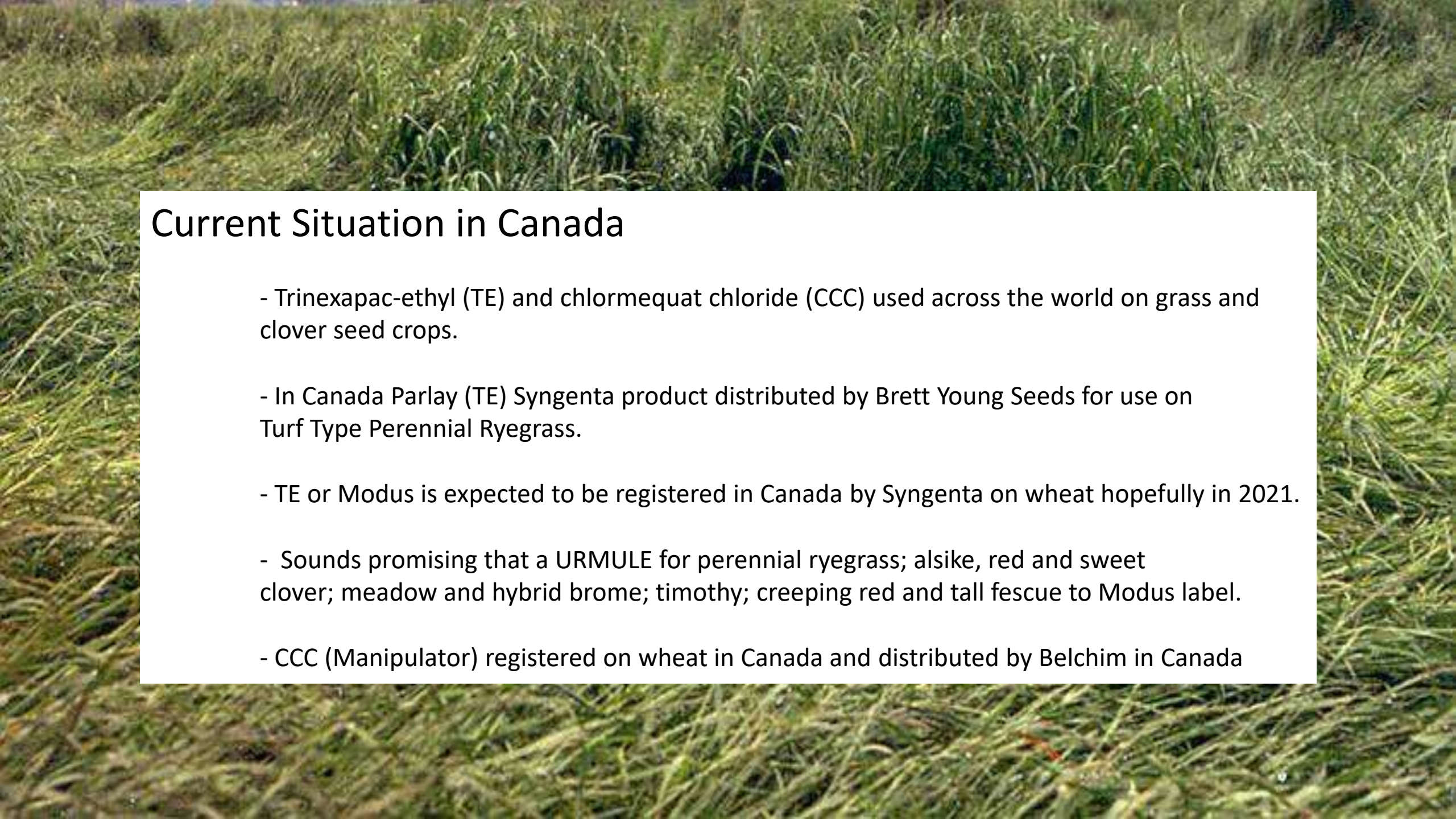


Plant Growth Regulators on Grass Seed Crops- Peace Region

Calvin Yoder, Forage Seed Specialist

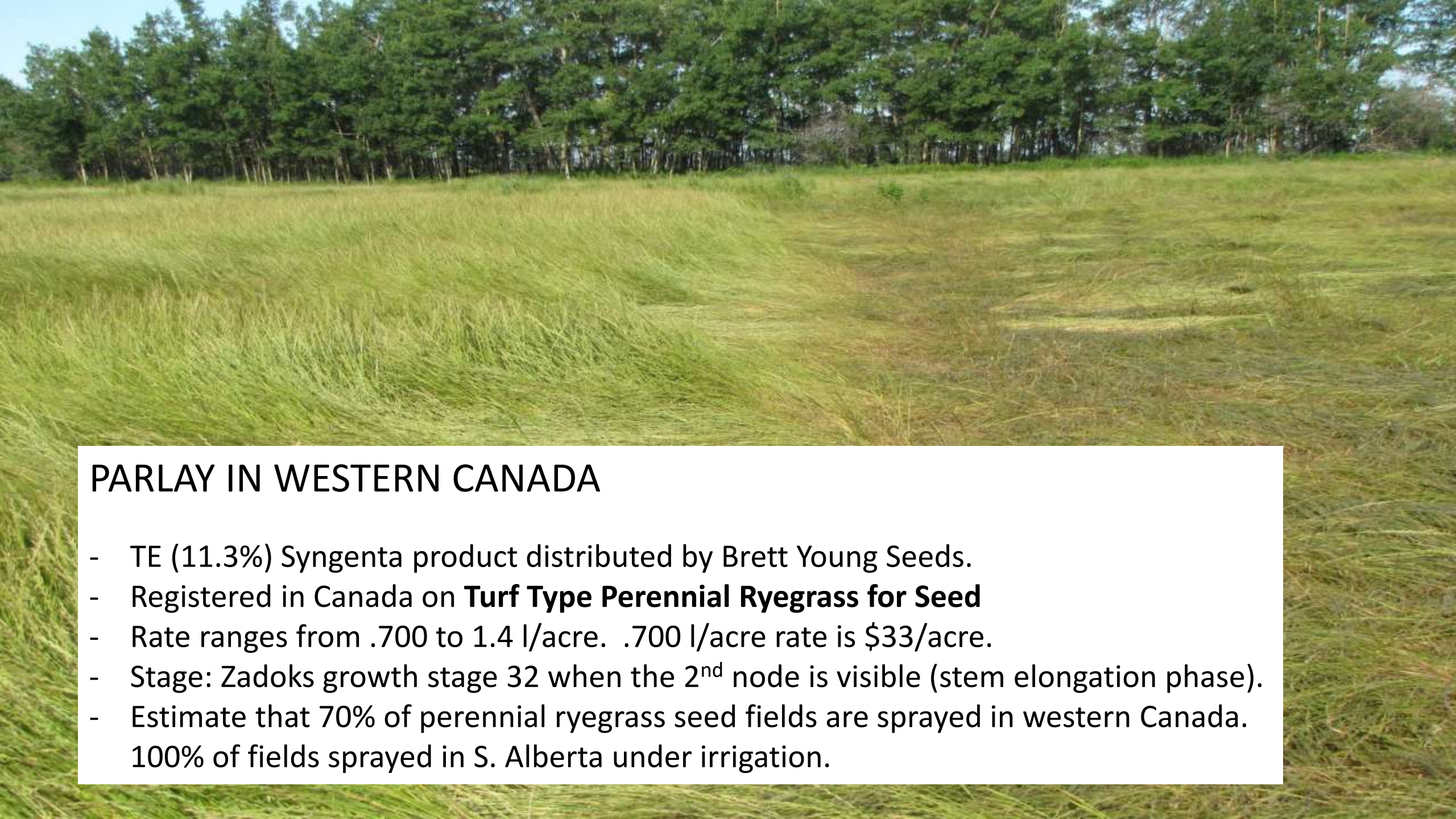
Alberta Agriculture and Forestry, Spirit River





Current Situation in Canada

- Trinexapac-ethyl (TE) and chlormequat chloride (CCC) used across the world on grass and clover seed crops.
- In Canada Parlay (TE) Syngenta product distributed by Brett Young Seeds for use on Turf Type Perennial Ryegrass.
- TE or Modus is expected to be registered in Canada by Syngenta on wheat hopefully in 2021.
- Sounds promising that a URMULE for perennial ryegrass; alsike, red and sweet clover; meadow and hybrid brome; timothy; creeping red and tall fescue to Modus label.
- CCC (Manipulator) registered on wheat in Canada and distributed by Belchim in Canada



PARLAY IN WESTERN CANADA

- TE (11.3%) Syngenta product distributed by Brett Young Seeds.
- Registered in Canada on **Turf Type Perennial Ryegrass for Seed**
- Rate ranges from .700 to 1.4 l/acre. .700 l/acre rate is \$33/acre.
- Stage: Zadoks growth stage 32 when the 2nd node is visible (stem elongation phase).
- Estimate that 70% of perennial ryegrass seed fields are sprayed in western Canada.
100% of fields sprayed in S. Alberta under irrigation.

Costs Of Growth Regulator Treatments

- TE at 700 ml /acre is \$33.00/acre
