Addressing Wheat Production Challenges with Applied Agronomic Research & Demonstration




Chris Holzapfel, MSc PAg

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

Sask Wheat DEVELOPMENT COMMISSION

Major Wheat Production Issues in Southeast Saskatchewan

- Wheat is one of the most economically & rotationally important SK crops but is not without production challenges
- Specific challenges vary with environment (i.e. weather) & across classes but a few broad & important agronomic issues frequently encountered throughout Saskatchewan include:

1. **Lodging:** Can reduce both yield & harvest efficiency; often influences variety, fertility & seeding rate decisions
2. **Protein:** Important quality parameter for many classes, largely dictated by weather but also managed through variety selection & nitrogen fertility
3. **Disease:** Primarily leaf spot & fusarium head blight, greater problem in wet years, potential to reduce both yield & quality, can result in major economic loss or unmarketable grain in severe cases


IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

Sask Wheat DEVELOPMENT COMMISSION

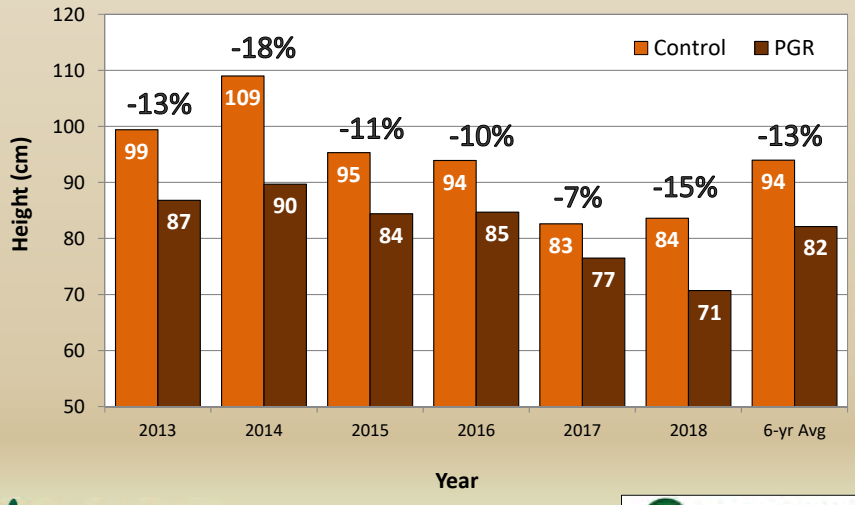
Production Challenge #1: Lodging

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019

SWDC Think Wheat

Average PGR Effects on Wheat Height
Indian Head 2013-2018

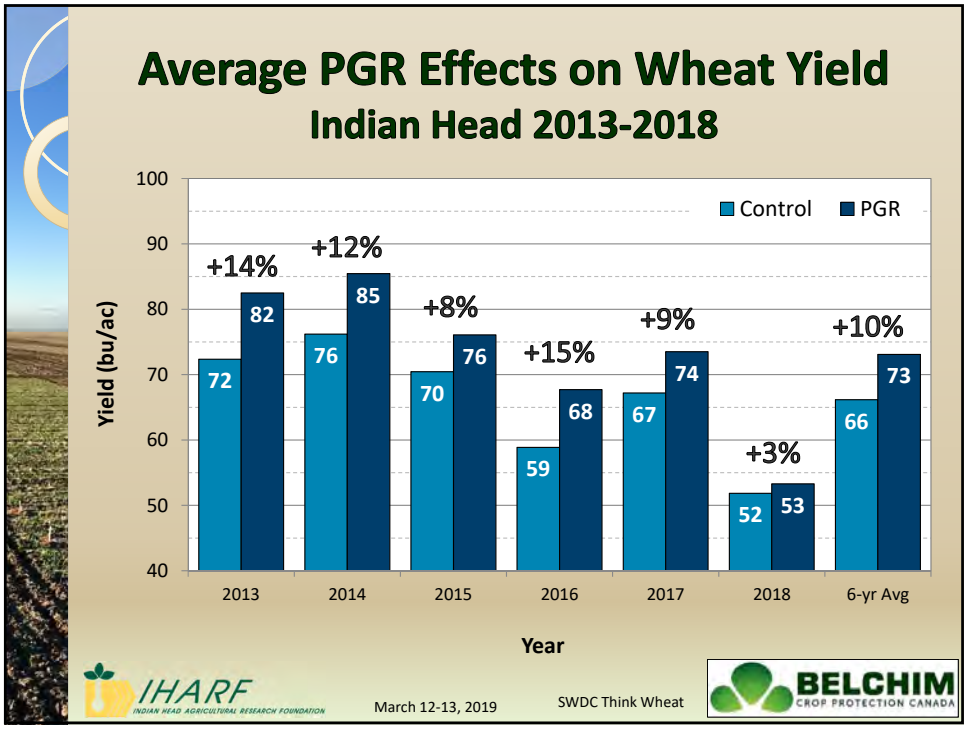


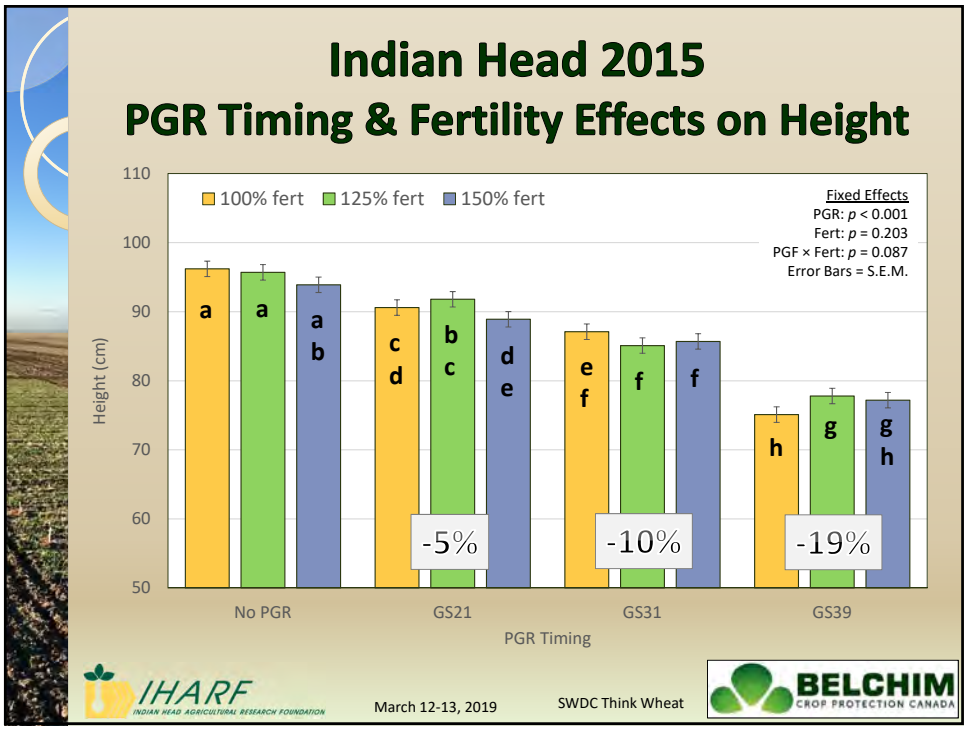
IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

