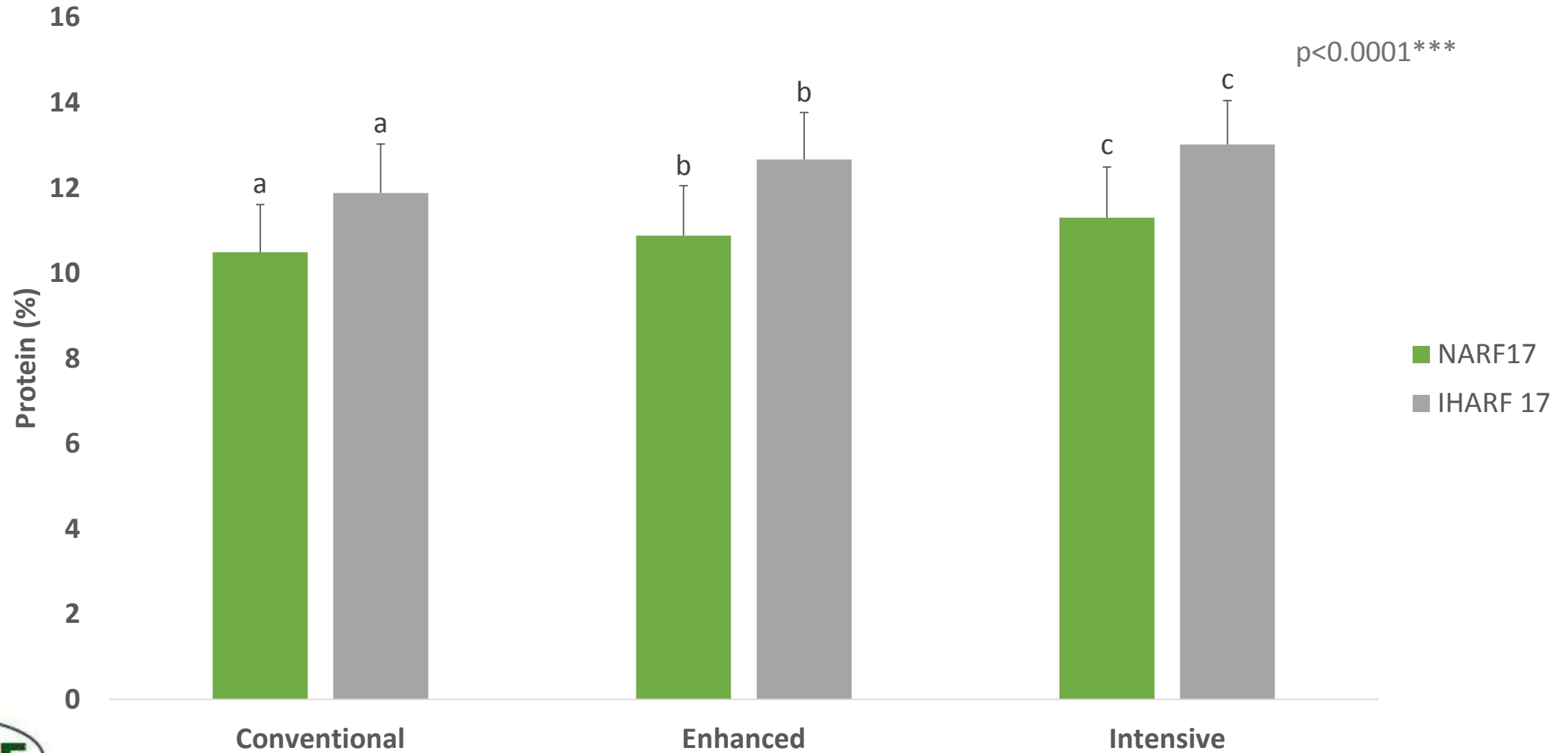
Yield - Management



Protein - Variety

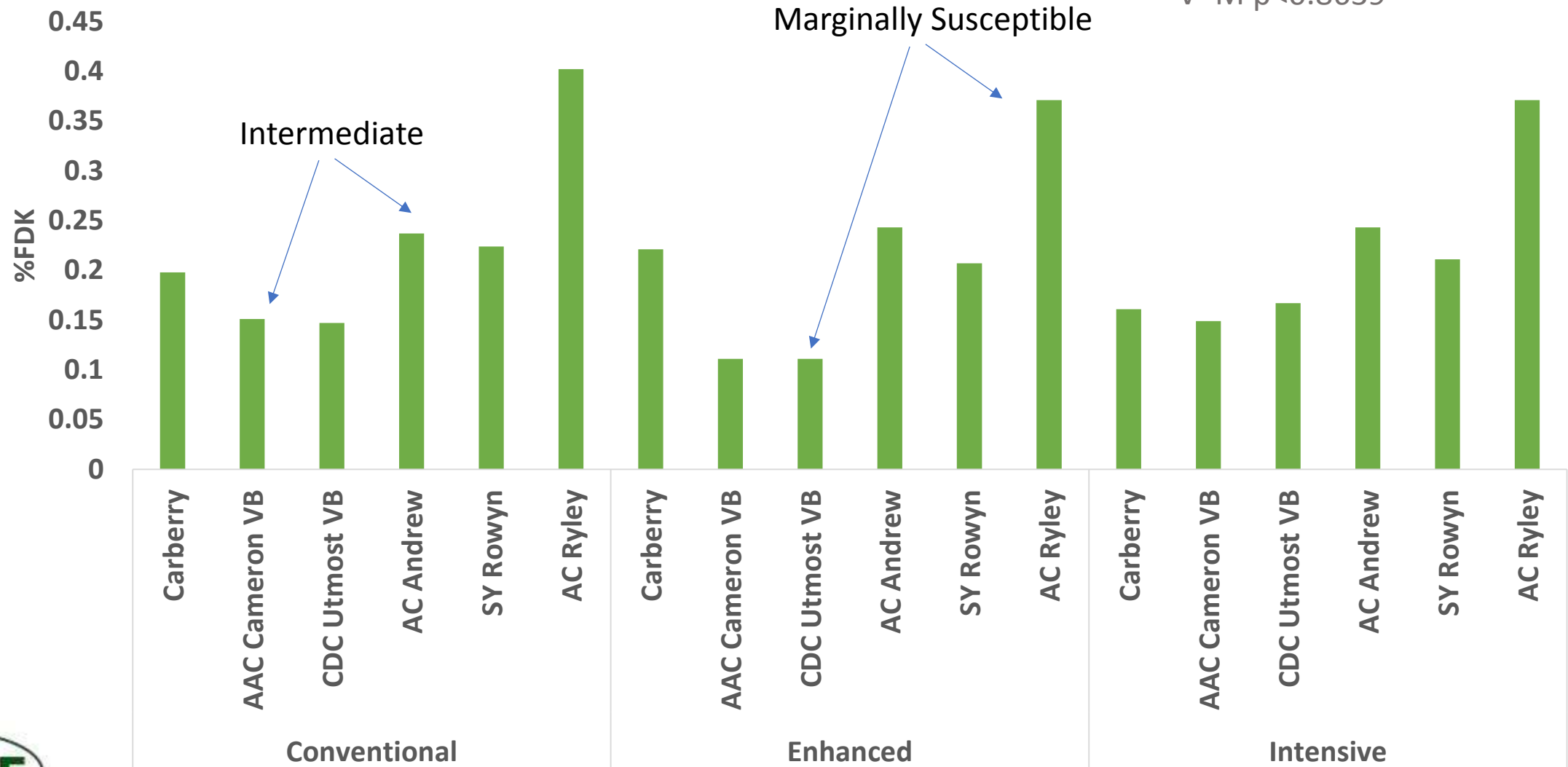


Protein - Management



Fusarium Damaged Kernels

Variety $p < 0.0667$
 Management $p < 0.5648$
 V*M $p < 0.8639$



Variable Cost of Production per Acre

	CWRS		
	Conventional	Enhanced	Intensive
Seed	25	38	45
N Fert	36	47	76
P Fert	16	21	25
Chemical	62	98	113
Machinery	24	24	24
Labour	19	19	19
Insurance	6	6	6
Misc	5	5	5
Interest	5	5	5
Total Cost	199	264	319

Revenue – Wheat Class

	Yield (bu/ac)	\$/bu	Revenue	Cost	Net Revenue
CWRS	67	\$6.35	\$428.33	\$199.00	\$229.33
CWSWS	83	\$6.65	\$555.25	\$223.00	\$332.25
CPSR	72	\$6.65	\$476.61	\$223.00	\$253.61

Revenue - Management

				Cost		Net Revenue	
	Yield	\$/bu	Revenue	CWRS	CPS	CWRS	CPS
Conventional	65	7	436	199	223	237	213
Enhanced	71	7	475	264	294	211	181
Intensive	78	7	517	319	362	198	155

Pencil it out for yourself!

Thank You!



- Agriculture Development Fund (ADF)
- Saskatchewan Wheat Development Commission
- NARF Technical and Summer Staff
- Western Applied Research Corporation
- East Central Research Foundation
- Indian Head Agricultural Research Foundation
- Wheatland Conservation Area



Saskatchewan Ministry of Agriculture and the Canada-Saskatchewan Growing Forward 2 bi-lateral agreement.