- CCC at 700 ml/acre is \$17.00/acre
- TE at 350 ml/acre+CCC at 350 ml/acre is \$25.00/acre



Effect of Trinexapac-ethyl (TE) on Grass Seed Crops

- Conducted at AAFC Beaverlodge in 2015, 2016 and 2017
- Parlay (TE) - BrettYoung Seeds/Syngenta
- Small plot (2 x 10 m) RCB with 4 replicates
- 3 rates x 2 stages of application
- Grasses received 75 kg/ha fall applied N
- Also included early spring applied UAN with and without GR
- 3 trials on creeping red fescue , 5 trials on timothy and 4 trials on meadow brome

TE on Grasses Treatment List (2015-2017 Beaverlodge)

Treatment	Rate kg ai/ha	Stage	Additional Spring UAN
1	0.200	Stem Elongation (GS 32-39)	
2	0.300	Stem Elongation (GS 32-39)	
3	0.400	Stem Elongation (GS 32-39)	
4	0.200	Heading	
5	0.300	Heading	
6	0.400	Heading	
7	0.300 + UAN	Stem Elongation (GS 37-39)	40 lbs of N/acre*
8	0.300 + UAN	Heading	40 lbs of N/acre*
9	UAN		40 lbs of N/acre*
10	Check		

Trials received 75 kg/ha of N in the fall

TE (trinexapac-ethyl) and CCC (chlormequat chloride) Mixtures

- Response of TE is generally stronger on grass seed crops than CCC.
- Studies conducted in New Zealand showed tank mixes of TE and CCC were very effective at increasing grass seed yields.
- Trials initiated over the past few years to evaluate the effects of TE, CCC and $\frac{1}{2}$ TE+ $\frac{1}{2}$ CCC at 2 different growth stages.