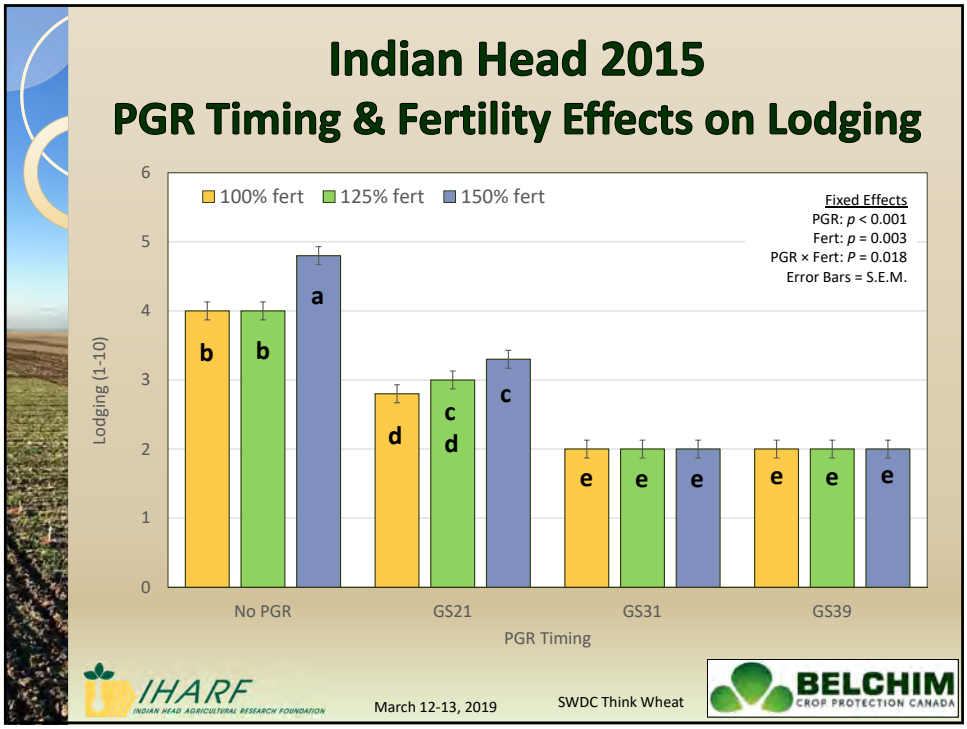
March 12-13, 2019

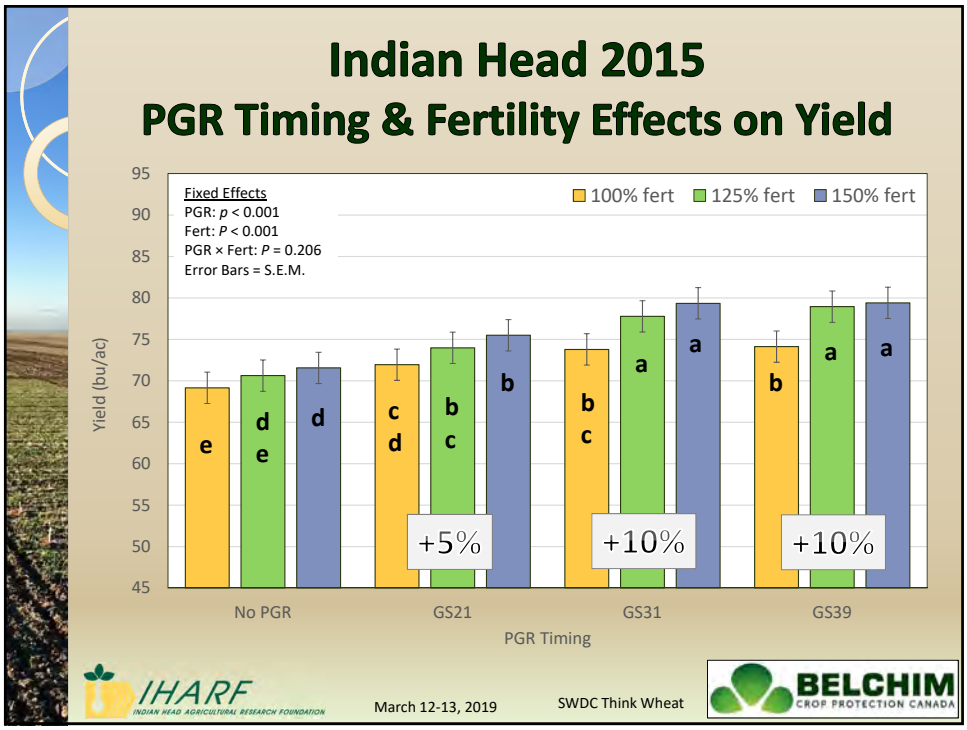
SWDC Think Wheat

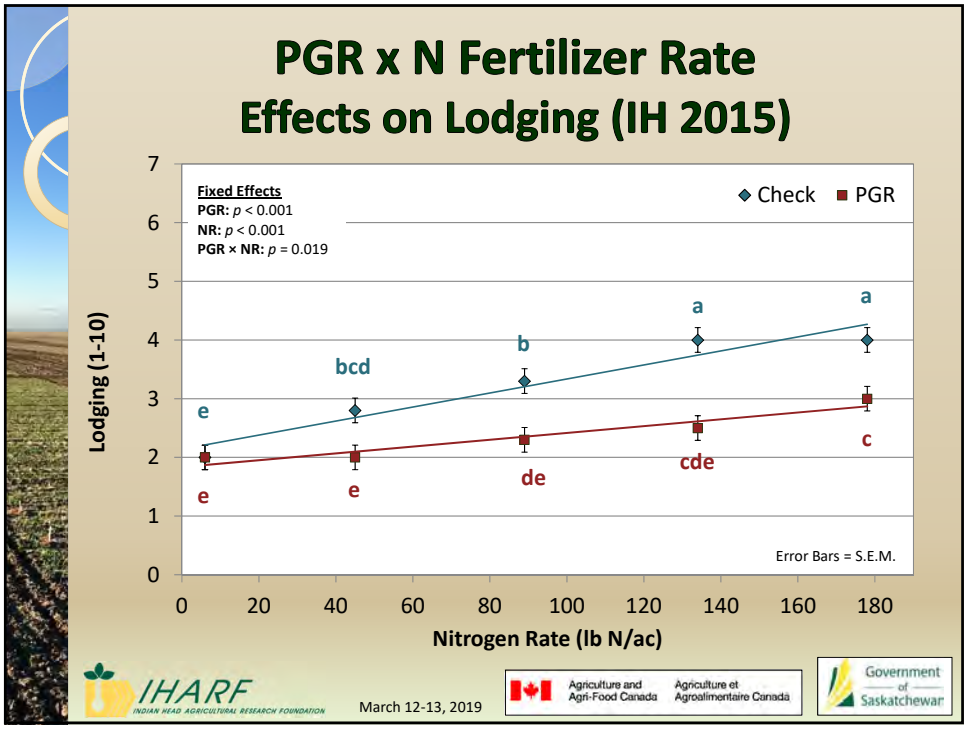
BELCHIM CROP PROTECTION CANADA

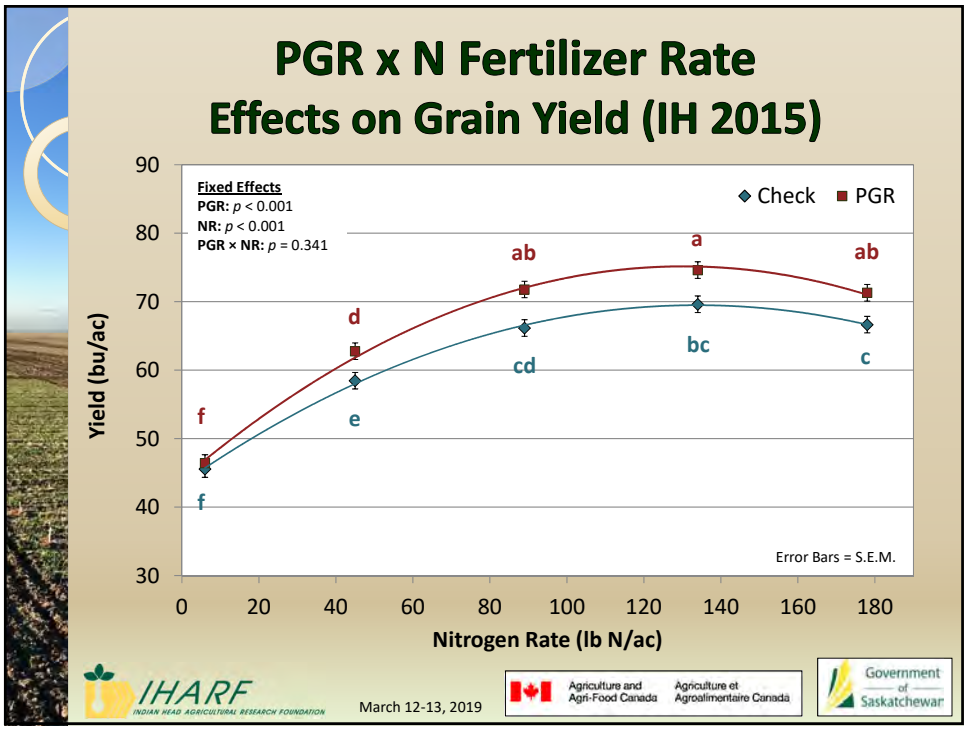

Average PGR Effects on Wheat Yield
Indian Head 2013-2018
Control
PGR
Yield (bu/ac)
100
90
80
70
60
50
40
+14%
+12%
+8%
+15%
+9%
+3%
+10%
72
82
76
85
70
76
59
68
67
74
52
53
66
73
2013
2014
2015
2016
2017
2018
6-yr Avg
Year
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
BELCHIM
CROP PROTECTION CANADA


