Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

IHARF Soil and Crop Management Seminar

Malting and feed barley: disease management research

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Canada

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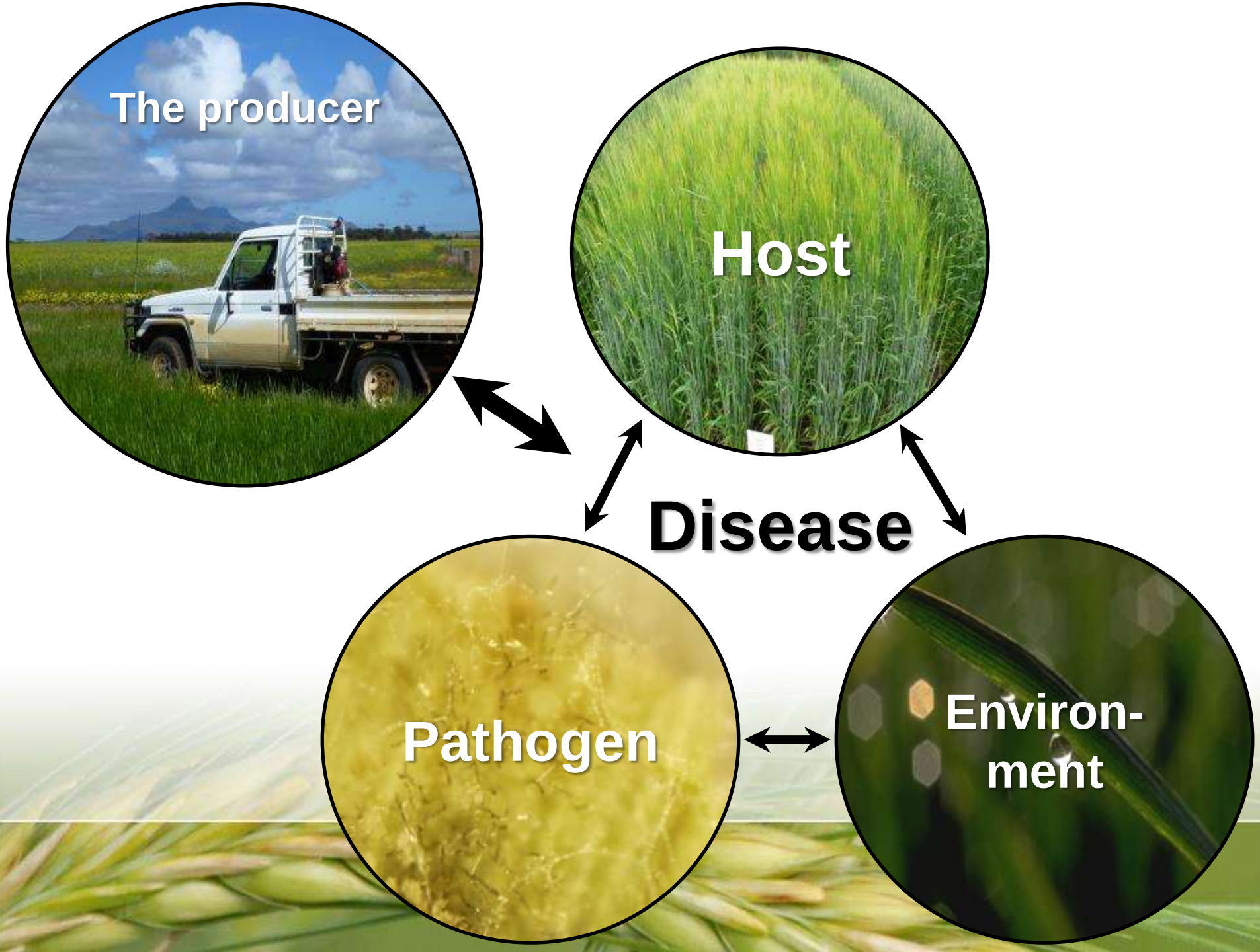
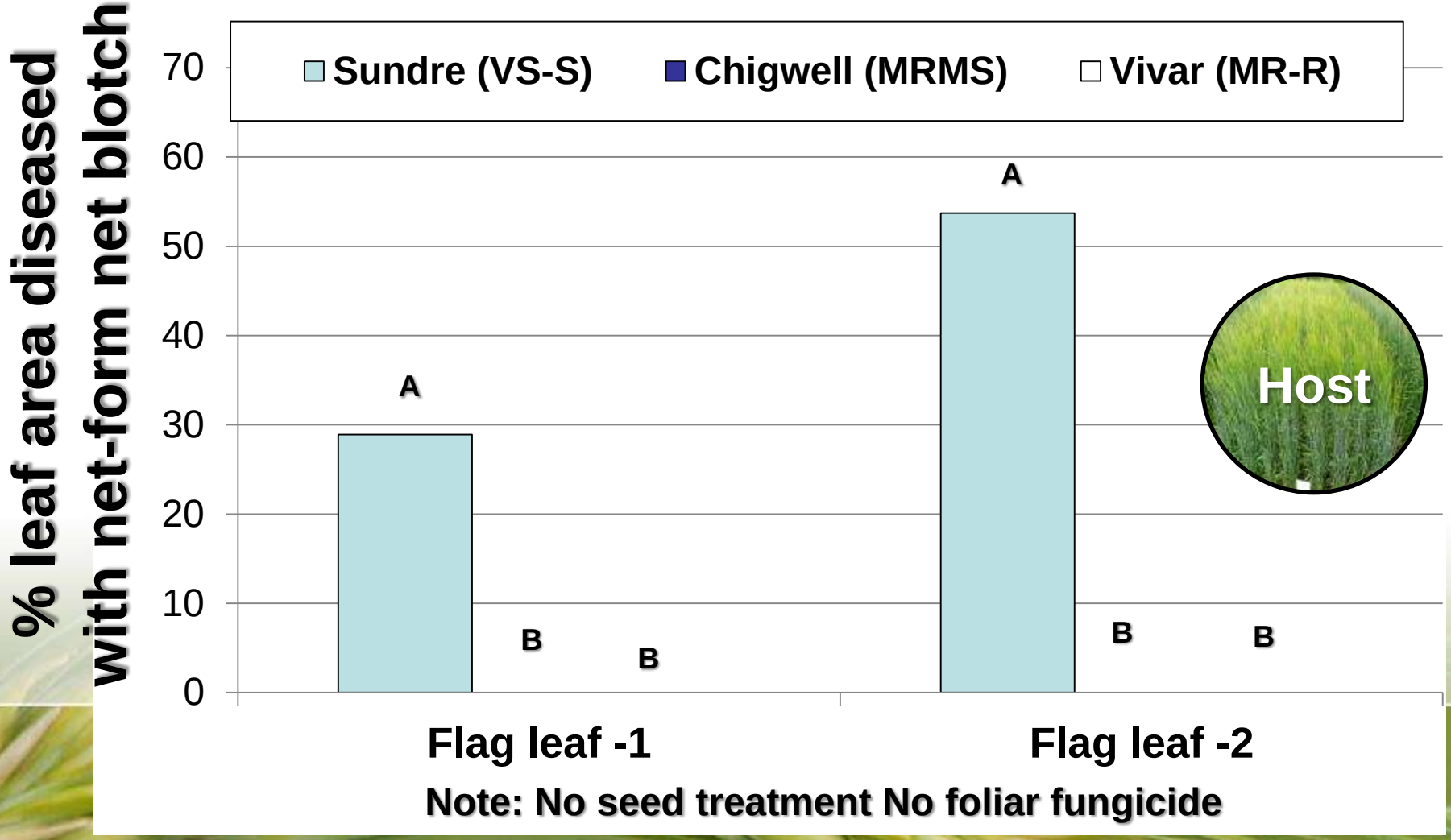
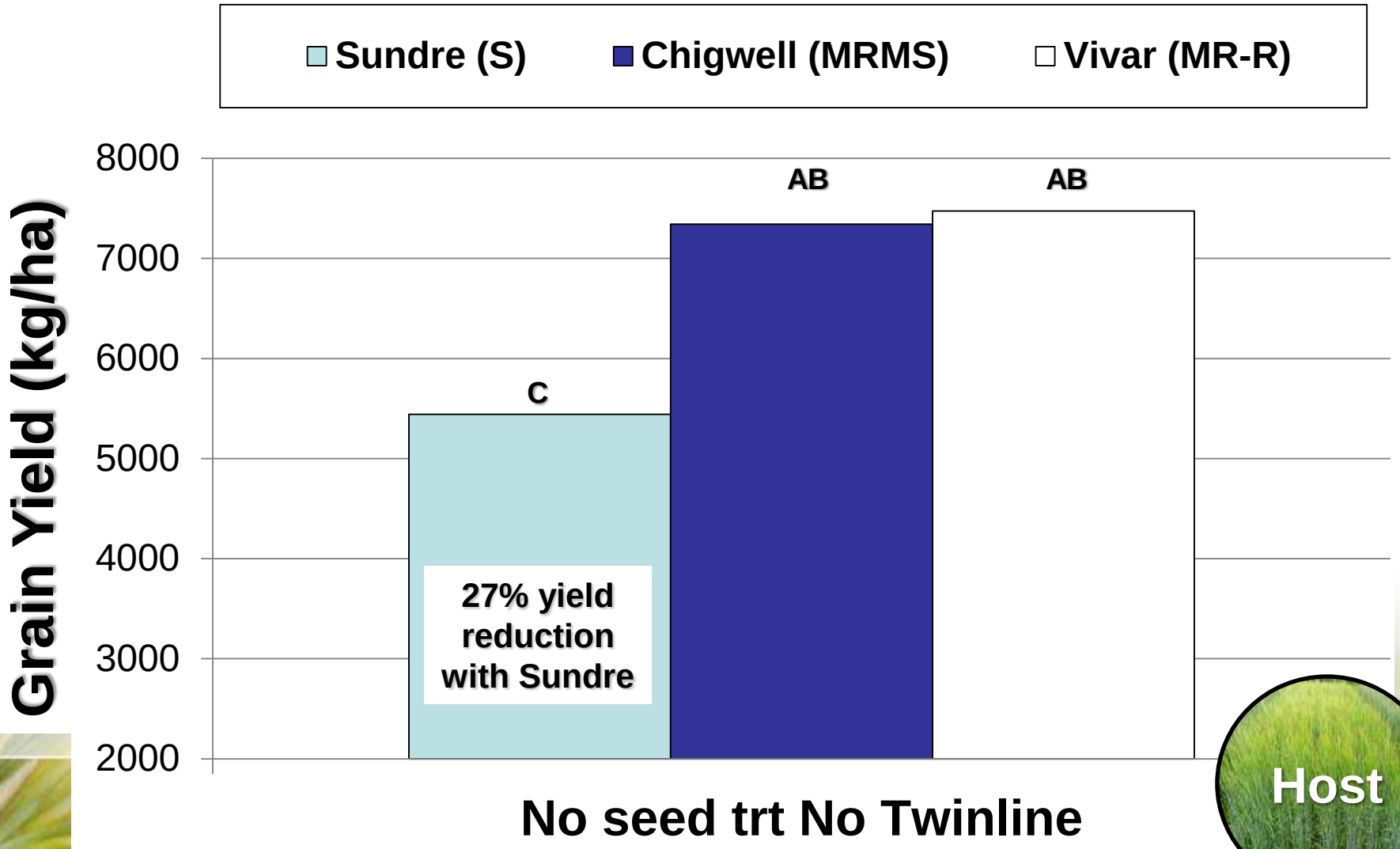

The producer
Host
Disease
Pathogen
Environ-
ment

Test 65, AB, 2013, Melfort, SK, Variety and % Leaf Area Diseased, Flag leaf – 1 & 2, Soft Dough Stage



Note: No seed treatment No foliar fungicide

Barley Test 65, Melfort, SK, 2013, Seed Treatment, Variety, Fungicide, Yield (kg/ha)



Leaf Spot Reaction of Barley Varieties For Alberta

Based on Varieties of Cereal and Oilseed Crops For Alberta - 2013, AARD Agdex 100/32

T.K. Turkington [1] , and K. Xi [2]

[1] Agriculture and Agri-Food Canada Lacombe, AB; [2] Alberta Agriculture and Rural Development (AARD), Lacombe, AB