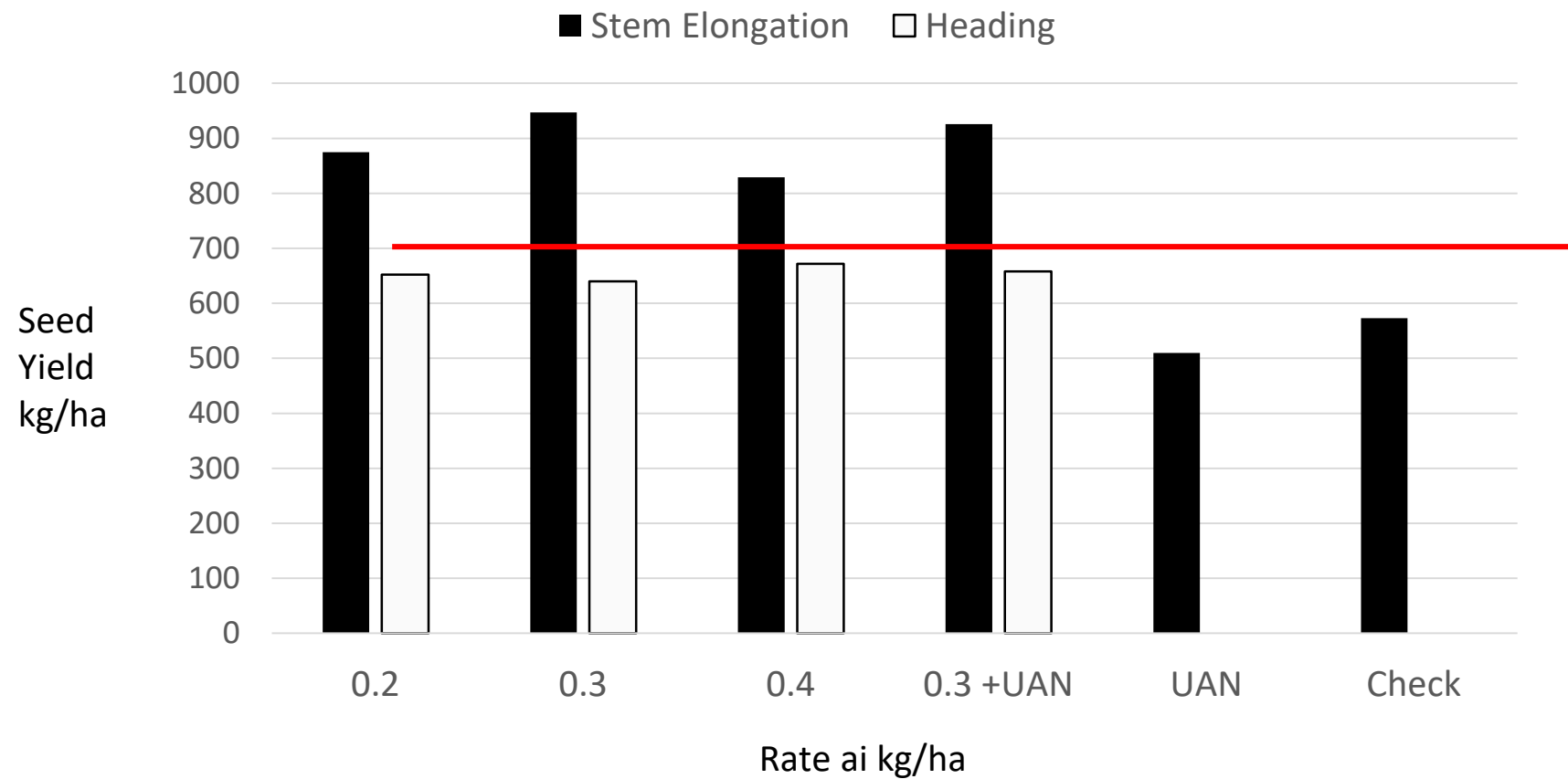




TE on Timothy

(Beaverlodge 2015 to 2017)