Indian Head 2015
PGR Timing & Fertility Effects on Height
100% fert
125% fert
150% fert
Fixed Effects
PGR: p < 0.001
Fert: p = 0.203
PGF × Fert: p = 0.087
Error Bars = S.E.M.
Height (cm)
110
100
90
80
70
60
50
a
a
a b
c d
b c
d e
e f
f
f
h
g
g h
-5%
-10%
-19%
No PGR
GS21
GS31
GS39
PGR Timing
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
BELCHIM
CROP PROTECTION CANADA

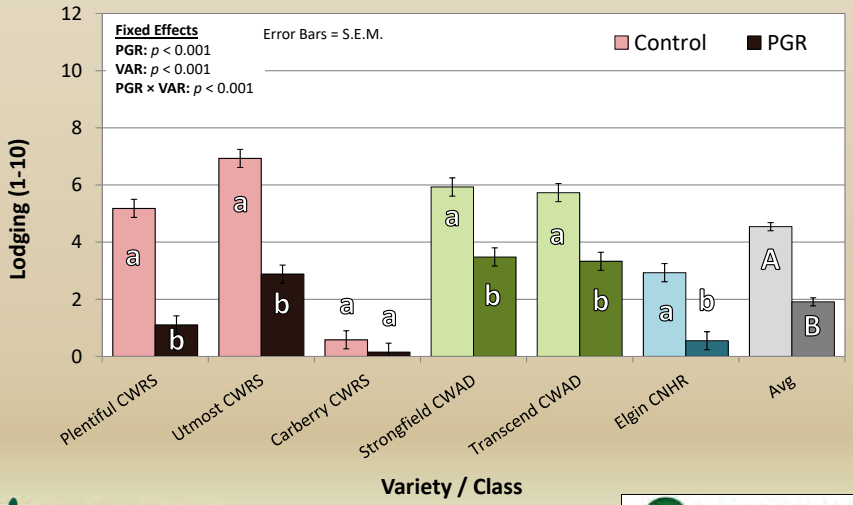

Indian Head 2015
PGR Timing & Fertility Effects on Lodging
100% fert
125% fert
150% fert
Fixed Effects
PGR: p < 0.001
Fert: p = 0.003
PGR × Fert: P = 0.018
Error Bars = S.E.M.
Lodging (1-10)
0
1
2
3
4
5
6
b
b
a
d
c d
c
e
e
e
e
e
e
No PGR
GS21
GS31
GS39
PGR Timing
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
BELCHIM
CROP PROTECTION CANADA


Indian Head 2015
PGR Timing & Fertility Effects on Yield
Fixed Effects
PGR: p < 0.001
Fert: P < 0.001
PGR × Fert: P = 0.206
Error Bars = S.E.M.
100% fert
125% fert
150% fert
Yield (bu/ac)
45
50
55
60
65
70
75
80
85
90
95
e
d e
d
c d
b c
b
b c
a
a
b
a
a
+5%
+10%
+10%
No PGR
GS21
GS31
GS39
PGR Timing
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
BELCHIM
CROP PROTECTION CANADA


PGR x N Fertilizer Rate
Effects on Lodging (IH 2015)
Fixed Effects
PGR: p < 0.001
NR: p < 0.001
PGR × NR: p = 0.019
Check
PGR
Lodging (1-10)
Nitrogen Rate (lb N/ac)
Error Bars = S.E.M.
a
a
b
bcd
e
e
e
de
cde
c
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
Agriculture and Agri-Food Canada
Agriculture et Agroalimentaire Canada
Government of Saskatchewan


PGR x N Fertilizer Rate
Effects on Grain Yield (IH 2015)
Fixed Effects
PGR: p < 0.001
NR: p < 0.001
PGR × NR: p = 0.341
Check
PGR
Yield (bu/ac)
Nitrogen Rate (lb N/ac)
Error Bars = S.E.M.
ab
a
ab
d
bc
c
cd
f
e
f
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
Agriculture and Agri-Food Canada
Agriculture et Agroalimentaire Canada
Government of Saskatchewan

PGR x Variety – IH 2016 (wet)
Effects on Lodging

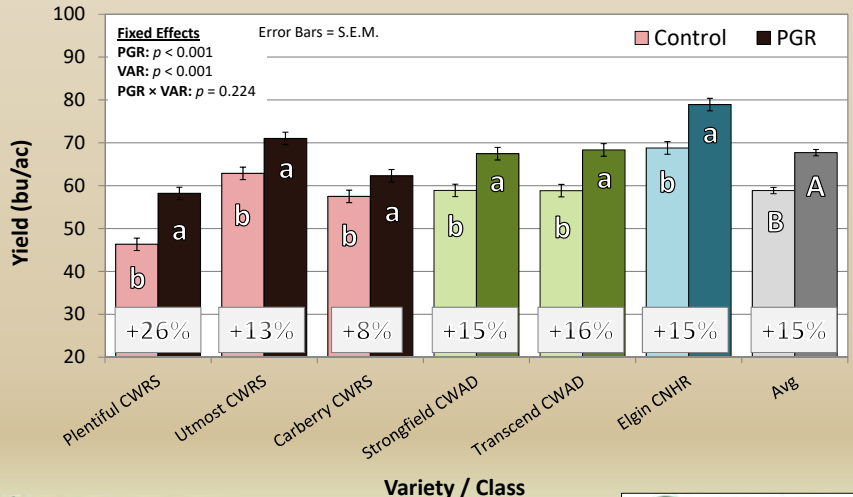


IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

BELCHIM CROP PROTECTION CANADA

PGR x Variety – IH 2016 (wet)
Effects on Grain Yield

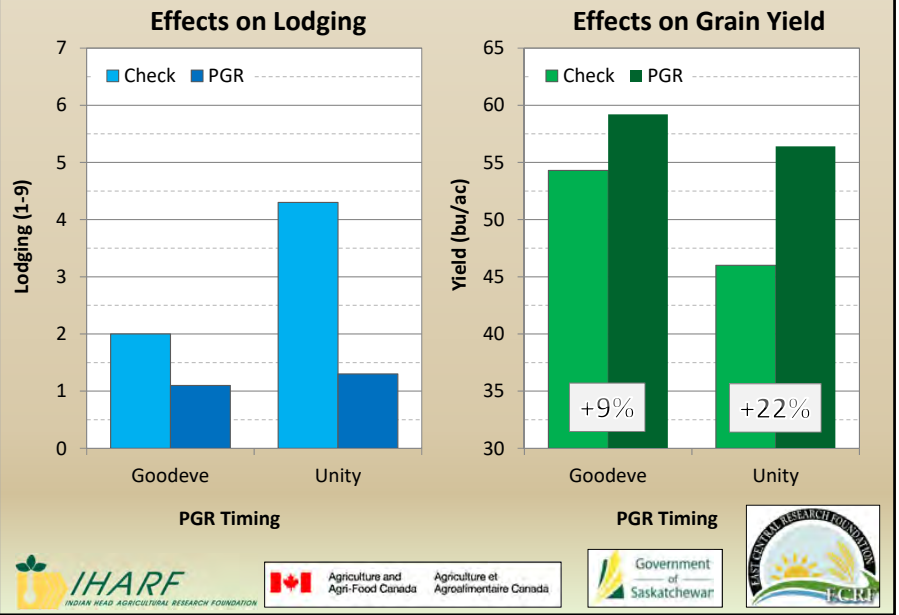


IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

BELCHIM CROP PROTECTION CANADA

PGR × Variety at Yorkton 2015



Production Challenge #2: Protein

March 12-13, 2019 SWDC Think Wheat

4R Nitrogen Management in Wheat

Indian Head 2017

Objectives: To demonstrate crop response to varying rates of N along with different forms, timing & placement relative to side-banded, untreated urea