Leaf Spot Reaction

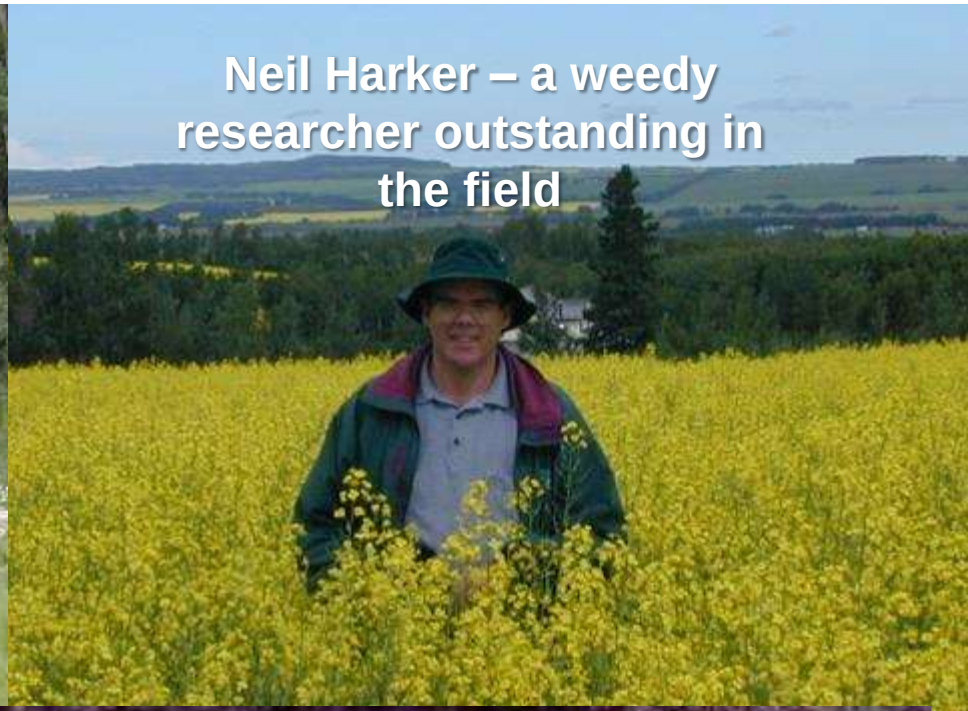
Very Good (VG) Good (G) Fair (F)

Poor (P) Very Poor (VP)

Barley (row type)	Scald	Net form Net	Spot form Net	Spot Blotch*
General purpose				
AC Harper (6)	F	F	F	xx
AC Lacombe (6)	P	P	G	xx
AC Ranger (6)	P	F	G	G
AC Rosser (6)	VP	F	G	xx
Busby (2)	F	P	G	G
CDC Austenson (2)	VP	P	VG	G
CDC Coalition (2)	VP	VP	G	F
CDC Cowboy (2)	P	F	G	F
CDC Dolly (2)	F	VP	P	xx
CDC Helgason (2)	VP	G	G	F
CDC Maverick (2)	P	F	G	xx
CDC Mindon (2)	VP	VP	G	F
CDC Trey (2)	P	F	VG	F
Champion (2)	VP	VP	F	P
Chigwell (6)	G	F	G	G
Conlon (2)	VP	F	G	P
Gadsby (2)	VG	P	G	VP
Muskwa	G	P	G	F
Ponoka (2)	G	P	G	G
Seebe (2)	G	VP	P	xx
Sundre (6)	VG	P	F	F
TR07728 (2)	VP	F	F	VP
Trochu (6)	F	VP	G	xx
Xena (2)	VP	VP	F	VP

Host

A single year between host crops (e.g. canola/barley/canola/barley) is not sufficient for adequate decomposition of infested crop residues



Net blotch infested barley residue, Tees, Alberta, 1998 – Conventional tillage, barley on barley

Tight rotation, susceptible variety … no worries, hit it good, hit it real good with fungicide! Problem solved … ???

Boise Gun Club Thanksgiving Turkey Shoot, Boise, Idaho, 2014

Brother: Brent T.

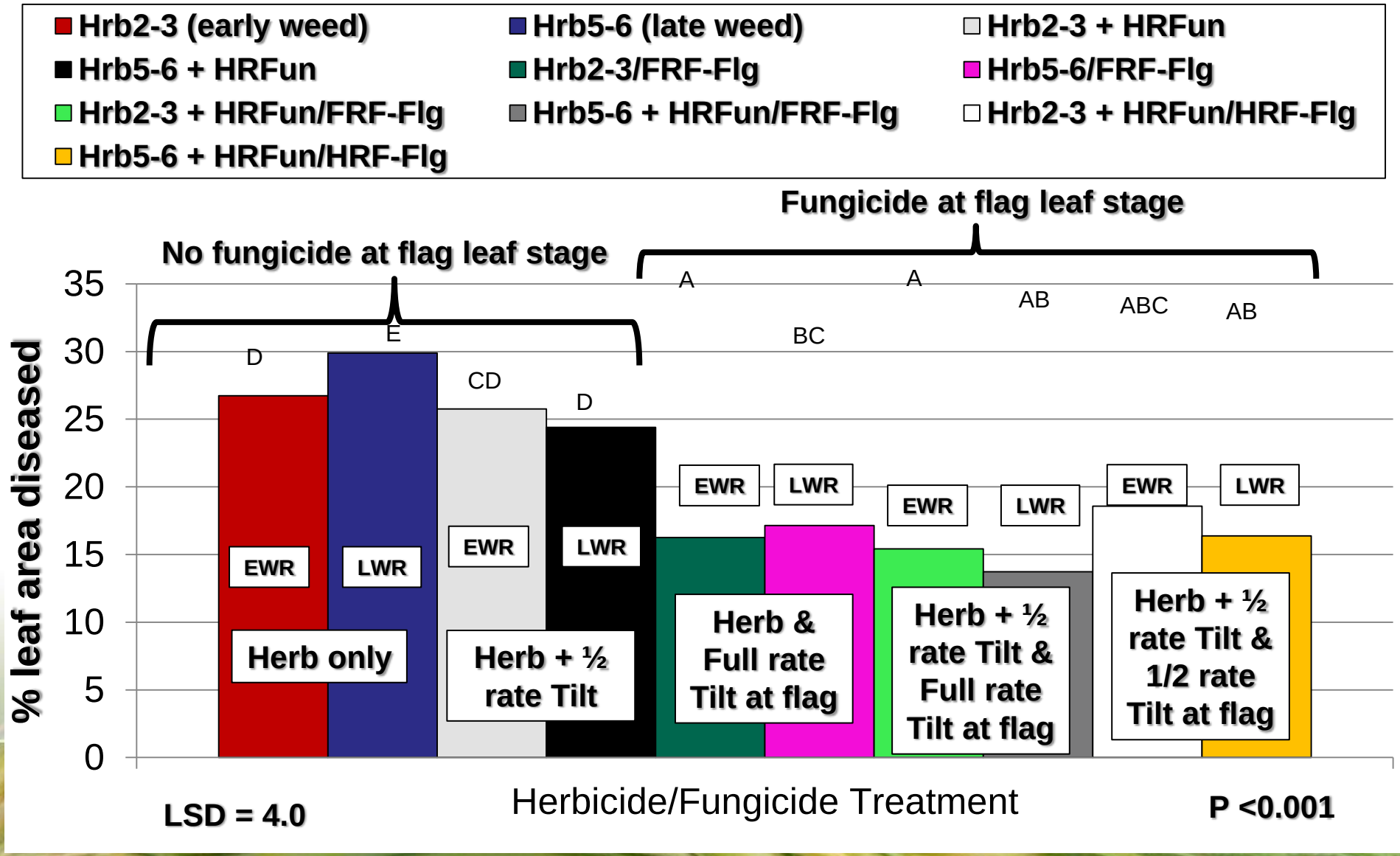
Nephew: Kyle W. – Armoury

Kelly T.
Haul = 1 turkey and 1 ham

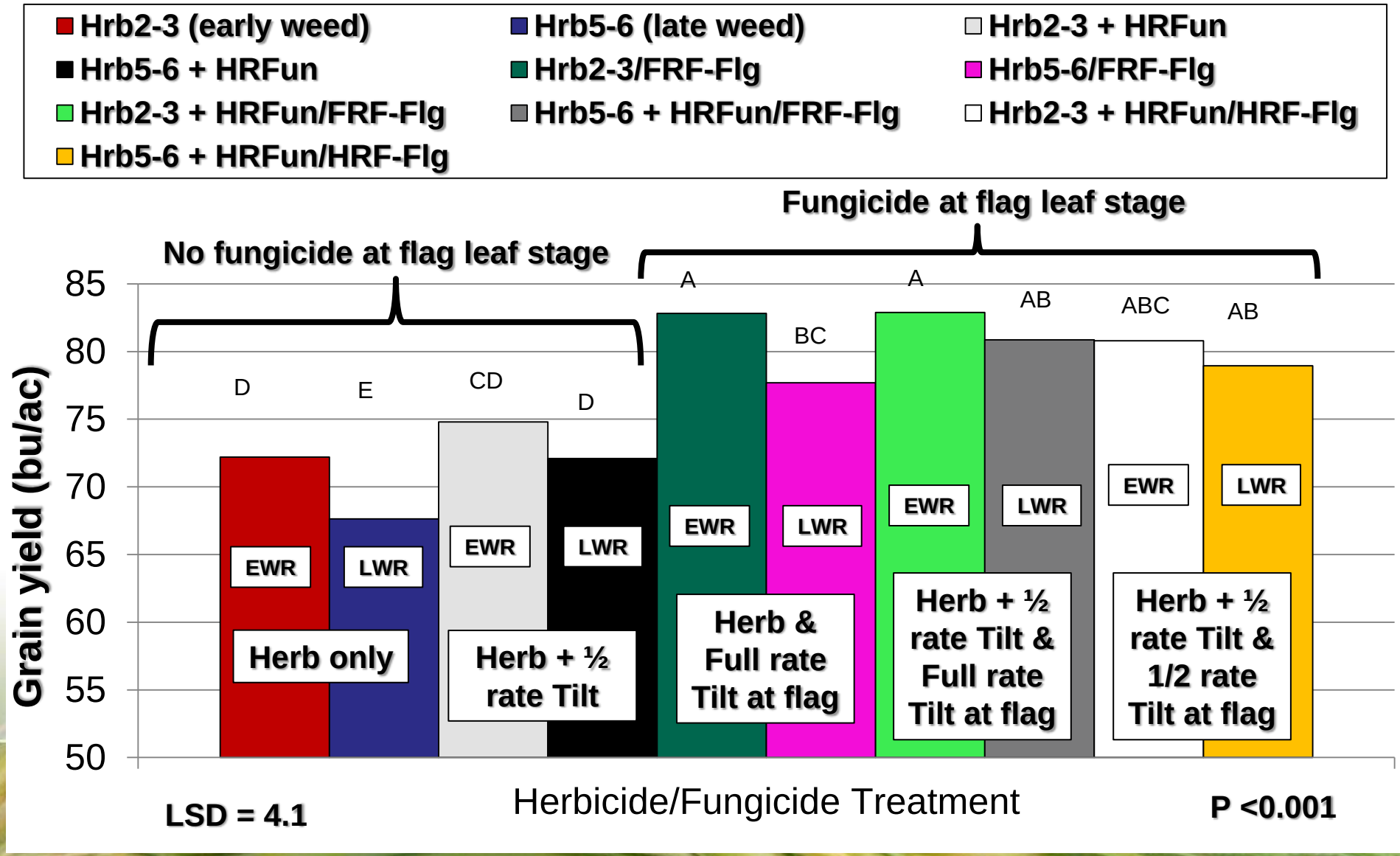
Photo by C. Fisher (Brother-in-law)


Pathogen
?