Effects of TE on a 1st year stand of timothy, Beaverlodge 2015



Sunset House 2019

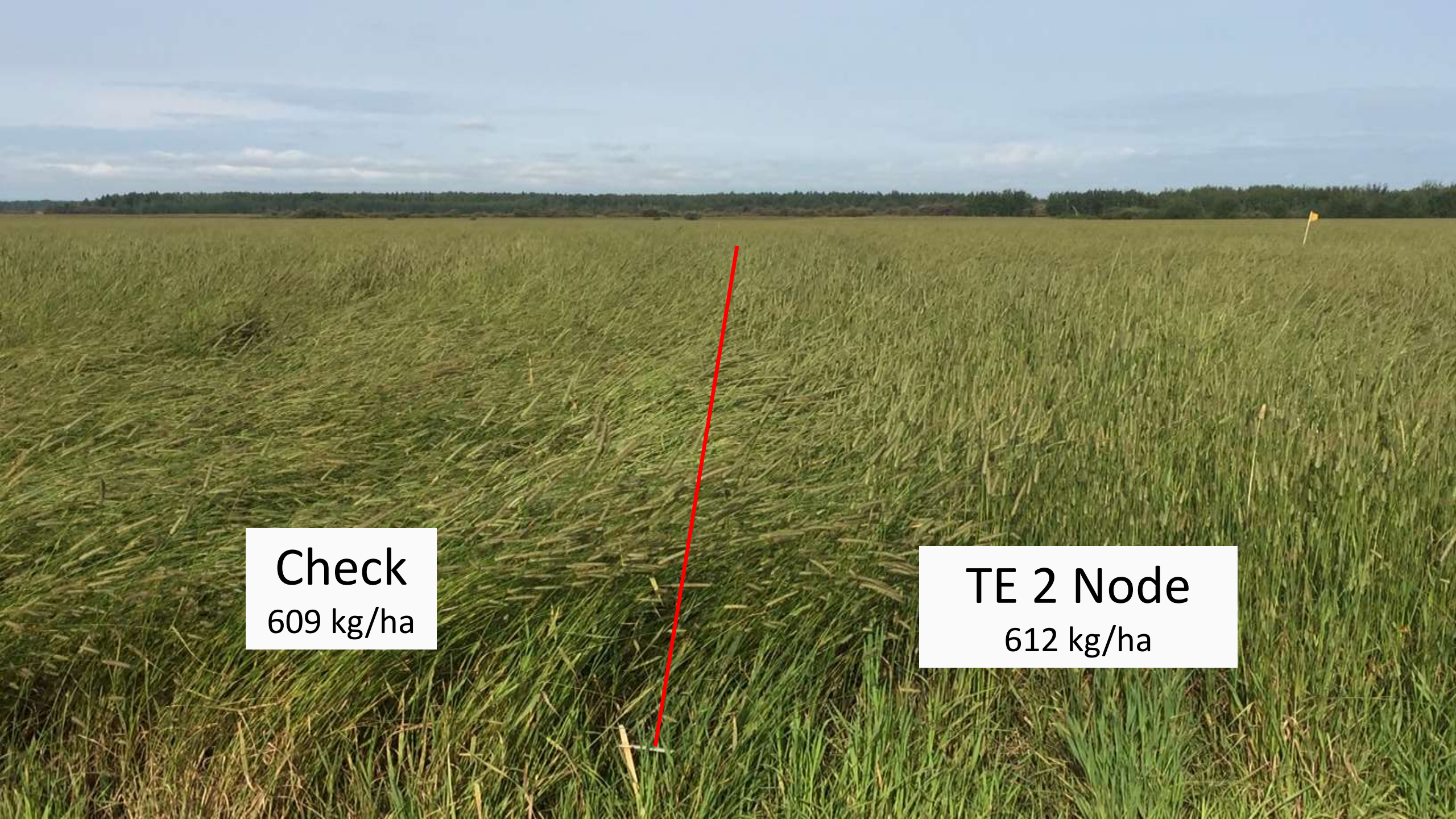


Effect of TE, CCC and TE+CCC Applied at 2 Growth Stages (May 30^h and June 11th) on 3 Year Old Timothy, Sunset House, AB 2019.

Treatment Kg ai/ha	Stage	Lodging (1-9)* July 31	Plant Height (cm) July 29	Seed Yield kg/ha
TE .200	2 Node	1.0 c	104 bc	612
TE 0.100+CCC 0.560	2 Node	1.0 c	102 cd	597
CCC 1.116	2 Node	3.0 b	109 ab	669
TE .200	Early Heading	1.0 c	102 cd	559
TE 0.100+CCC 0.560	Early Heading	1.0 c	97 d	574
CCC 1.116	Early Heading	2.8 b	110 ab	646
Check		4.0 a	114 a	609
CV%		18.4	3.0	11.3
LSD.05		0.5	4.7	NSD

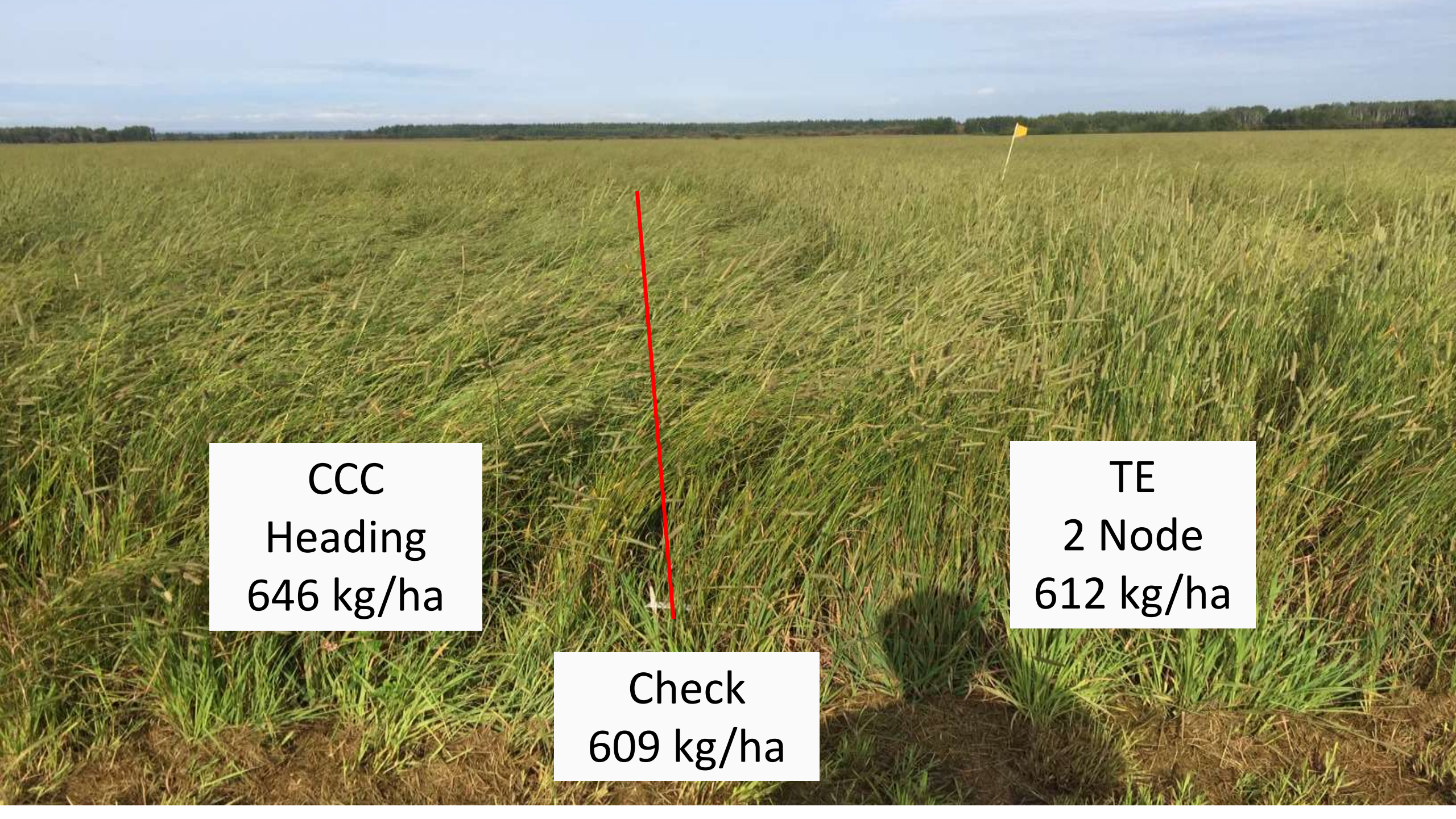
* Lodging Rating Scale 1= erect, 9 = flat

