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# 23rd BMBRI Triennial Barley Improvement Meeting



John O'Donovan, AAFC  
Lacombe

GF II Barley Cluster  
Research - Agronomy and  
malt quality

Results to date for yield and  
yield components (2013 and  
2014), and malt quality  
(2014)

Canada 



**Contrary to  
what John had  
hoped for,  
Lethbridge did  
not irrigate  
their plots with  
beer!**





# Acknowledgements

- **AAFC colleagues & technical staff**
- **Canadian Grain Commission**
  - Grain Research Laboratory colleagues and staff
- **Alberta Barley, WGRF, AAFC Barley Cluster, Rahr Malting, AAFC, Atlantic Grains Council, BASF, Bayer CropScience, and Syngenta**



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# Pre-harvest glyphosate on malting barley - 5 locations

- The objective was to assess the **benefits** and **risks** associated with using a pre-harvest glyphosate application as a dry-down on malting barley - AC Metcalfe and CDC Meredith - 2 rates (**900** and **1125** g/ha) - 3 application times (**soft dough**, **hard dough** and **maturity**)
- The effect of the glyphosate applications were very variable among locations and years
- **Yield reductions** sometimes occurred when glyphosate was applied at the soft dough stage, mainly with CDC Meredith
- **Yield increases** sometimes occurred when glyphosate was applied after the soft dough stage, mainly with Meredith
- **Glyphosate residues** were almost always **below** the allowable threshold (<10 ppm) when applied at the **recommended rate and correct stage**

# Pre-harvest glyphosate on malting barley

- Glyphosate residues were almost always **above** the allowable threshold (<10 ppm) when applied at the **higher rate and soft dough stage**
- Germination energy **decreased below 95%** when glyphosate was applied at the higher rate and soft dough
- **In general, barley with glyphosate residue <40 ppm exhibited adequate germination energy**
- Barley with glyphosate residue > 20ppm produced **lower amount of rootlets** (than normally expected) during germin.
- Malt friability, the levels of  $\alpha$ -amylase and  $\beta$ -glucanase in malts, and the level of FAN in wort were **negatively affected by glyphosate treatments** especially when glyphosate was applied at the higher rate and/or at the **soft dough stage**
- **Could be risky if guidelines are not followed**



## Plant growth regulators on malting barley - 5 locations

- The objective was to assess the **benefits** and **risks of** applying plant growth regulators to mitigate lodging and associated quality and yield loss of malting barley - Ethephon (Ethrel), Chlormequat (Cycocel), Trinexapac (Moddus)
- Results were quite variable across sites and years, but there were **sometimes higher yields associated with the PGRs, especially ethephon (average 5% yield increase)**
- In 2013, the yield increases were greatest at Lacombe where **both ethephon and chlormequat increased yields by 8-10%**
- In 2014, **both chlormequat and trinexapac increased yields at Scott**
- Plant height and lodging were reduced by ethephon but rarely by chlormequat or trinexapac
- **Ethephon tended to reduce kernel plumpness**
- Ethephon or chlormequat did not affect the germination or malt quality
- Overall, the effects of the PGRs were very inconsistent

# Results - Height (cm)

Location	No PGR (check)		Ethephon		Chlormequat		Trinexapac
	2013	2014	2013	2014	2013	2014	2014
<i>Lacombe</i>	95	96	91	92	96	98	95
<i>Lethbridge</i>	85	70	79	73	85	74	79?
<i>Indian Head</i>	88	88	82	74	86	86	83
<i>Scott</i>	-	99	-	89	-	99	94
<i>Brandon</i>	84	80	78	71	84	78	61

Coloured values indicate significance from check

# Results - yield (T/HA)

Location	No PGR (check)		Ethephon		Chlormequat		Trinexapac	
	2013	2014	2013	2014	2013	2014	2014	
<b>Lacombe</b>	4.61	5.07	5.10 (+10%)	5.39 (+6%)	4.98 (+7%)	5.09	5.12	
<b>Lethbridge</b>	6.07	5.51	6.20	5.89	6.19	5.80	5.80	NS
<b>Indian Head</b>	5.17	5.16	5.28	4.92 (-5%)	5.34	5.20	5.22	
<b>Scott</b>	-	4.26	-	4.56	-	4.93 (+14%)	5.30 (+20%)	
<b>Brandon</b>	5.99	4.14	6.51 (+8%)	3.84	6.19	4.05	3.94	