Percentage leaf area diseased, penultimate leaf, AC Metcalfe, herb./fungicide exp., 13 site yrs, 2010-2012



Yield (bu/ac) and herb./fungicide treatment, 13 site years, AC Metcalfe barley, 2010-2012

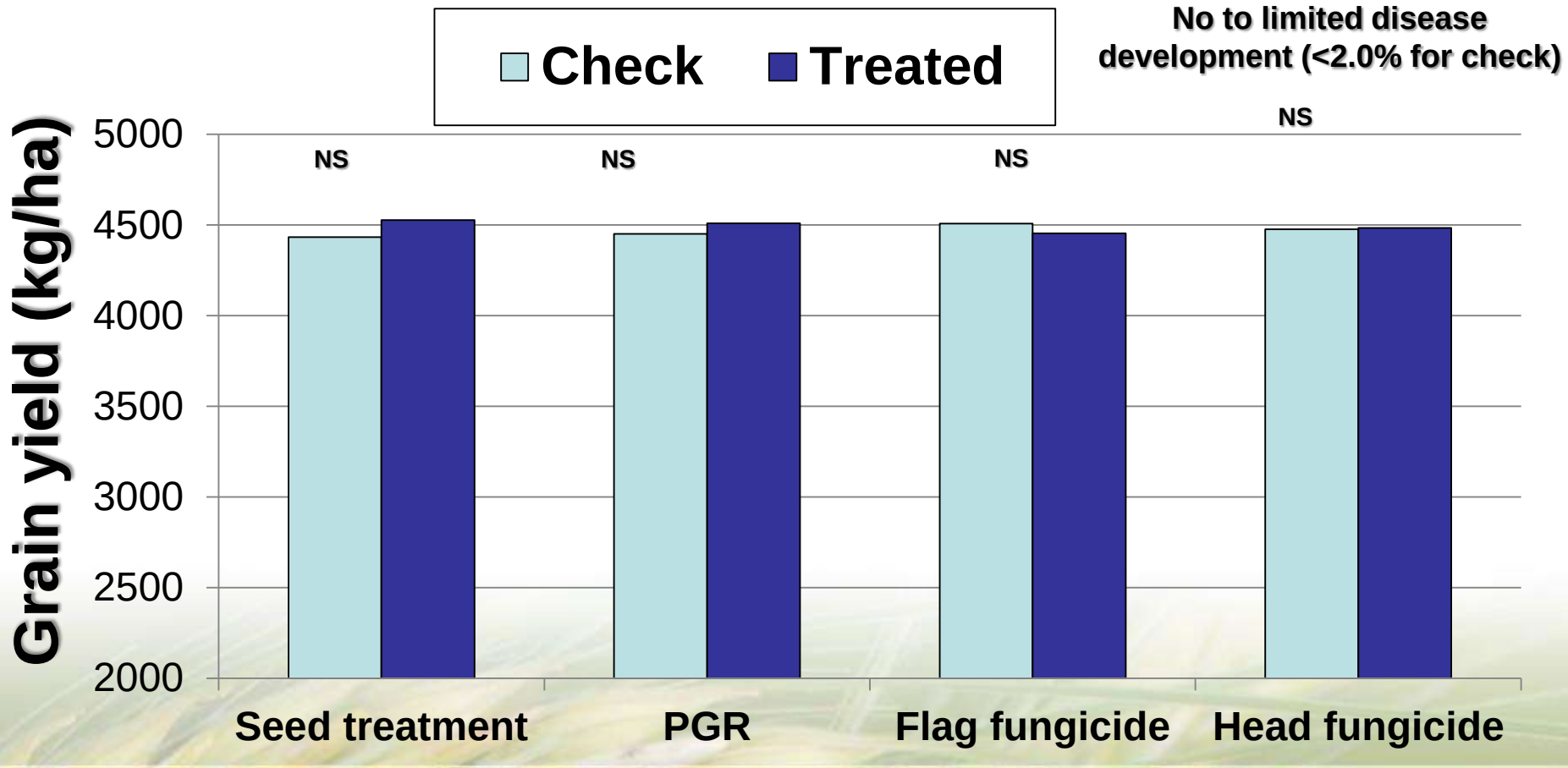


Trial 62, Seed treatment, PGR and fungicide timing, 2013-2016

- Seed treatment
  - Insure at 600 ml/100 kg seed (2x rate)
- PGR
  - Ethrel (ethephon) at 300-400 ml/ac (Cerone)
- Flag leaf
  - Twinline at 202 ml/ac
- Head emergence
  - Prosaro at 324 ml/ac

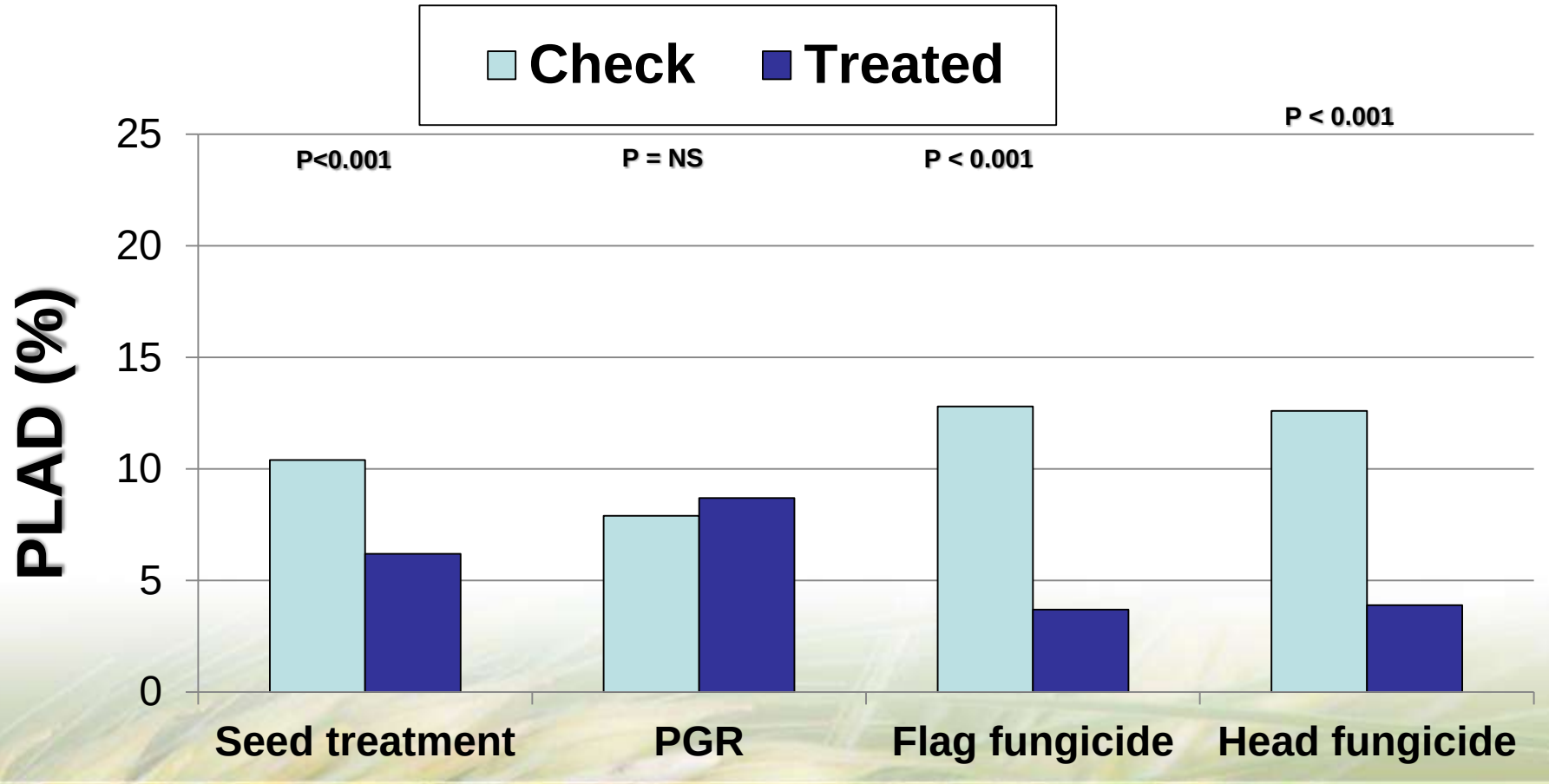
- Percentage leaf area diseased
  - Flag leaf – 1
- Grain yield
- Kernel characteristics
- AC Metcalfe barley
- Multiple locations across Canada

Test 62, Beaverlodge, AB, 2014, Grain Yield (kg/ha)