Means followed by the same letter do not significantly differ (P=.05 Student-Newman-Keuls)



Check
609 kg/ha

TE 2 Node
612 kg/ha



CCC
Heading
646 kg/ha

Check
609 kg/ha

TE
2 Node
612 kg/ha

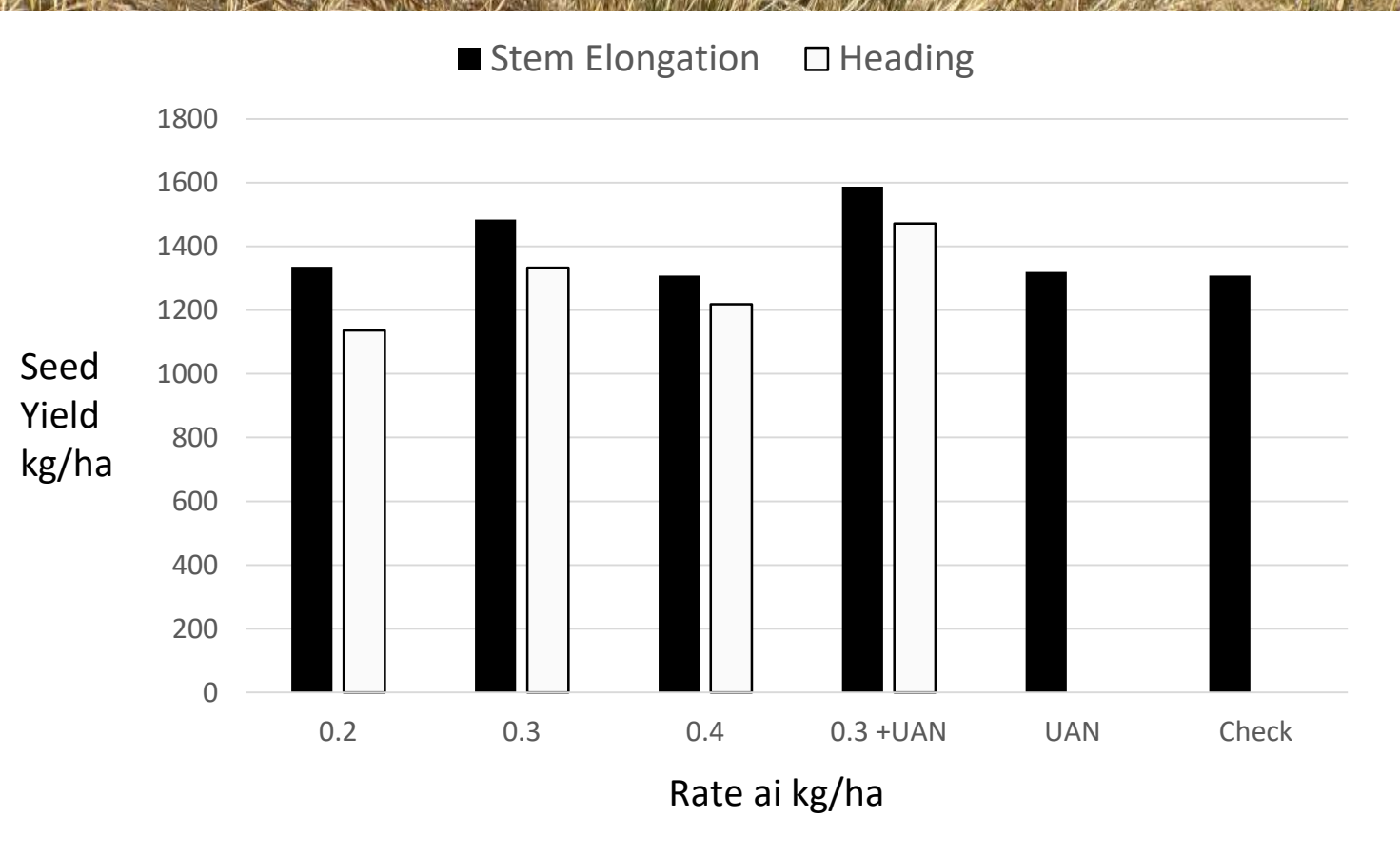
GR On Timothy - Summary to date

- TE increased seed yields at Beaverlodge by 50% in 2015 and 30% in 2016 and 0% in 2017. A slight trend for additional Spring UAN+TE to be one of the higher yielding treatments in timothy. Additional spring UAN caused lodging and did not improve yields.
- Not much benefit to go with higher rate of TE at .200 ai kg/ha. TE at 0.150 ai kg/ha is used on timothy in Norway.
- Applications of TE and $\frac{1}{2}$ TE+ $\frac{1}{2}$ CCC at 2 node stage are very effective but almost too hard on the crop. Lower application rates should be considered. Late stem elongation or early heading may be a good compromise between benefits and crop safety.
- CCC not as effective as TE or $\frac{1}{2}$ TE+ $\frac{1}{2}$ CCC in terms of plant height and lodging but still showed some yield benefit and is softer on the crop.
- Younger and well fertilized timothy stands with good moisture conditions have responded well to growth regulator applications in terms of reduced lodging, reduced plant heights and increases in seed yield.