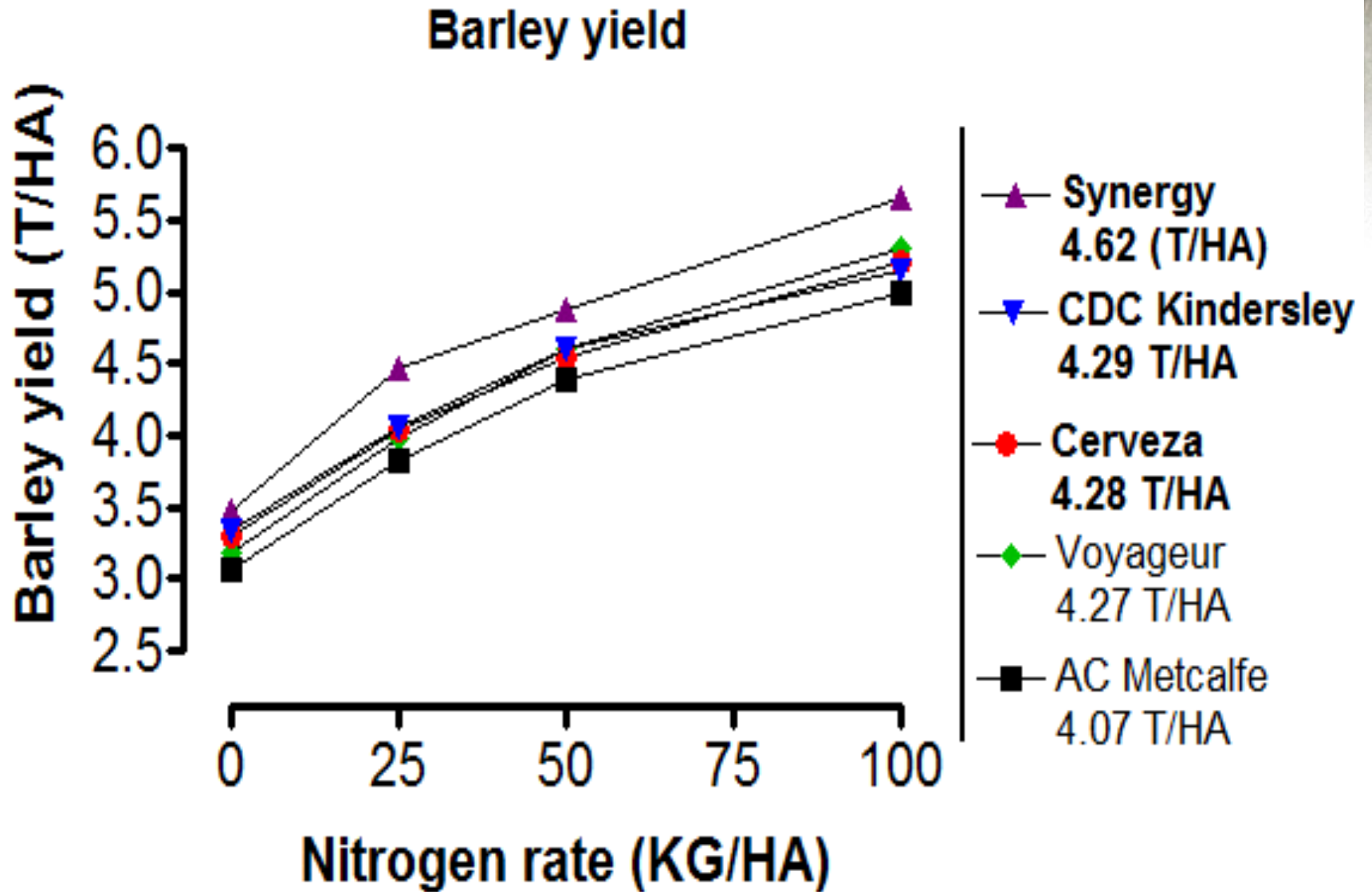
Coloured values indicate significance from check  
 NS = not significantly different from the check