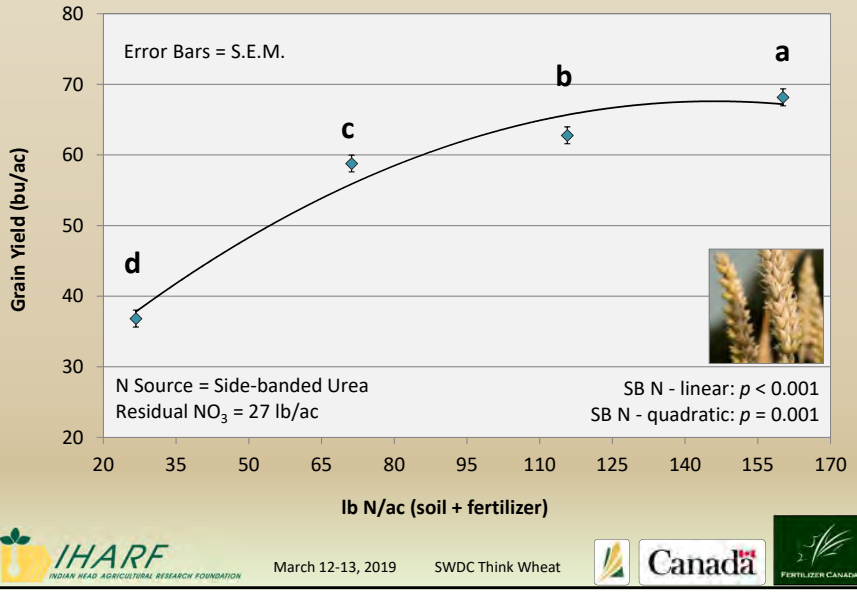
#	Form	Timing / Placement	Rate *
1	N/A	N/A	N/A
2	Urea (untreated)	Side-band (during seeding)	0.5x
3	Urea	Side-band	1.0x
4	Urea	Side-band	1.5x
5	Urea	Spring surface broadcast (pre-seed)	1.0x
6	Urea Ammonium-Nitrate (UAN)	Spring surface dribble-band	1.0x
7	Agrotain® (AT)	Spring surface broadcast	1.0x
8	SuperUrea® (SU)	Spring surface broadcast	1.0x
9	Urea / Urea	50:50 Split (side-band : in-crop)	1.0x
10	Urea / UAN	50:50 Split	1.0x
11	Urea / Agrotain®	50:50 Split	1.0x
12	Urea / SuperUrea®	50:50 Split	1.0x

* 1x = 116lb N/ac (soil + fertilizer)

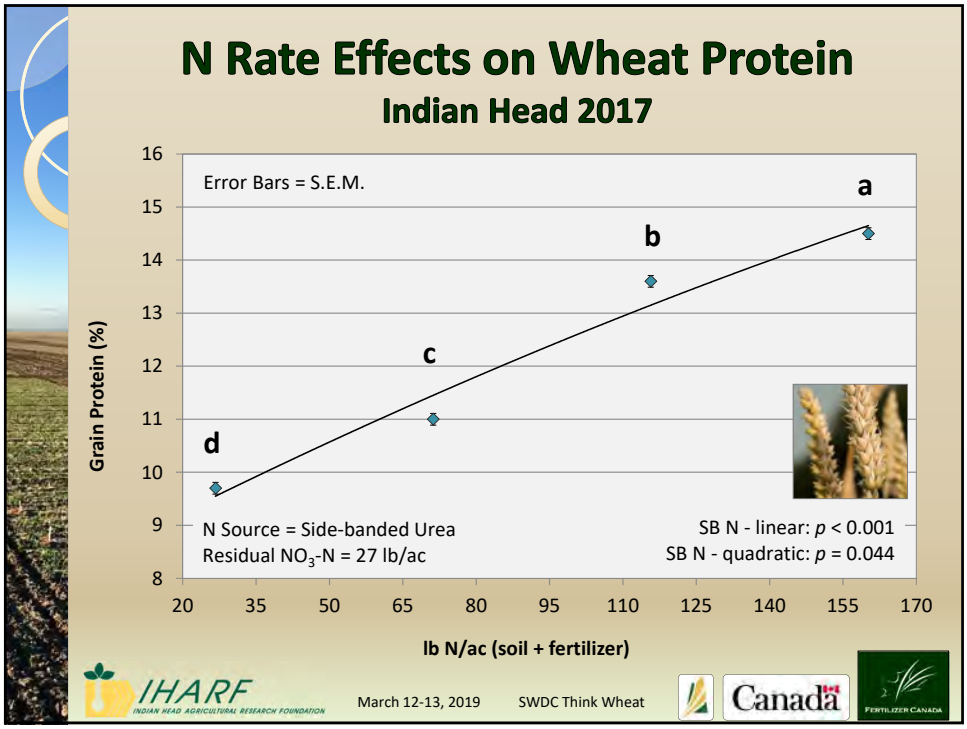
IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION March 12-13, 2019 SWDC Think Wheat