TE on Meadow Bromegrass
(Beaverlodge 2015 to 2017)

Effects of TE on a 1st year stand of meadow brome grass, Beaverlodge 2015



TE, CCC and $\frac{1}{2}$ TE + $\frac{1}{2}$ CCC on Meadow Bromegrass, Rycroft, 2017 and 2018





TE + CCC on First Year Meadow Bromegrass (Rycroft 2017)

Treatments kg ai/ha	Stage	Height cm	Lodging 1=erect 9=flat	Seed Yield kg/ha	Dockage %
			August 14		
TE 0.200	Stem Elongation	126	2 a	1537 a	14.2 bc
TE 0.100+ CCC 0.560	Stem Elongation	125	1.2 a	1572 a	13.5 c
CCC 1.116	Stem Elongation	127	3.8 a	1282 ab	15.5 b
TE 0.200	Heading	128	3.3 a	1320 ab	15.7 b
CCC 1.116	Heading	131	2.4 ab	1290 ab	14.8 bc
Check		130	5.8 c	1092 b	17.7 a
CV%		3.2	18.9	11.3	5.1
LSD P=.05			2.1	232	1.2

Means followed by the same letter do not significantly differ (P=.05 Student-Newman-Keuls)

TE and CCC on 2nd Year Meadow Brome - Rycroft 2018



2nd Year Meadow Brome Rycroft-2018

TE+CCC 2 Node

2nd Year Meadow Brome Rycroft-2018

TE Early Head

2nd Year Meadow Brome Rycroft-2018

CCC Early Head

Check



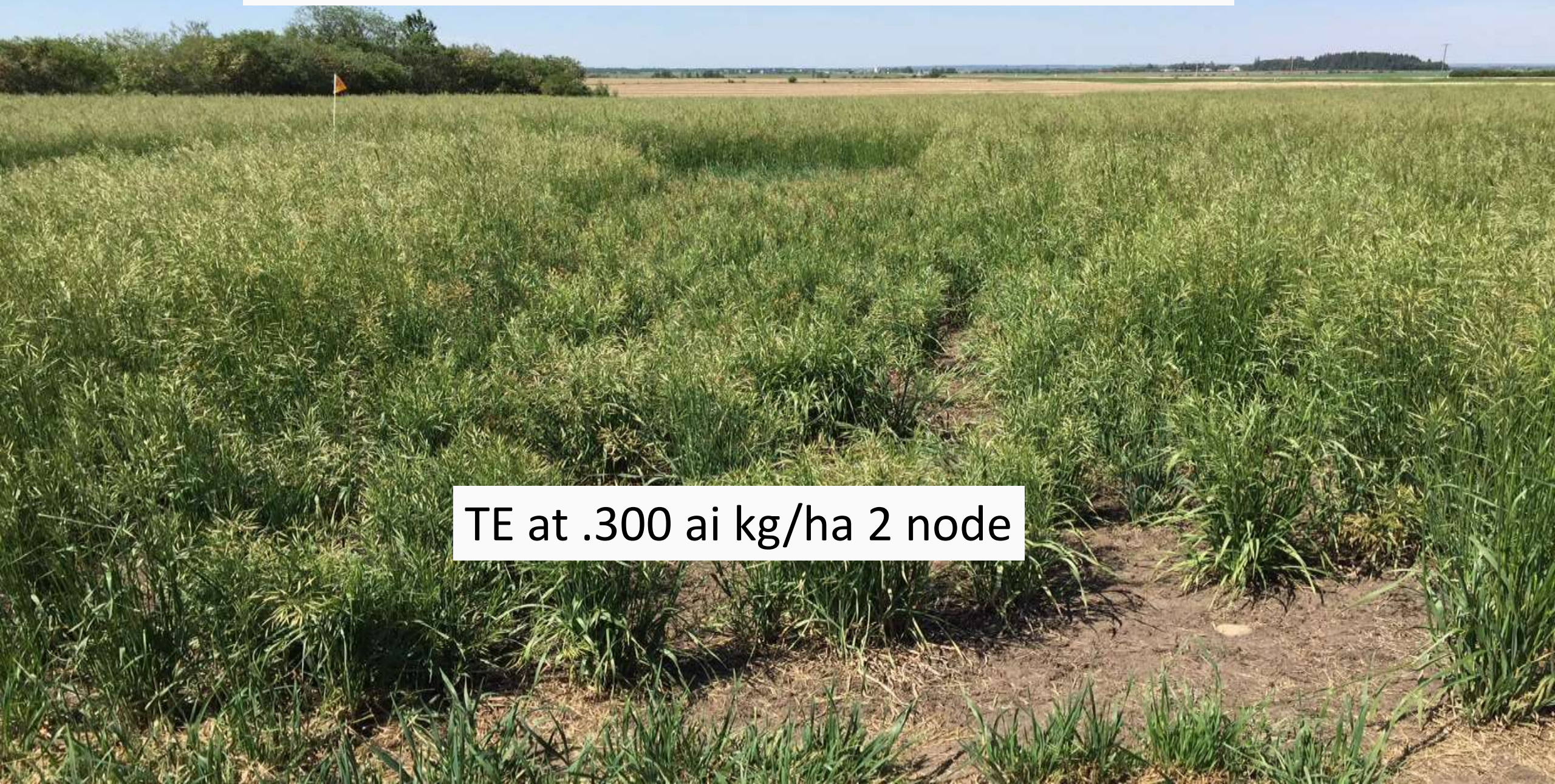
TE + CCC on 2nd Year Meadow Bromegrass-Rycroft 2018