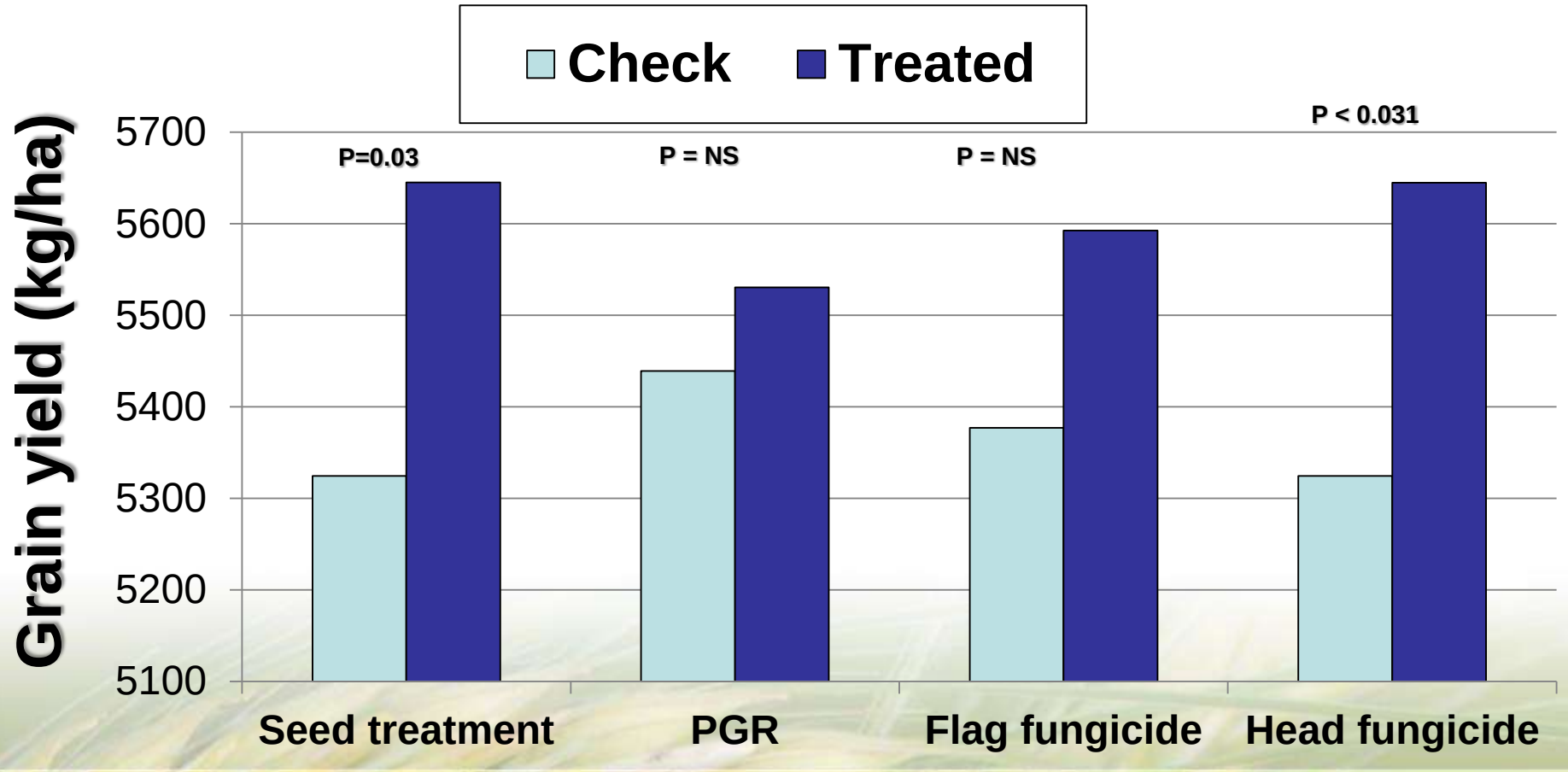


Similar results in other years at Beaverlodge

Test 62, Indian Head, MB, 2013, Percentage Leaf Area Diseased



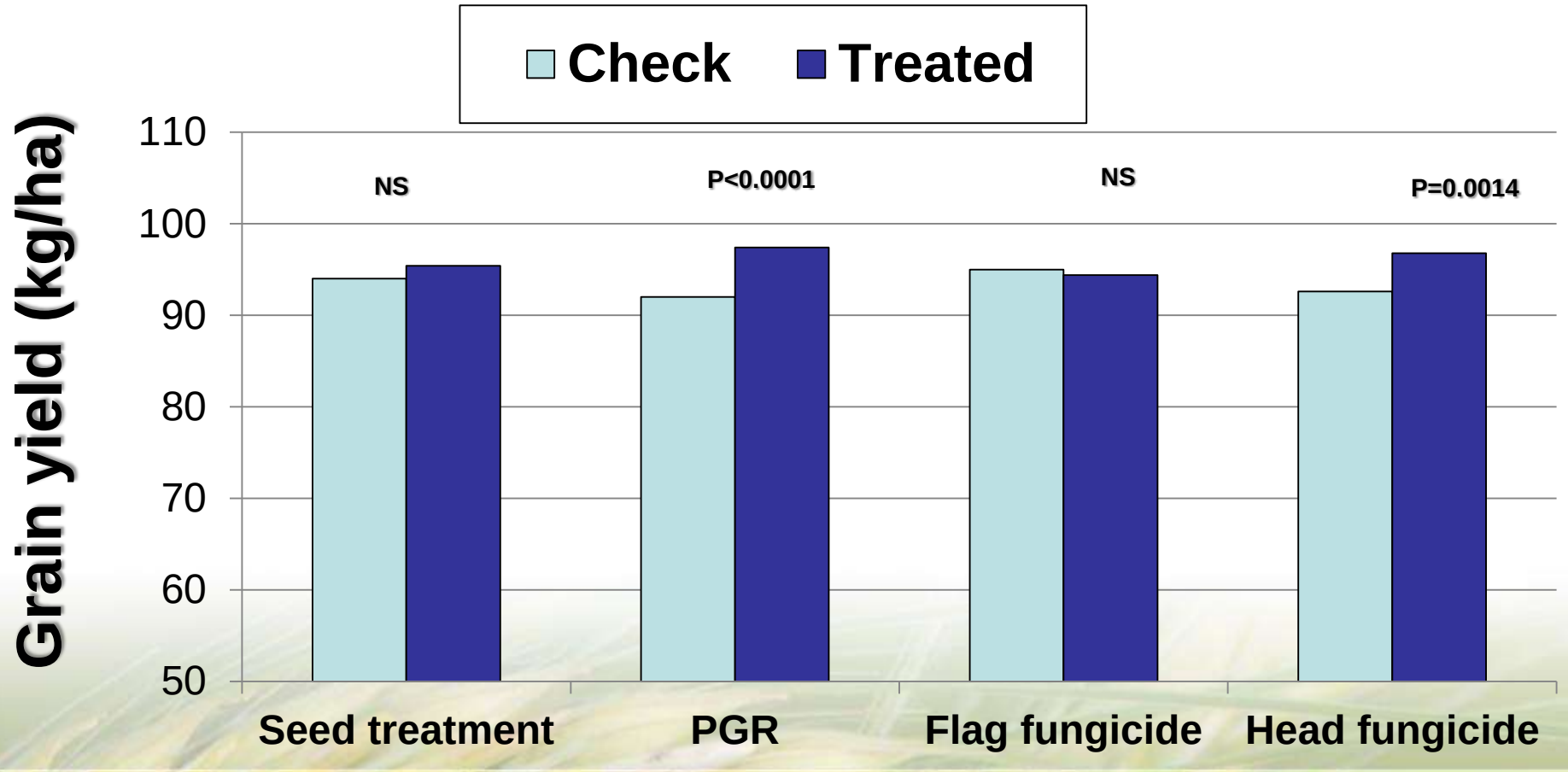
Test 62, Indian Head, MB, 2013, Grain Yield (kg/ha)



Indian Head 2014 and 2015

- **Low disease levels in 2014**
  - **Limited influence on yield**
- **Low to moderate in 2015**
  - **Limited treatment effects**

Test 62, Indian Head, SK, 2016, Grain Yield (kg/ha)

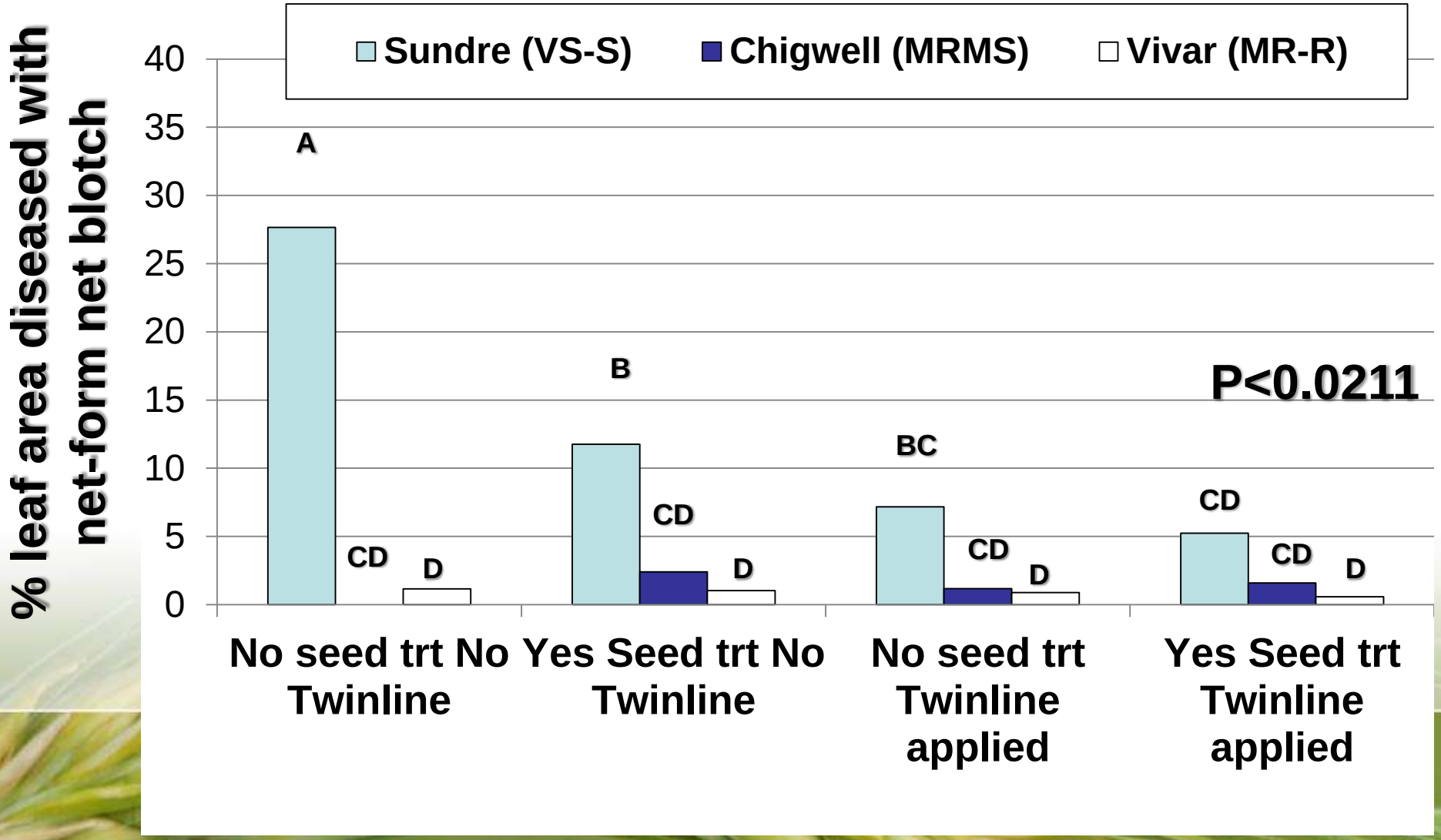


Final leaf disease ratings not available

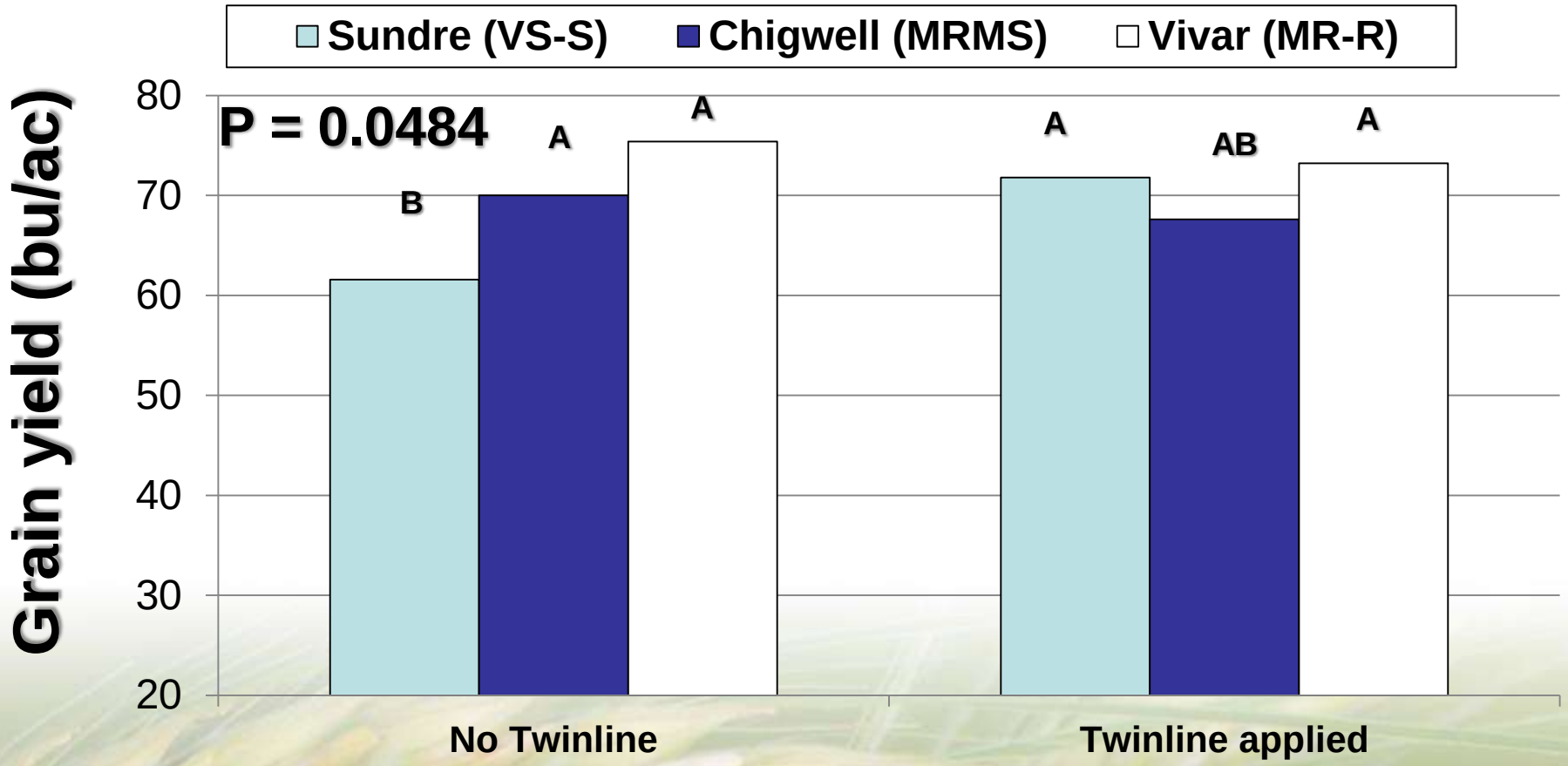
Trial 65, Seed Treatment, Variety Resistance and Fungicide

- Seed treatment
  - Insure at 600 ml/100 kg seed (2x rate)
    - Triticonazole, pyraclostrobin, metalaxyl
- Flag leaf
  - Twinline at 202 ml/ac
    - Metconazole, pyraclostrobin
- Variety resistance
  - Lacombe (scald)
    - Xena (S)
    - Busby (MRMS)
    - Gadsby (MR-R)
- Variety resistance
  - Melfort/Charlottetown (net form net blotch)
    - Sundre (VS-S)
    - Chigwell (MRMS)
    - Vivar (MR-R)
- Percentage leaf area diseased
  - Early and late
- Grain yield/ kernel characteristics

Barley Test 65, AB, 2016, Charlottetown, PEI, Seed Treatment, Variety, Fungicide, % Leaf Area Diseased, Flag – 1, Soft Dough Stage



Test 65, Charlottetown, PEI, 2016, Interaction of Variety and Fungicide, Grain Yield (bu/ac)