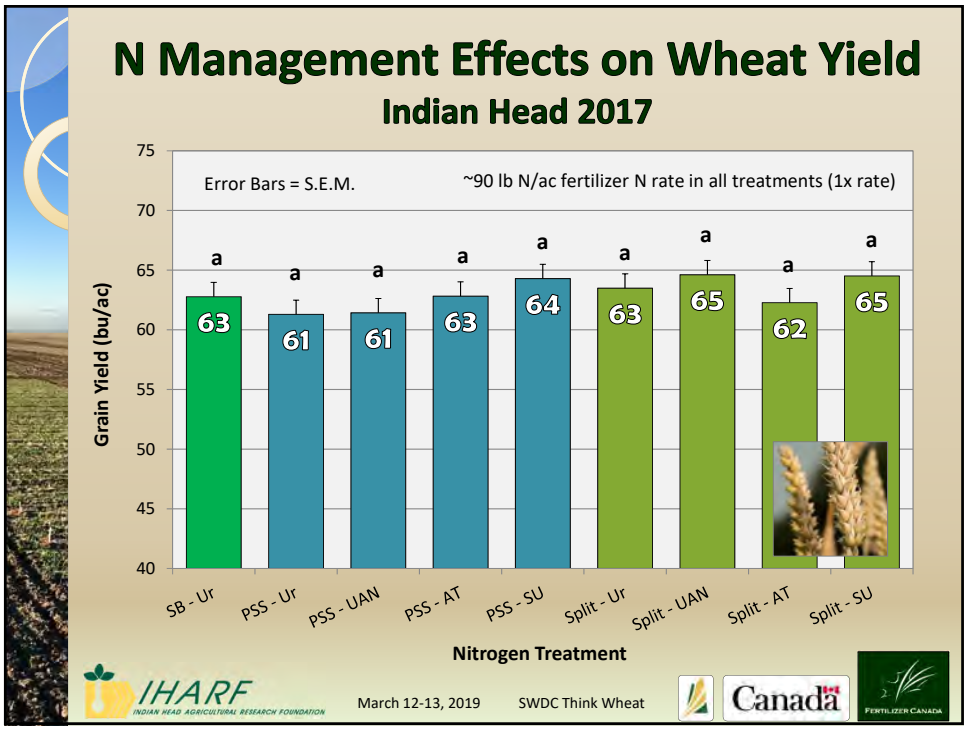
N Rate Effects on Wheat Yield

Indian Head 2017



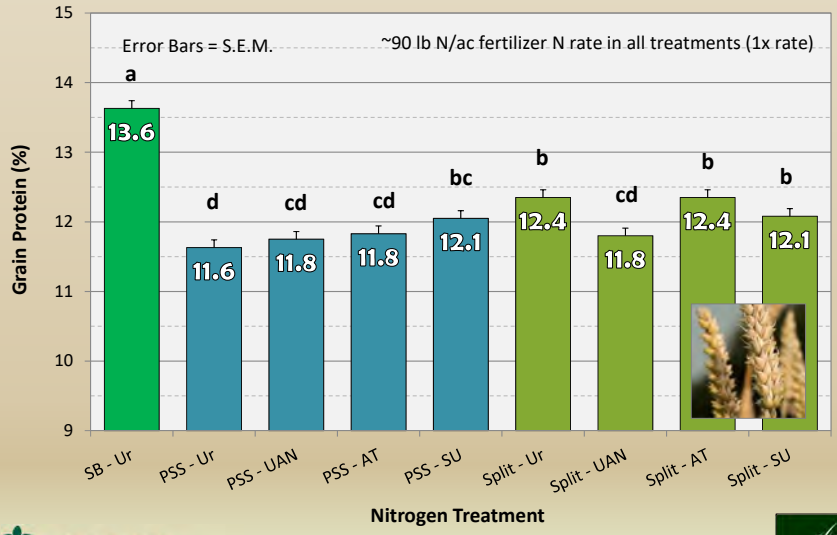
IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION March 12-13, 2019 SWDC Think Wheat


N Rate Effects on Wheat Protein
Indian Head 2017
Error Bars = S.E.M.
a
b
c
d
Grain Protein (%)
16
15
14
13
12
11
10
9
8
20
35
50
65
80
95
110
125
140
155
170
lb N/ac (soil + fertilizer)
N Source = Side-banded Urea
Residual NO3-N = 27 lb/ac
SB N - linear: p < 0.001
SB N - quadratic: p = 0.044
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
Canada
FERTILIZER CANADA


N Management Effects on Wheat Yield
Indian Head 2017
Error Bars = S.E.M.
~90 lb N/ac fertilizer N rate in all treatments (1x rate)
Grain Yield (bu/ac)
75
70
65
60
55
50
45
40
a
a
a
a
a
a
a
a
a
63
61
61
63
64
63
65
62
65
SB - Ur
PSS - Ur
PSS - UAN
PSS - AT
PSS - SU
Split - Ur
Split - UAN
Split - AT
Split - SU
Nitrogen Treatment
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
Canada
FERTILIZER CANADA

N Management Effects on Wheat Protein

Indian Head 2017



IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION March 12-13, 2019 SWDC Think Wheat Canada FERTILIZER CANADA