Treatments kg ai/ha	Stage	Plant Height cm	Lodging 1=erect 9=flat	Seed Yield kg/ha	Dockage %	Seed Moisture %
		July 12	August 15			
TE 0.200	2 Node	33.5 bc	1.0 a	1016 a	3.7 bc	11.4 b
TE 0.100+ CCC 0.560	2 Node	30.6 c	1.0 a	966 a	3.5 bc	11.9 b
CCC 1.116	2 Node	37.2 b	1.2 a	1095 a	4.4 bc	12.0 b
TE 0.200	Heading	35.7 b	1.0 a	1065 a	3.3 c	11.7 b
CCC 1.116	Heading	39.4 a	0.5 a	1176 a	5.2 b	12.3 b
Check		42.6 a	2.7 b	910 a	7.2 a	14.1 a
CV%		6.7	9.9	13.6	9.7	8.6
LSD P=.05		3.7	1.4	NSD	1.7	1.6

Means followed by the same letter do not significantly differ (P=.05 Student-Newman-Keuls)

GR on First Year Meadow Brome, Valhalla 2018

TE at .300 ai kg/ha 2 node



GR on First Year Meadow Brome, Valhalla 2018

CCC at 2 node

GR on First Year Meadow Brome, Valhalla 2018

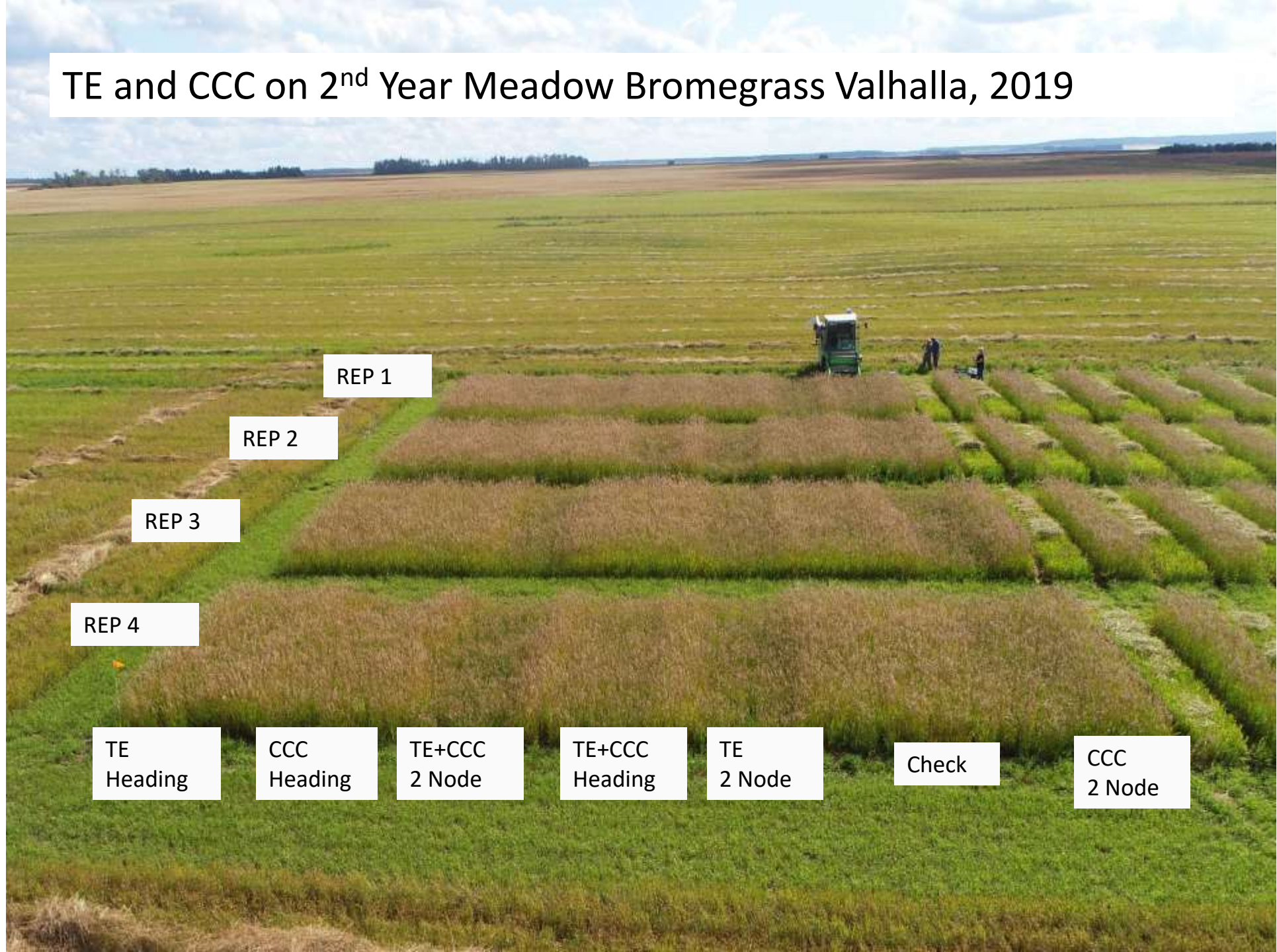
$\frac{1}{2}$ TE at $\frac{1}{2}$ CCC at at 2 node

TE + CCC on First Year Meadow Bromegrass- Valhalla 2018

Treatments kg ai/ha	Stage	Plant Height cm	Lodging 1=erect 9=flat	Seed Yield kg/ha	Seed Moisture %
			July 27	August 7	
TE 0.200	2 Node	81 c	1.2 a	867 b	16.3 bc
TE 0.100+CCC 0.560	2 Node	86 c	1.0 a	921 b	18.0 b
CCC 1.116	2 Node	103 b	1.1 a	1064 a	14.0 d
TE 0.300	2 Node	64 d	1.0 a	627 c	20.2 a
Check		114 a	4.1 a	878 b	15.3 cd
CV%		3.5	10.2	7.3	6.7
LSD P=.05		.53	1.3	98.4	1.7

**Means followed by the same letter do not significantly differ (P=.05 Student-Newman-Keuls)

TE and CCC on 2nd Year Meadow Bromegrass Valhalla, 2019



Effect of TE, CCC and TE+CCC Applied at 2 Growth Stages (May 27th and June 9th) on 2nd Year Meadow Bromegrass, Valhalla, AB 2019.