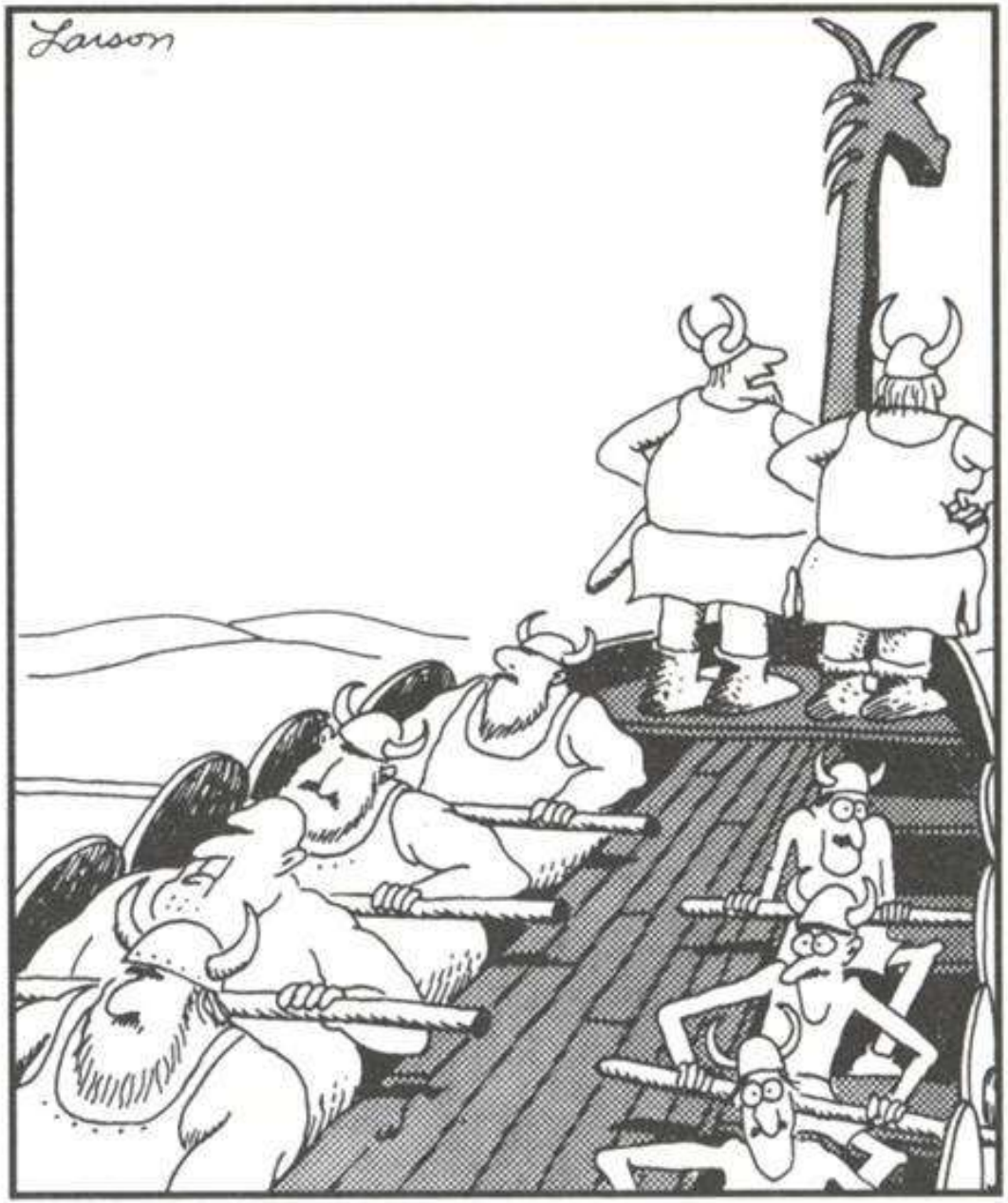


Take home messages

- **Seed treatment**
  - **May have some impact/benefit**
    - **When leaf disease risk is higher**
- **PGR**
  - **Perhaps when there is a risk of lodging**
- **Flag/Head fungicide**
  - **Most consistent impact**
    - **When leaf disease risk was moderate-high**
- **Few interactions**
  - **Single fungicide applications similar to split applications**

Take home messages

- **Resistant varieties generally not responsive to fungicide inputs**
  - **Resistance provides producers with peace of mind when disease risk is high, protecting yield, while limiting input costs**
- **No synergistic impact of using a seed treatment in combination with a foliar fungicide**
  - **May reflect the seed treatment that was used**
  - **If leaf disease is an issue then direct protection of the upper canopy leaves should be your focus**



"I've got it, too, Omar … a strange feeling like we've just been going in circles."

Cropping system management is more than just disease management

Use of Advanced Agronomic Practices in Malt Barley: Benefits and Risk to Yield and Quality

B.D. Tidemann

J.T. O'Donovan

Agriculture and Agri-Food Canada
Lacombe

Collaborating Scientists

- Neil Harker and Kelly Turkington – AAFC Lacombe
- Marta Izydorczyk – Canadian Grain Commission
- Lori Oatway – Alberta Agriculture and Forestry
- Brian Beres – AAFC Lethbridge
- Bill May – AAFC Indian Head
- Cecil Vera – AAFC Melfort
- Greg Semach – AAFC Beaverlodge
- Ramona Mohr– AAFC Brandon
- Jessica Weber – Western Applied Research Corporation

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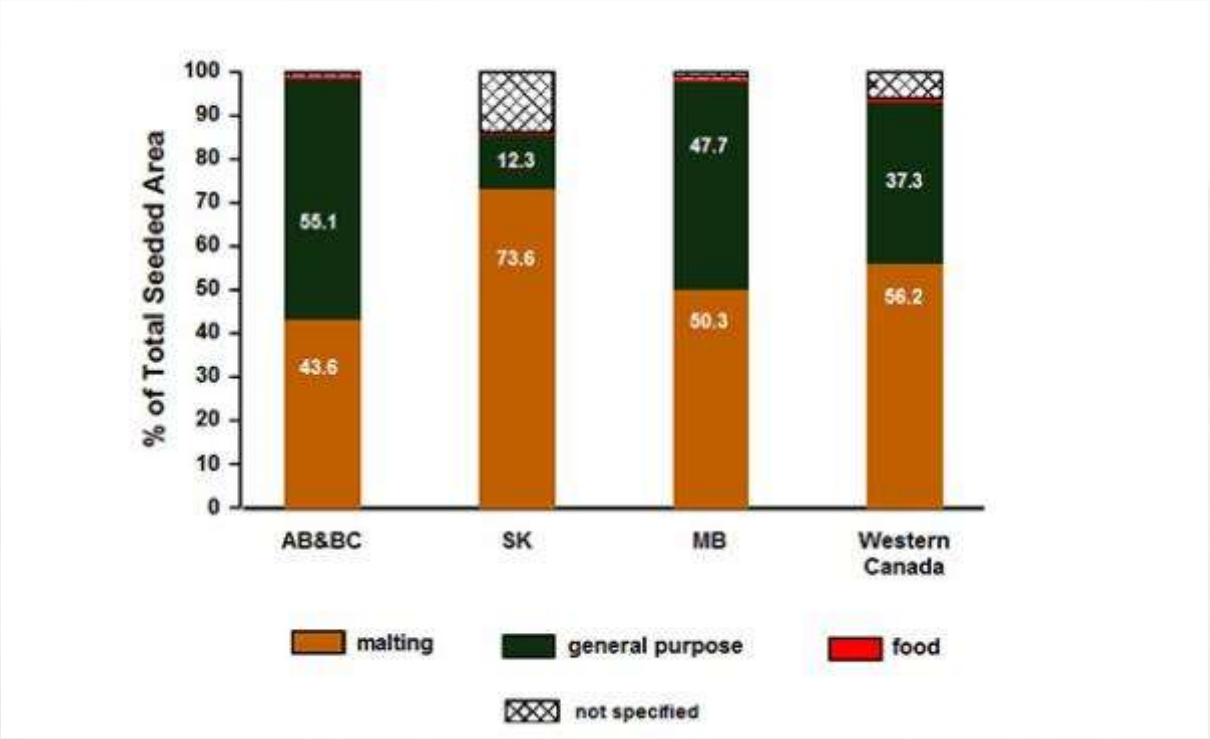
- Alberta Barley Commission
- Brewing and Malting Barley Research Institute
- Rahr Malting

- National Barley Cluster – Growing Forward II
- Technical support and summer students at each site

Malt barley in western Canada

- ~2.5 million ha of total barley
- Top varieties: CDC Copeland, AC Metcalfe



Canadian Grain Commission 2016

Malt barley in western Canada

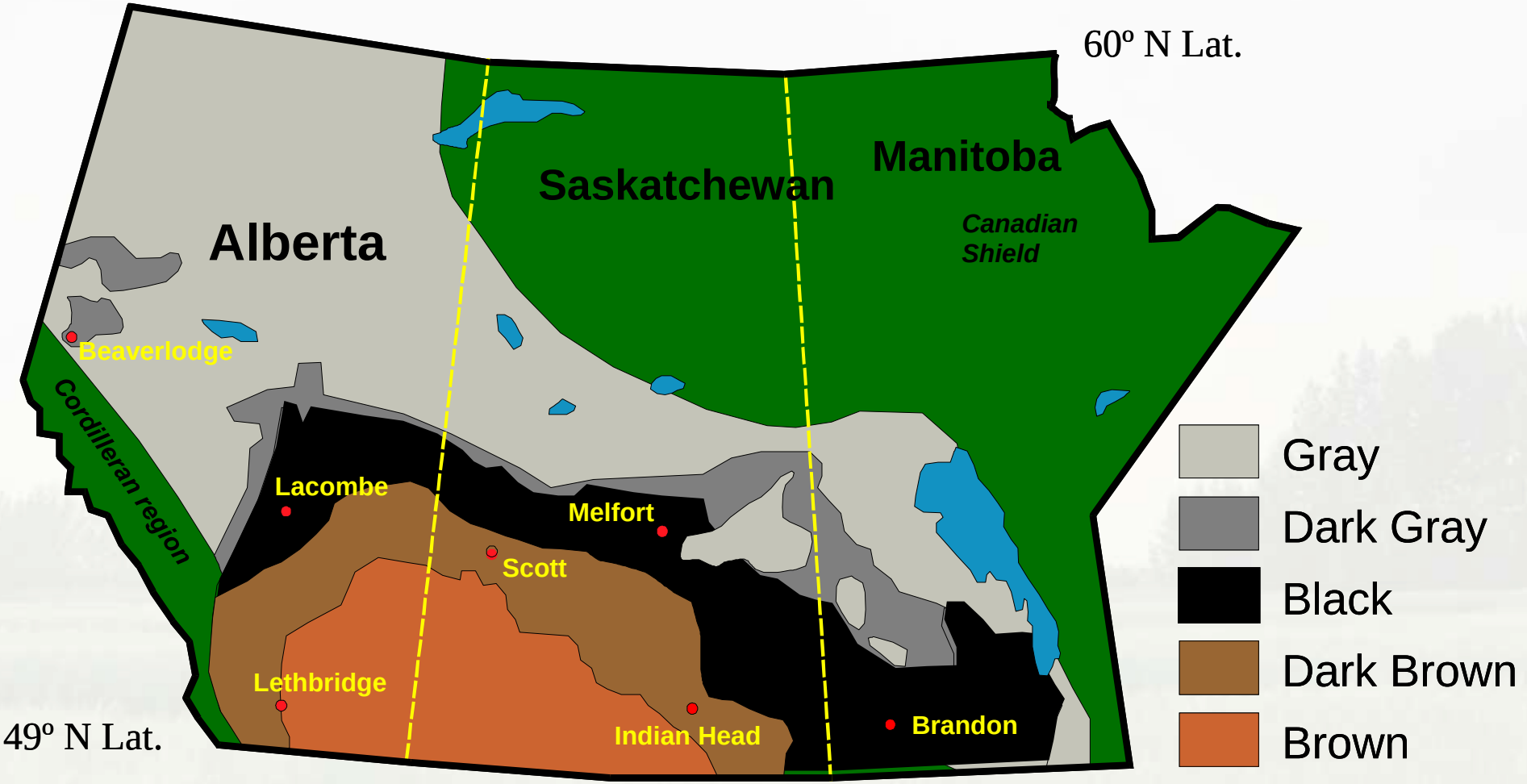
- Premium for malt barley vs. feed barley

- Difficulty achieving malt quality
  - 15 quality targets
  - Grain protein (11-12.5%)
  - Lodging
  - Uneven maturity

Potential Advanced Agronomics

- Use of varieties less responsive to nitrogen
  - Increased yield, maintained protein
- Use of plant growth regulators (PGRs) to prevent lodging
- Use of glyphosate as a pre-harvest aid for uneven maturity