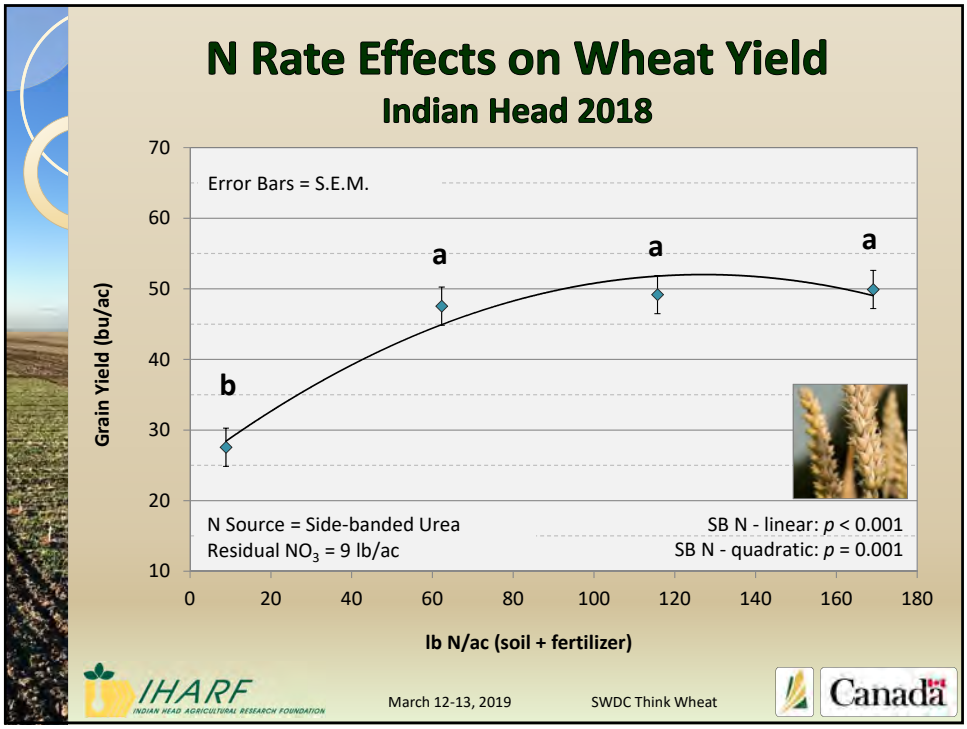
4R N Management in Wheat

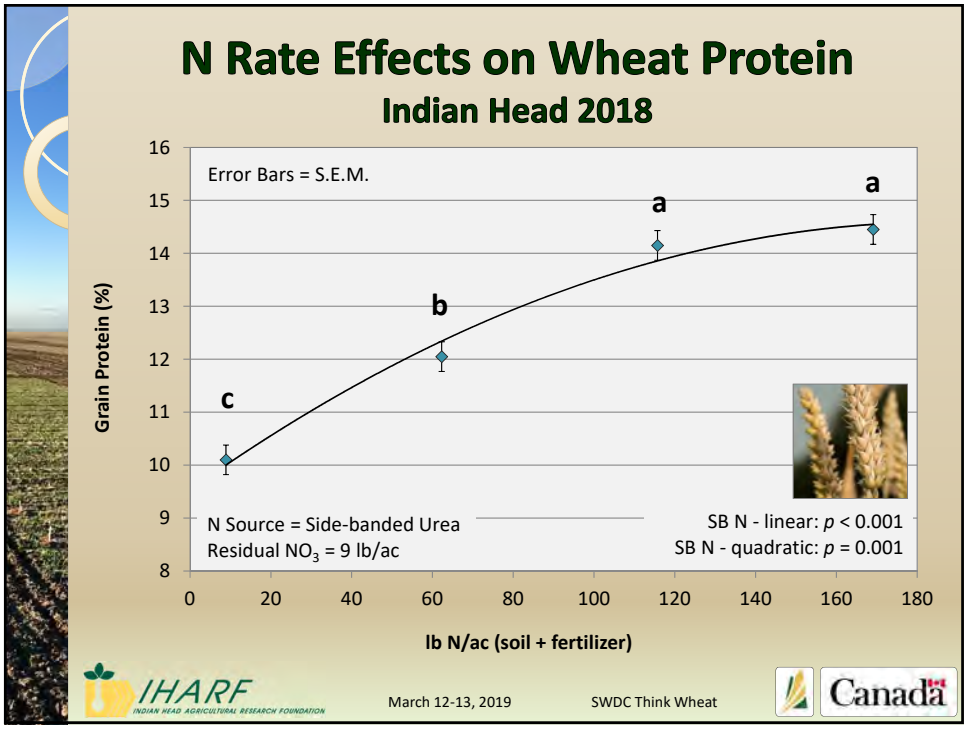
Indian Head 2018

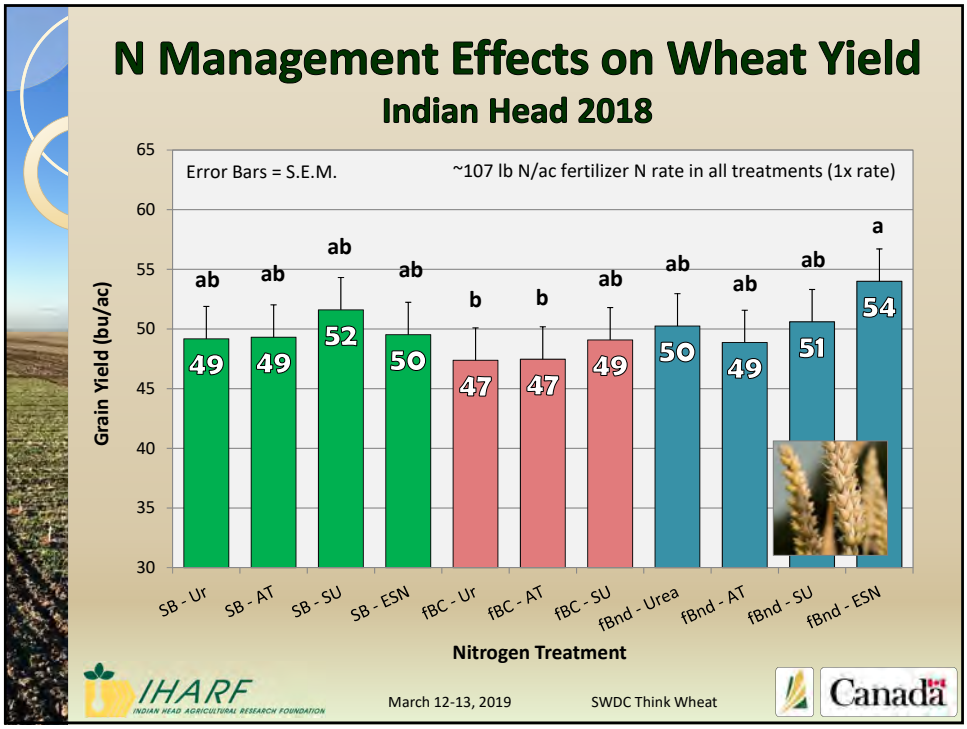
#	Form	Timing / Placement	Rate *
1	N/A	N/A	N/A
2	Urea (untreated)	Side-band (during seeding)	0.5x
3	Urea	Side-band	1.0x
4	Urea	Side-band	1.5x
5	Agrotain® (AT)	Side-band	1.0x
6	SuperUrea® (SU)	Side-band	1.0x
7	ESN® Smart Nitrogen (ESN)	Side-band	1.0x
8	Urea	Fall Surface Broadcast	1.0x
9	Agrotain® (AT)	Fall Surface Broadcast	1.0x
10	SuperUrea® (SU)	Fall Surface Broadcast	1.0x
11	Urea	Fall In-Soil Band	1.0x
12	Agrotain® (AT)	Fall In-Soil Band	1.0x
13	SuperUrea® (SU)	Fall In-Soil Band	1.0x
14	ESN® Smart Nitrogen (ESN)	Fall In-Soil Band	1.0x

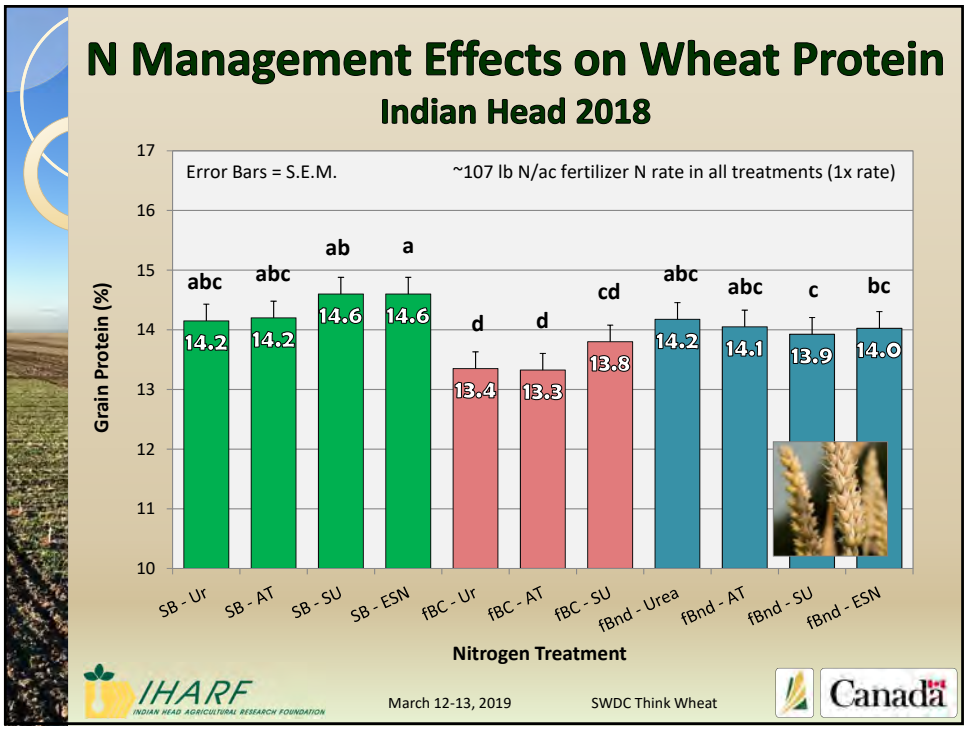
* 1x = 116 lb/ac (soil + fertilizer) for wheat

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION March 12-13, 2019 SWDC Think Wheat Canada


N Rate Effects on Wheat Yield
Indian Head 2018
Error Bars = S.E.M.
Grain Yield (bu/ac)
70
60
50
40
30
20
10
a
a
a
b
N Source = Side-banded Urea
Residual NO3 = 9 lb/ac
SB N - linear: p < 0.001
SB N - quadratic: p = 0.001
0
20
40
60
80
100
120
140
160
180
lb N/ac (soil + fertilizer)
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
Canada


N Rate Effects on Wheat Protein
Indian Head 2018
Error Bars = S.E.M.
Grain Protein (%)
16
15
14
13
12
11
10
9
8
a
a
b
c
N Source = Side-banded Urea
Residual NO3 = 9 lb/ac
SB N - linear: p < 0.001
SB N - quadratic: p = 0.001
0
20
40
60
80
100
120
140
160
180
lb N/ac (soil + fertilizer)
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
Canada


N Management Effects on Wheat Yield
Indian Head 2018
Error Bars = S.E.M.
~107 lb N/ac fertilizer N rate in all treatments (1x rate)
Grain Yield (bu/ac)
65
60
55
50
45
40
35
30
ab
ab
ab
ab
b
b
ab
ab
ab
ab
a
49
49
52
50
47
47
49
50
49
51
54
SB - Ur
SB - AT
SB - SU
SB - ESN
fBC - Ur
fBC - AT
fBC - SU
fBnd - Urea
fBnd - AT
fBnd - SU
fBnd - ESN
Nitrogen Treatment
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
Canada


N Management Effects on Wheat Protein
Indian Head 2018
Error Bars = S.E.M.
~107 lb N/ac fertilizer N rate in all treatments (1x rate)
Grain Protein (%)
17
16
15
14
13
12
11
10
abc
abc
ab
a
d
d
cd
abc
abc
c
bc
14.2
14.2
14.6
14.6
13.4
13.3
13.8
14.2
14.1
13.9
14.0
SB - Ur
SB - AT
SB - SU
SB - ESN
fBC - Ur
fBC - AT
fBC - SU
fBnd - Urea
fBnd - AT
fBnd - SU
fBnd - ESN
Nitrogen Treatment
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
Canada

Increasing Wheat Protein with In-Crop UAN Applications (ADOPT/SWDC)

PROJECT LEAD: MIKE HALL, ECRF, YORKTON, SK

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019

Sask Wheat DEVELOPMENT COMMISSION

Canada

Increasing Wheat Protein with In-Crop UAN Applications (2018)

Objective: To demonstrate the potential for late-season applications of UAN to increase wheat protein relative to side-banding the same amounts during seeding