Treatment Kg ai/ha	Stage	Lodging 1=erect 9=flat July 29	Plant Height (cm) July 29	Seed Yield kg/ha**
TE .200	2 Node	1.0 b	33.9 c	502 b
TE 0.100+CCC 0.560	2 Node	1.0 b	32.4 c	485 b
CCC 1.116	2 Node	1.2 b	39.9 b	650 a
TE .200	Early Heading	1.0 b	38.3 b	605 ab
TE 0.100+CCC 0.560	Early Heading	1.0 b	34.8 c	600 ab
CCC 1.116	Early Heading	1.0 b	38.9 b	668 a
Check		2.2 a	44.8 a	597 ab
CV%		9.4	5.5	10.4
LSD.05		0.43	3.1	90.1

*Lodging 1 is no lodging 9 is lodged flat

**Means followed by the same letter do not significantly differ (P=.05 Student-Newman-Keuls)

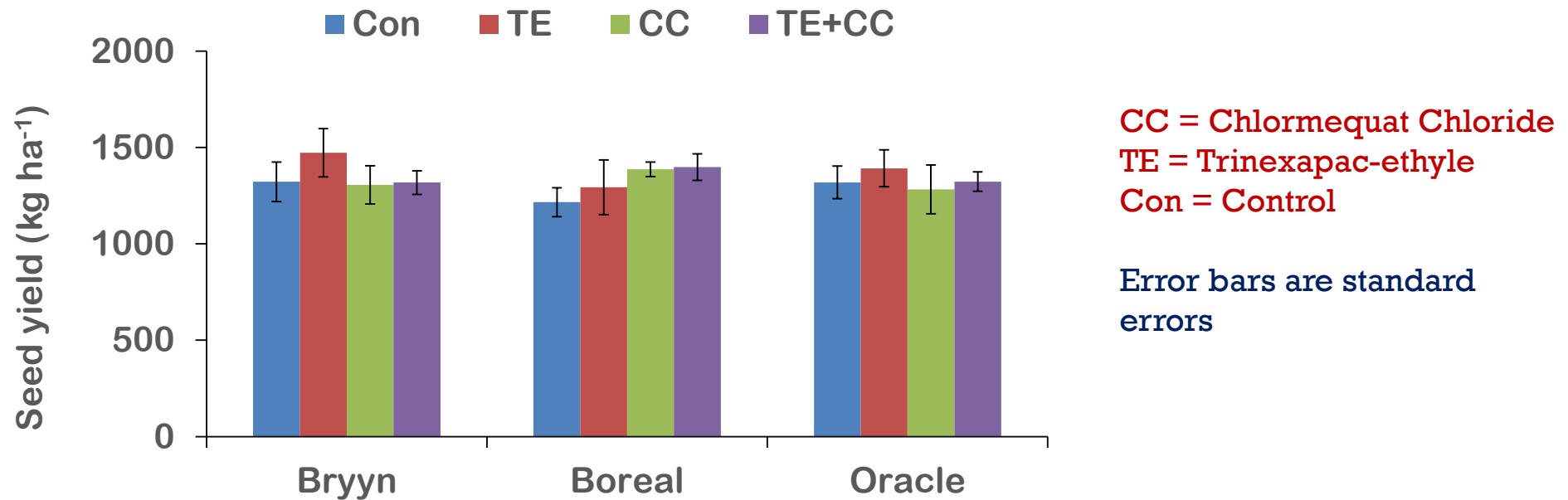
GR On Meadow Bromegrass - Summary

- Well fertilized stands with good moisture conditions have responded well to growth regulator applications in terms of reduced lodging, reduced plant heights, reduced dockage and increases in seed yield.
- At Beaverlodge a slight trend for additional Spring UAN+TE to be one of the higher yielding treatments.
- Late stem elongation to early head appear safer than applications at 2 node stage.
- Not much benefit to go with higher rate of TE at .200 ai kg/ha.
- CCC not as effective as TE or $\frac{1}{2}$ TE+ $\frac{1}{2}$ CCC in terms of plant height and lodging but still has shown good yield benefits and is softer crop. Should consider trials with higher rates of CCC.
- CCC maybe be a good option on older stands where yield potential is less.
- TE 0.100 ai kg/ha +CCC 0.560 ai kg/ha very effective and could likely consider lower rates.

GR on Creeping Red Fescue



Creeping red Fescue - Effect of plant growth regulators Beaverlodge, AB (2019)



GR On Creeping red fescue - Summary

- Creeping red fescue stands have not responded well or consistently to growth regulators in trials to date.
- Fine fescue fields have responded well to growth regulators in other parts of the world.
- Further trials on creeping red fescue will be conducted.

Summary To Date

- SPECIES – Timothy, meadow brome grass and red clover responding strongly to growth regulators in terms of height reduction, lodging and seed yield. Alsike clover response has been minimal but did have a nice response 2 years ago in one trial. Creeping red fescue has shown minimal responses to growth regulators in trials to date.
- Once Modus (TE) is registered in Canada on spring wheat a number of grasses and clovers may be added to the label (URMULE). BE AWARE OF THE RISKS as we have seen seed yield losses.
- Stands sprayed with TE or TE+CCC will look terrible but they generally bounce back.
- CCC not as effective as TE or $\frac{1}{2}$ TE+ $\frac{1}{2}$ CCC but will have more potential for use than first thought. Higher rates of CCC should be considered.
- Have funding for two more years to conduct trials on 3 grasses/year. May change rates particularly with the TE+CCC mix and add a second rate of CCC.
- Under dryland conditions positive responses will not be as consistent as under irrigation.
- Responses of GR always dependent on age of stand, fertility, moisture and yield potential.

Thank-you

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