Trial Locations



Trials

- Variety x Nitrogen
- PGR’s

The nitrogen conflict

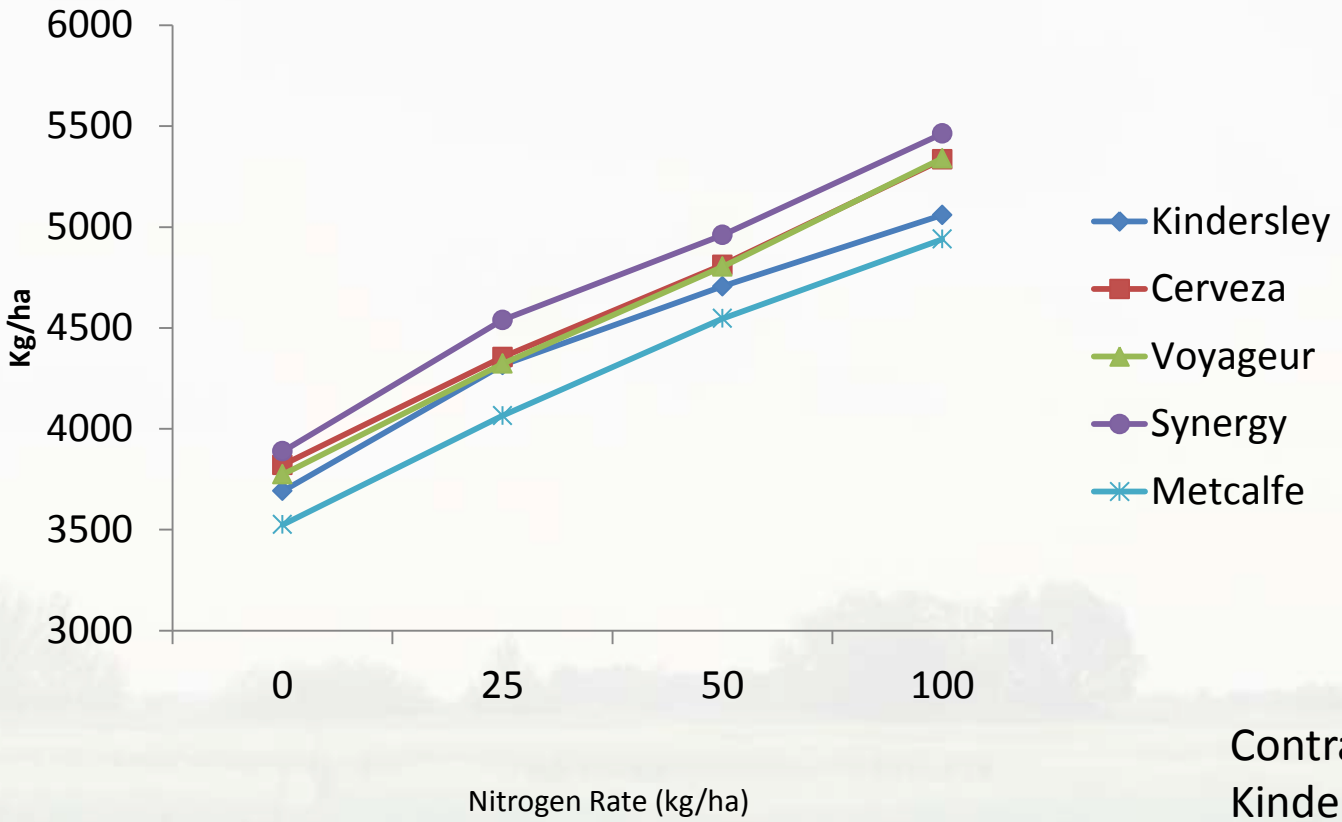
- Producers goal is to increase yield
- Nitrogen effectively increases yield
- Nitrogen increases protein
  - Less chance of malt quality

- Are there varieties that show less response to nitrogen in quality?

Materials and Methods

- The trial was conducted over 4 years under direct seeding conditions
- 2 factor factorial, RCBD
  - 5 varieties
    - AC Metcalfe
    - AAC Synergy
    - CDC Kindersley
    - Voyager
    - Cerveza
  - 4 nitrogen rates (kg/ha)
    - 0
    - 25
    - 50
    - 100
- Results presented across site-years (Proc Mixed)