#	Side-band Urea	In-Crop UAN	UAN Placement*	UAN Timing
1	70 lb N/ac	nil	n/a	n/a
2	100 lb N/ac	nil	n/a	n/a
3	130 lb N/ac	nil	n/a	n/a
4	70 lb N/ac	30 lb/ac	surface dribble band	GS36-39 (pre-boot)
5	100 lb N/ac	30 lb/ac	surface dribble band	GS36-39
6	70 lb N/ac	30 lb/ac	foliar spray (flat fan)	GS65-71 (post-anthesis)
7	100 lb N/ac	30 lb/ac	foliar spray	GS65-71
8	70 lb N/ac	30 lb/ac	surface dribble band	GS65-71
9	100 lb N/ac	30 lb/ac	surface dribble band	GS65-71

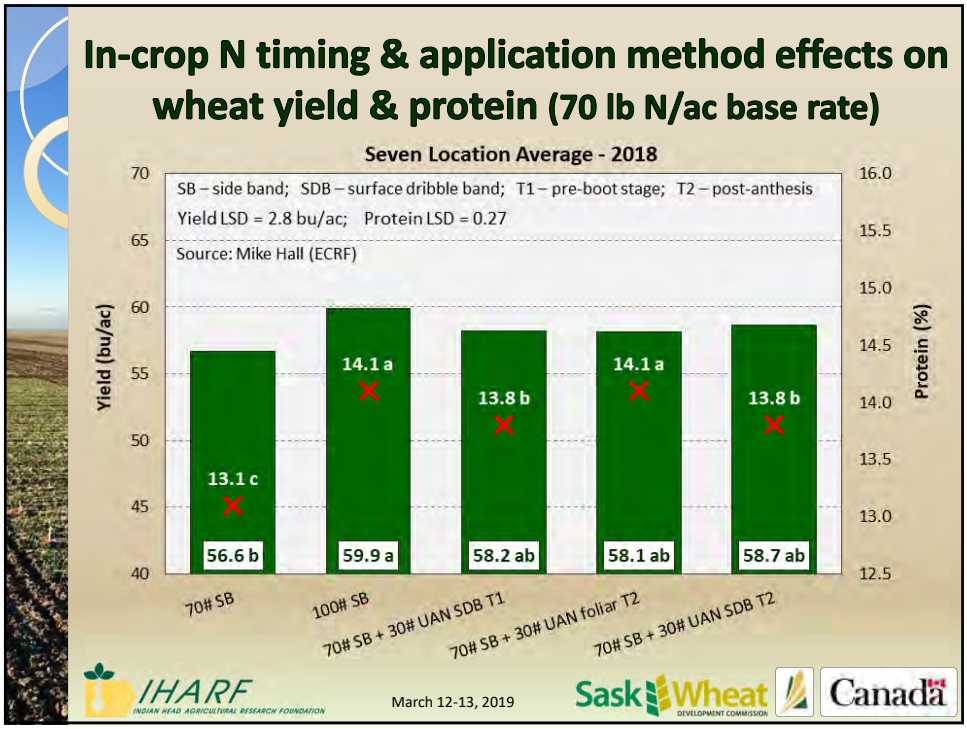
*In-crop UAN was diluted 1:1 with water & the application rate was 20 U.S. gal/ac

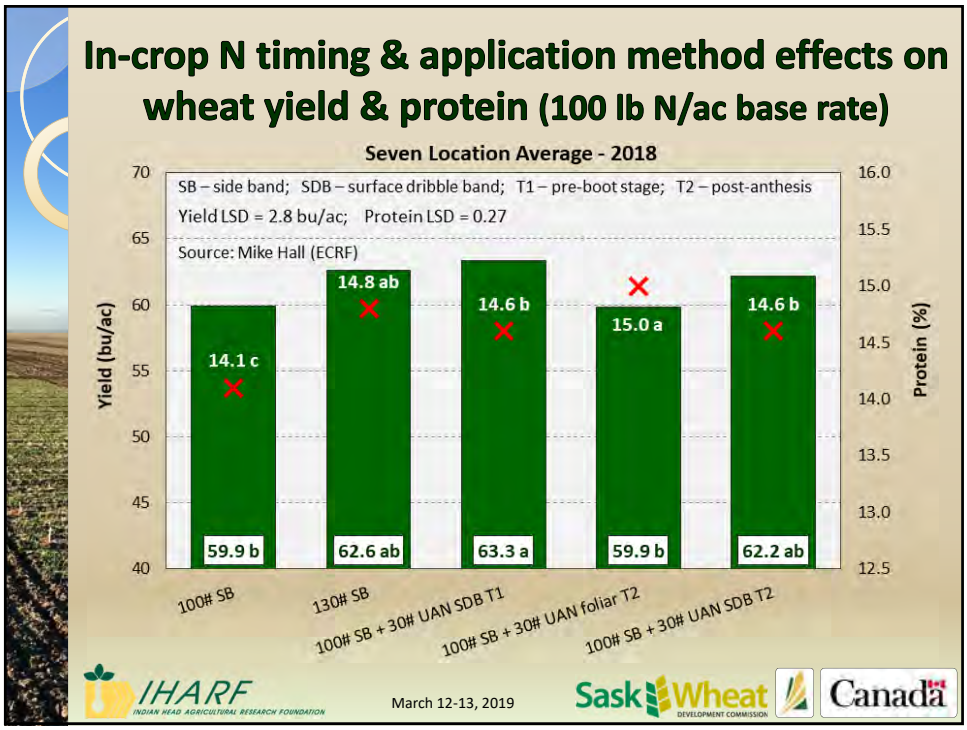
IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