# Yield and quality effects of nitrogen on malting barley varieties- 7 locations

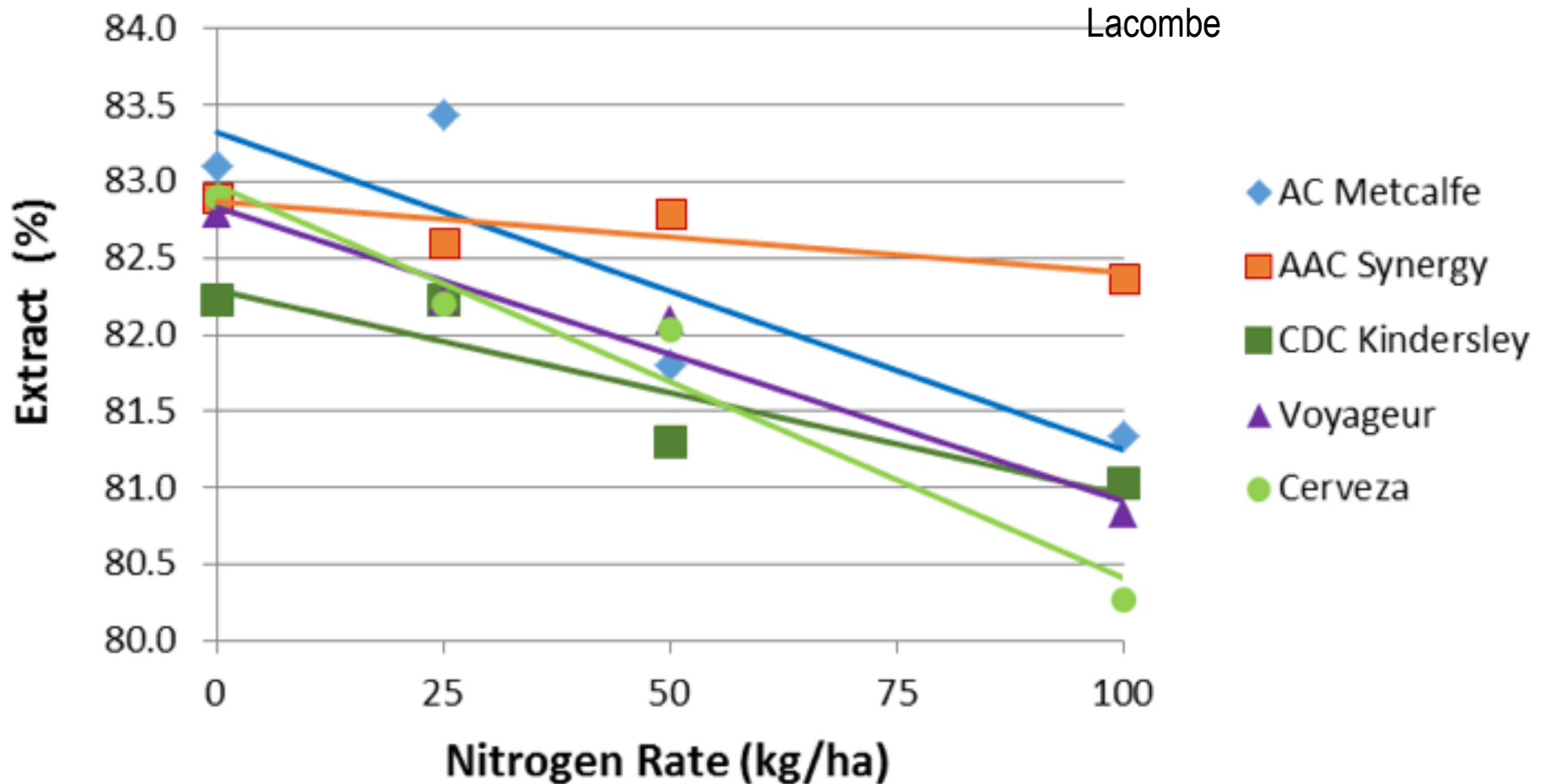
- The objective was to determine the effects of increasing nitrogen rates on several Canadian and a US malting barley varieties, compared to AC Metcalfe - AAC Synergy, ABI Voyager, CDC Kindersley, Cerveza
- Results were generally consistent among locations and years
- The alternative varieties generally produced higher yields than AC Metcalfe
- AAC Synergy produced the highest yield - 10 Bu/acre more than Metcalfe
- Both AAC Synergy and ABI Voyager consistently had less protein and greater kernel plumpness than AC Metcalfe
- Voyager and to a lesser extent Synergy took a few days longer to mature than the other varieties
- Overall, AAC Synergy was excellent with higher yield, lower protein better plumpness, lower beta-glucan, better friability than AC Metcalfe, and higher extract at high N rates

# Results - yield averaged across sites, 2014



Bolded average values indicate yields are significantly higher than AC Metcalfe

# Effects of increasing N rates on malt extract –variety response



- AC Metcalfe had the highest extract at the lowest N rates, whereas AAC Synergy had the highest extract at the highest N rate (both locations)



# The future

- The experiments were repeated in 2015, and will be repeated again in 2016 - total of 4 years data



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**Thank you!**

For more information, please  
contact:  
[John.O'Donovan@agr.gc.ca](mailto:John.O'Donovan@agr.gc.ca)  
403-782-8123

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