Yield



Contrasts with Metcalfe

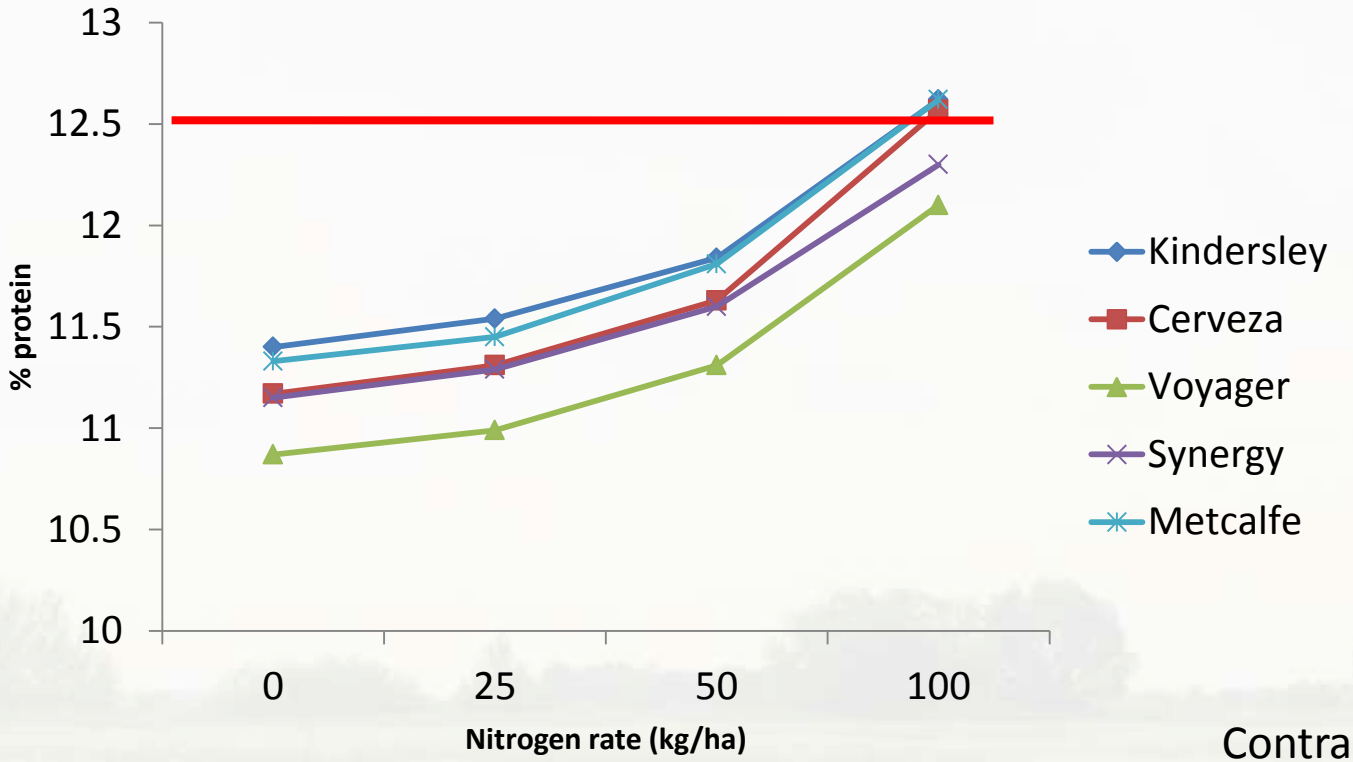
Kindersley $p = 0.0016$

Cerveza $p < 0.0001$

Voyager $p < 0.0001$

Synergy $p < 0.0001$

Protein



Contrasts with Metcalfe

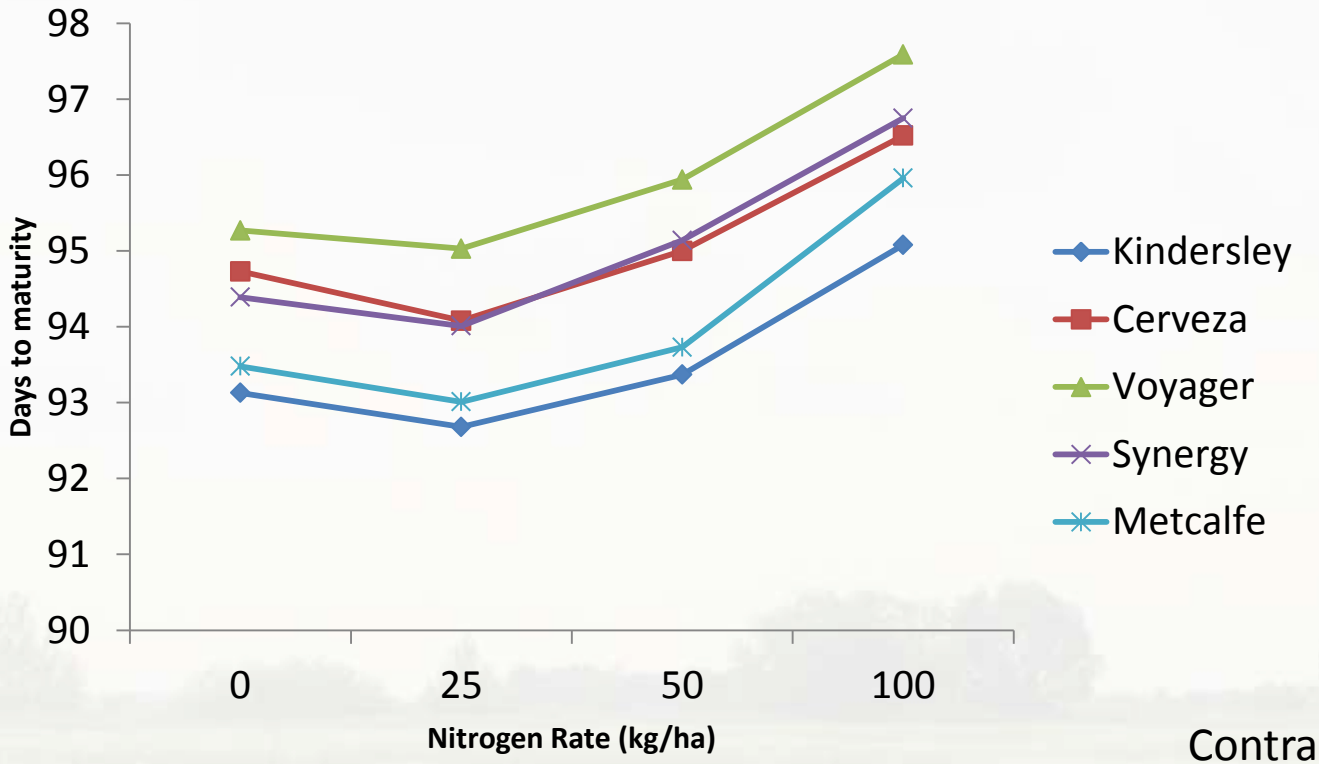
Kindersley $p = 0.4095$

Cerveza $p = 0.0135$

Voyager $p < 0.0001$

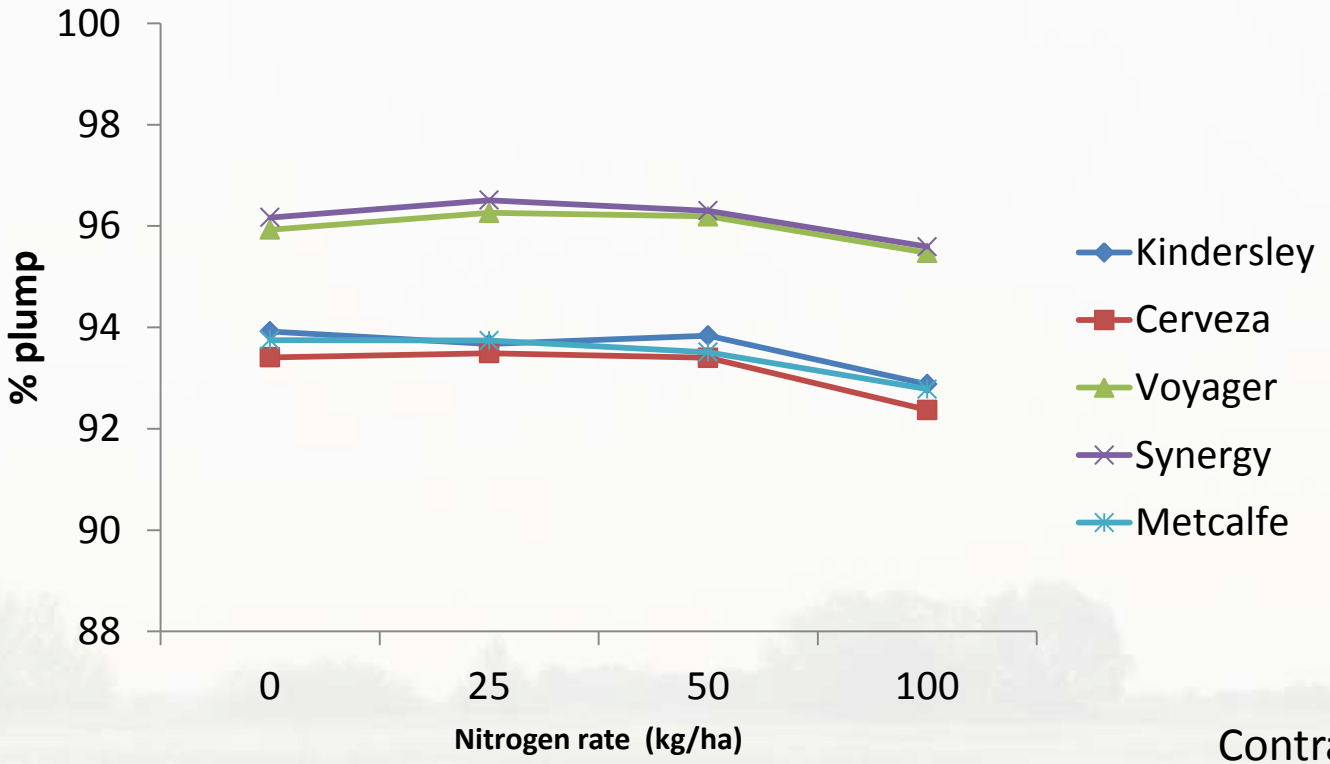
Synergy $p < 0.0001$

Maturity



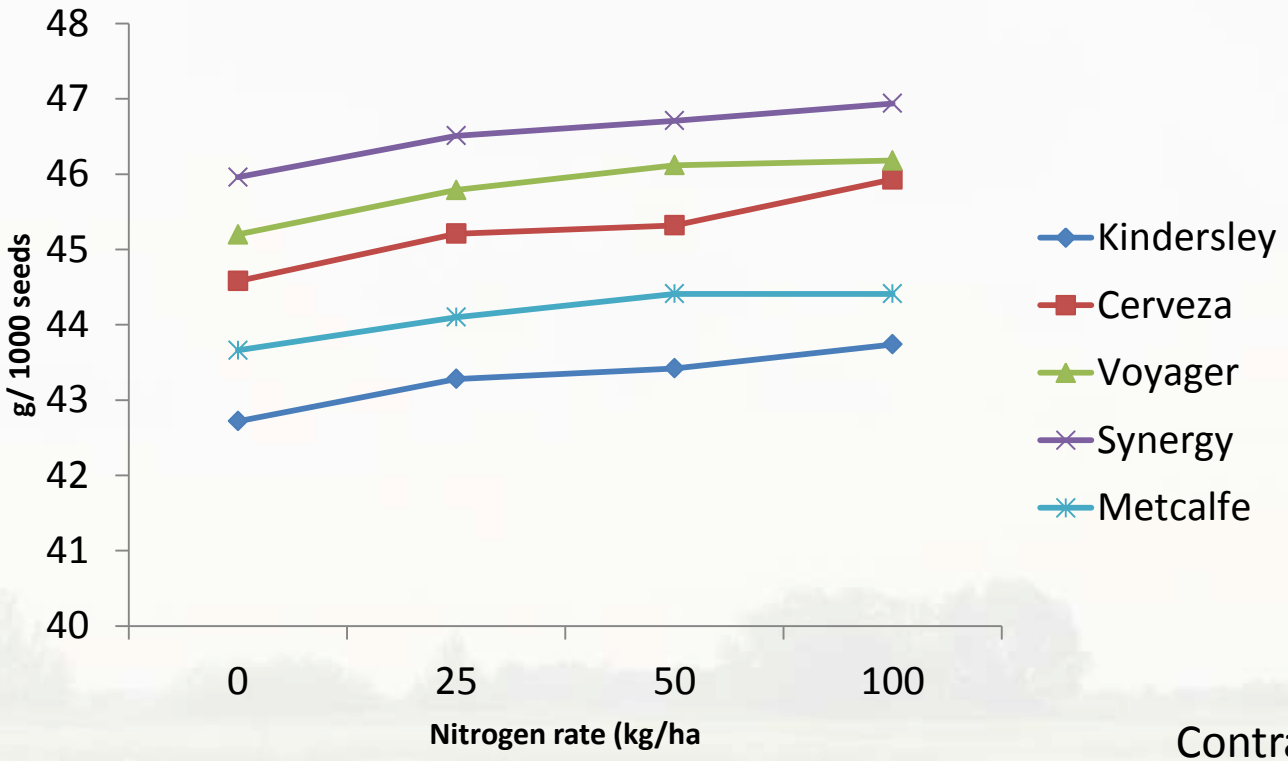
Contrasts with Metcalfe
Kindersley p = 0.0758
Cerveza p = 0.0001
Voyager p < 0.0001
Synergy p = 0.0002

Percent Plump



Contrasts with Metcalfe
Kindersley p = 0.591
Cerveza p = 0.2496
Voyager p < 0.0001
Synergy p < 0.0001

Kernel Weight



Contrasts with Metcalfe
Kindersley $p < 0.0001$
Cerveza $p < 0.0001$
Voyager $p < 0.0001$
Synergy $p < 0.0001$

Conclusions

- All four of the new varieties were higher yielding than Metcalfe at all nitrogen rates
- **AAC Synergy** produced the highest yield regardless of nitrogen rate
- Synergy and Voyager performed well in quality, but are later maturing
- Synergy as a Canadian variety may be quite successful

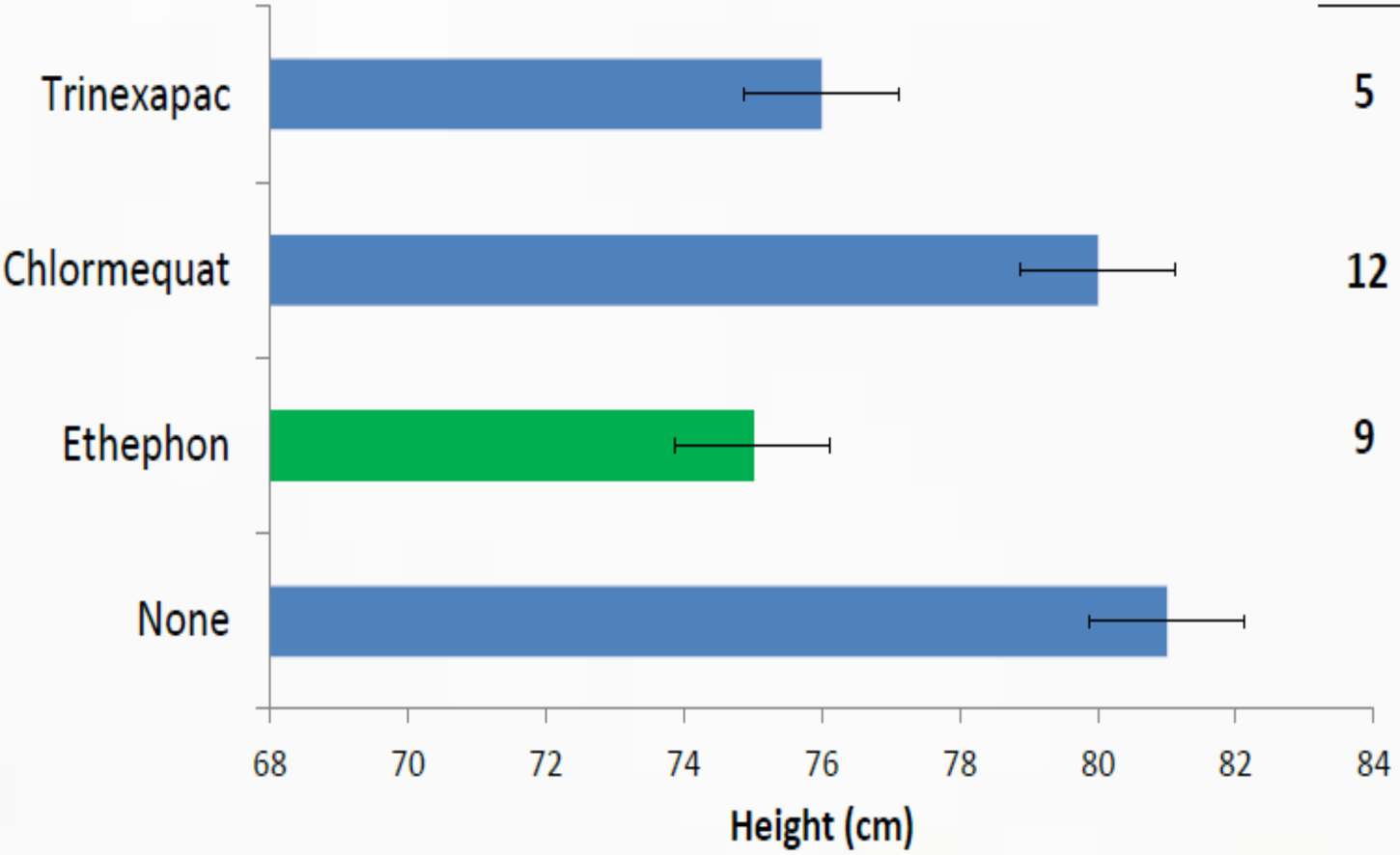
Trials

- Variety x Nitrogen
- PGR’s

Materials and Methods

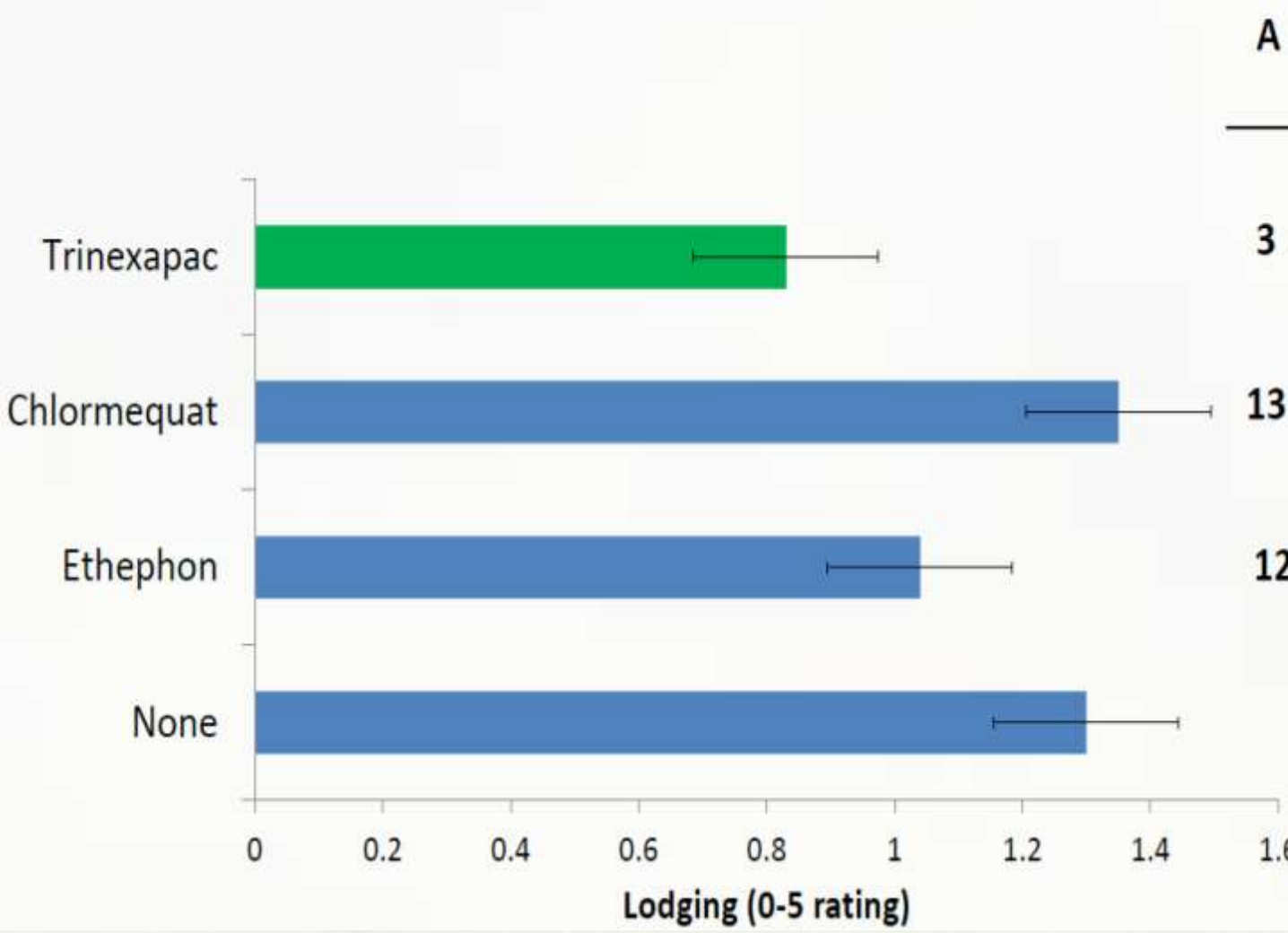
- 15 site-years, 2 factor factorial
- CDC Copeland
- PGR
  - None
  - Ethephon (Ethrel) (flag leaf – swollen boot)
  - Chlormequat (Manipulator) (<3rd node)
  - Trinexapac (Moddus)(<3rd node)
- Seeding rate – 200, 300 or 400 seed m^{-2}

Effects on Height



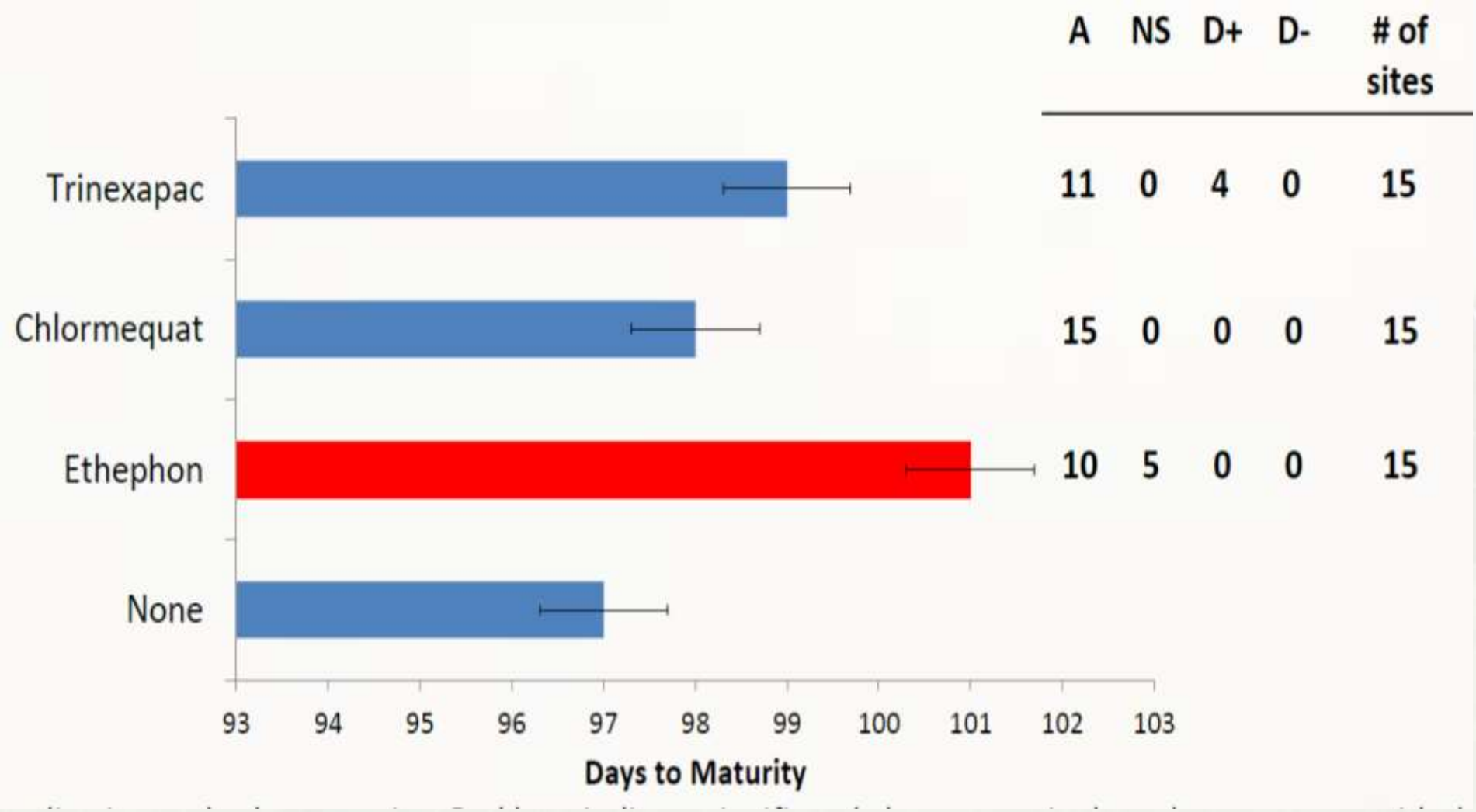
	A	NS	D+	D-	# of sites
Trinexapac	5	0	9	1	15
Chlormequat	12	0	3	0	15
Ethephon	9	6	0	0	15
None					

Effects on Lodging



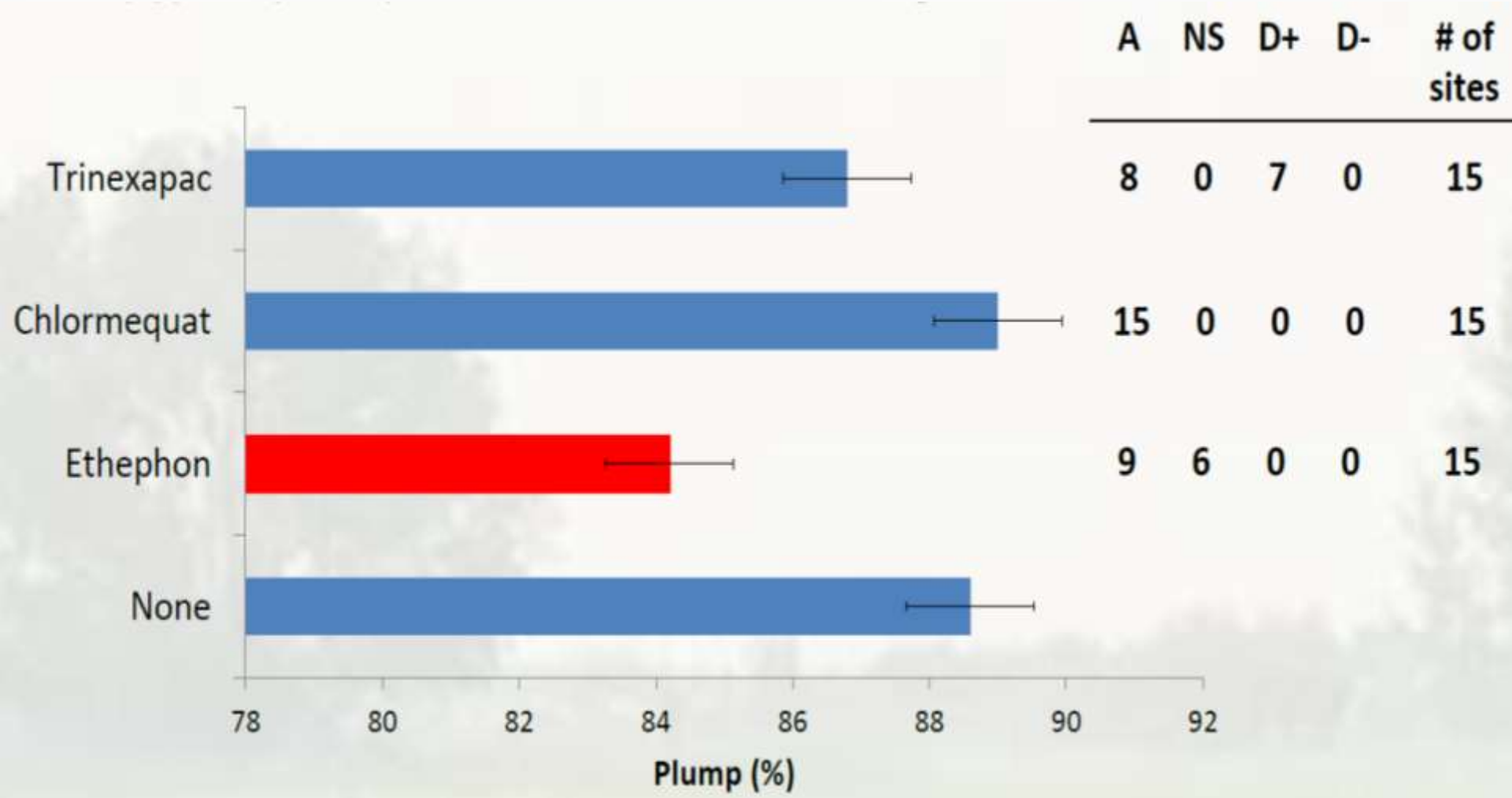
	A	NS	D+	D-	# of sites
Trinexapac	3	12	0	0	15
Chlormequat	13	0	1	1	15
Ethephon	12	0	2	1	15
None					

Effects on Maturity

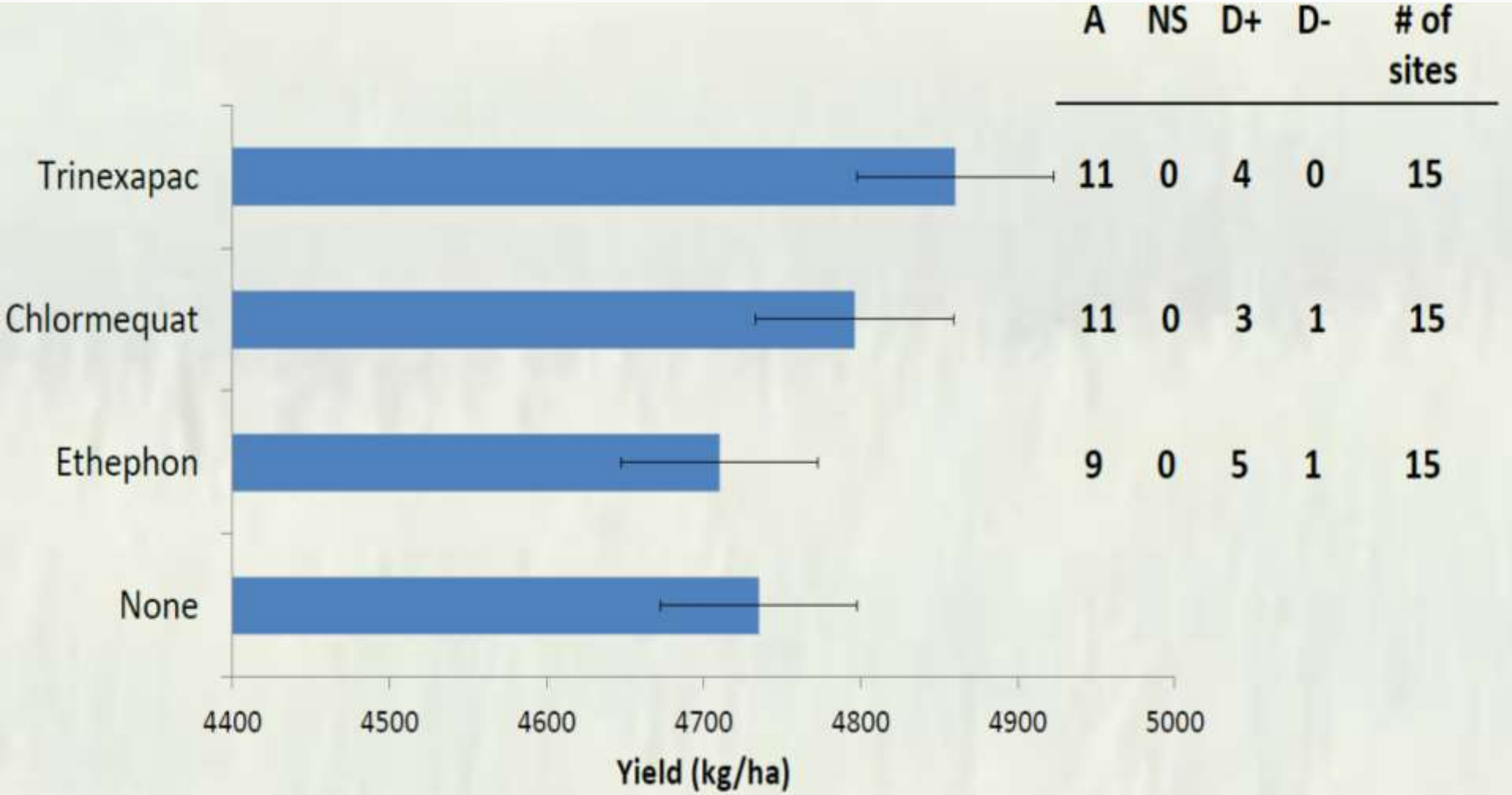


	A	NS	D+	D-	# of sites
Trinexapac	11	0	4	0	15
Chlormequat	15	0	0	0	15
Ethephon	10	5	0	0	15

Effects on % Plump



Effects on Yield



Conclusions

- Inconsistent benefits of PGRs on height, lodging and yield
- More consistent risks to maturity, percent plump
- Little to no negative effect on malt quality
- Increased variability in malt quality
- Generally more consistent risks than benefits to use of PGRs in malt barley


Thank you