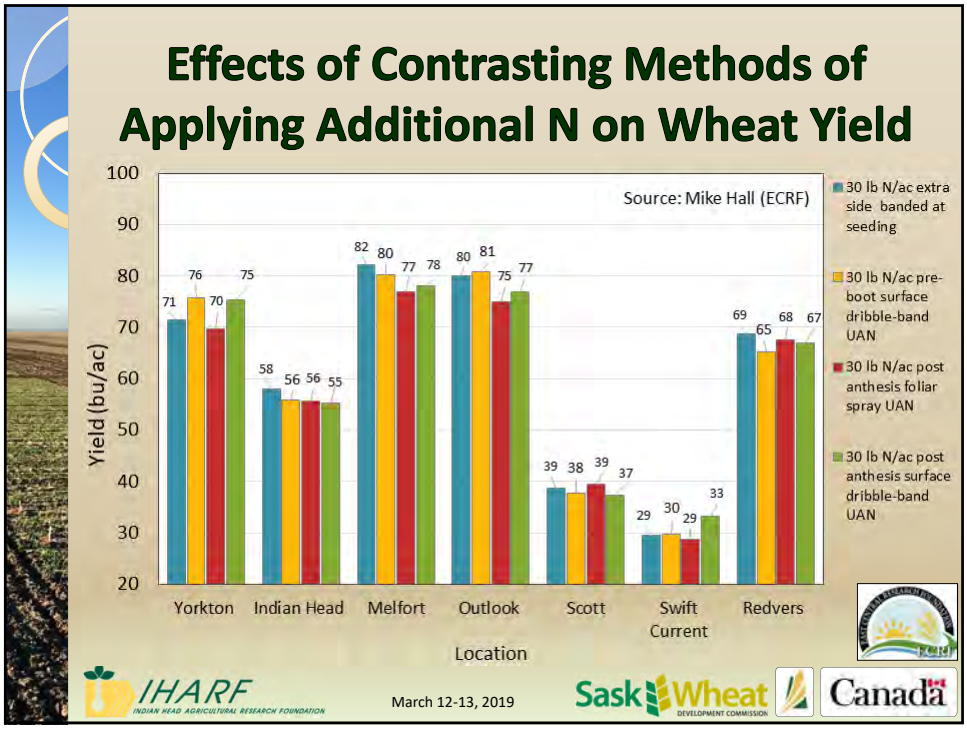
March 12-13, 2019

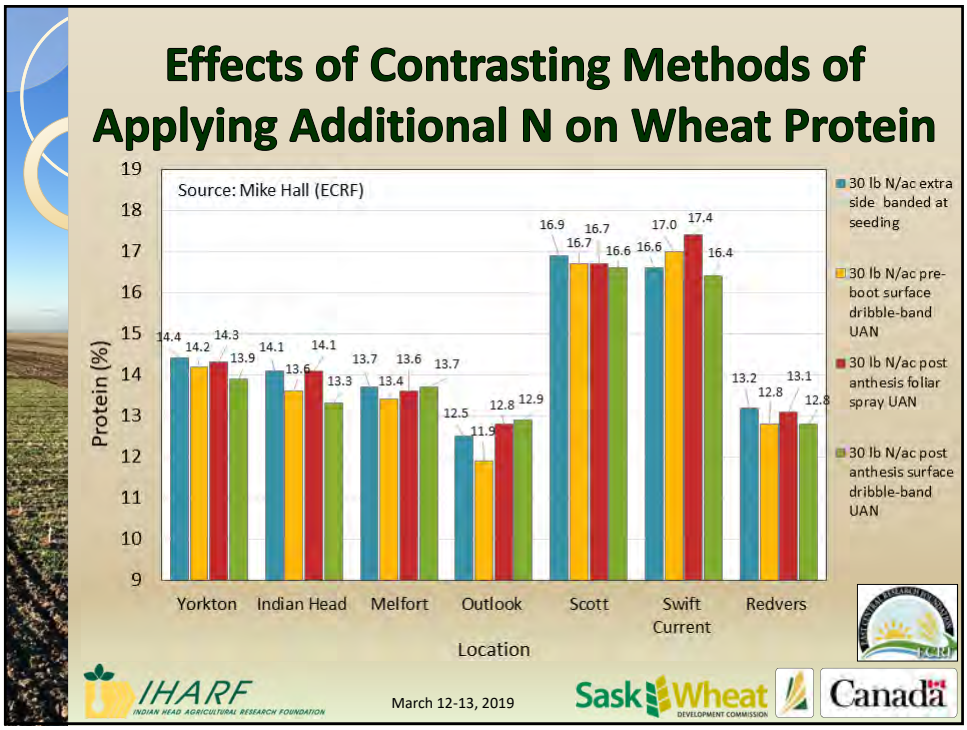
Sask Wheat DEVELOPMENT COMMISSION

Canada


In-crop N timing & application method effects on wheat yield & protein (70 lb N/ac base rate)
Seven Location Average - 2018
SB – side band; SDB – surface dribble band; T1 – pre-boot stage; T2 – post-anthesis
Yield LSD = 2.8 bu/ac; Protein LSD = 0.27
Source: Mike Hall (ECRF)
Yield (bu/ac)
Protein (%)
13.1 c
14.1 a
13.8 b
14.1 a
13.8 b
56.6 b
59.9 a
58.2 ab
58.1 ab
58.7 ab
70# SB
100# SB
70# SB + 30# UAN SDB T1
70# SB + 30# UAN foliar T2
70# SB + 30# UAN SDB T2
IHARF
March 12-13, 2019
Sask Wheat
Canada


In-crop N timing & application method effects on wheat yield & protein (100 lb N/ac base rate)
Seven Location Average - 2018
SB – side band; SDB – surface dribble band; T1 – pre-boot stage; T2 – post-anthesis
Yield LSD = 2.8 bu/ac; Protein LSD = 0.27
Source: Mike Hall (ECRF)
Yield (bu/ac)
Protein (%)
14.1 c
14.8 ab
14.6 b
15.0 a
14.6 b
59.9 b
62.6 ab
63.3 a
59.9 b
62.2 ab
100# SB
130# SB
100# SB + 30# UAN SDB T1
100# SB + 30# UAN foliar T2
100# SB + 30# UAN SDB T2
IHARF
March 12-13, 2019
Sask Wheat
Canada


Effects of Contrasting Methods of Applying Additional N on Wheat Yield
Source: Mike Hall (ECRF)
Yield (bu/ac)
100
90
80
70
60
50
40
30
20
71 76 70 75
58 56 56 55
82 80 77 78
80 81 75 77
39 38 39 37
29 30 29 33
69 65 68 67
Yorkton
Indian Head
Melfort
Outlook
Scott
Swift Current
Redvers
Location
30 lb N/ac extra side banded at seeding
30 lb N/ac pre-boot surface dribble-band UAN
30 lb N/ac post anthesis foliar spray UAN
30 lb N/ac post anthesis surface dribble-band UAN
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
Sask Wheat
DEVELOPMENT COMMISSION
Canada

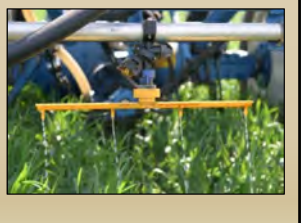

Effects of Contrasting Methods of Applying Additional N on Wheat Protein
Source: Mike Hall (ECRF)
Protein (%)
19
18
17
16
15
14
13
12
11
10
9
14.4 14.2 14.3 13.9
14.1 13.6 14.1 13.3
13.7 13.4 13.6 13.7
12.5 11.9 12.8 12.9
16.9 16.7 16.6
16.6 17.0 17.4 16.4
13.2 12.8 13.1 12.8
Yorkton
Indian Head
Melfort
Outlook
Scott
Swift Current
Redvers
Location
30 lb N/ac extra side banded at seeding
30 lb N/ac pre-boot surface dribble-band UAN
30 lb N/ac post anthesis foliar spray UAN
30 lb N/ac post anthesis surface dribble-band UAN
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
Sask Wheat
DEVELOPMENT COMMISSION
Canada

Effect of In-Crop N Rate & Timing on Durum

Indian Head & Swift Current 2001-03 (B. May – AAFC)

Objectives: To help farmers improve the protein level and quality of durum

#	N at Seeding	Extra N Rate	Extra N Timing
1	nil	Nil	N/A
2	75%	Nil	N/A
3	75%	18 lb N/ac	Seeding (banded urea)
4	75%	36 lb N/ac	Seeding (banded urea)
5	75%	53 lb N/ac	Seeding (banded urea)
6	75%	18 lb N/ac	5 leaf (surface UAN)
7	75%	36 lb N/ac	5 leaf (surface UAN)
8	75%	53 lb N/ac	5 leaf (surface UAN)
9	75%	18 lb N/ac	Flag leaf (surface UAN)
10	75%	36 lb N/ac	Flag leaf (surface UAN)
11	75%	53 lb N/ac	Flag leaf (surface UAN)
12	75%	18 lb N/ac	Anthesis (surface UAN)
13	75%	36 lb N/ac	Anthesis (surface UAN)
14	75%	53 lb N/ac	Anthesis (surface UAN)



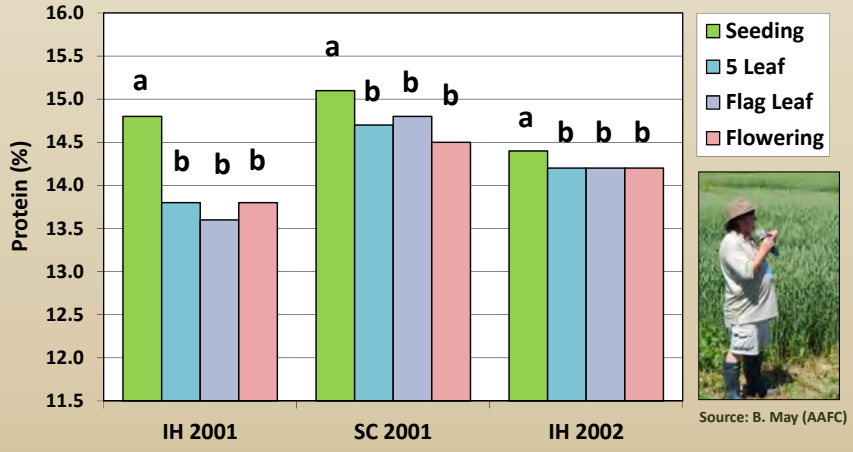
- N treatments tested on each of 4 varieties (AC Avonlea, AC Morse, AC Navigator or Kyle)

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019

Agriculture and Agri Food Canada | Agriculture et Agroalimentaire Canada

N Timing Effects on Durum Protein



Source: B. May (AAFC)

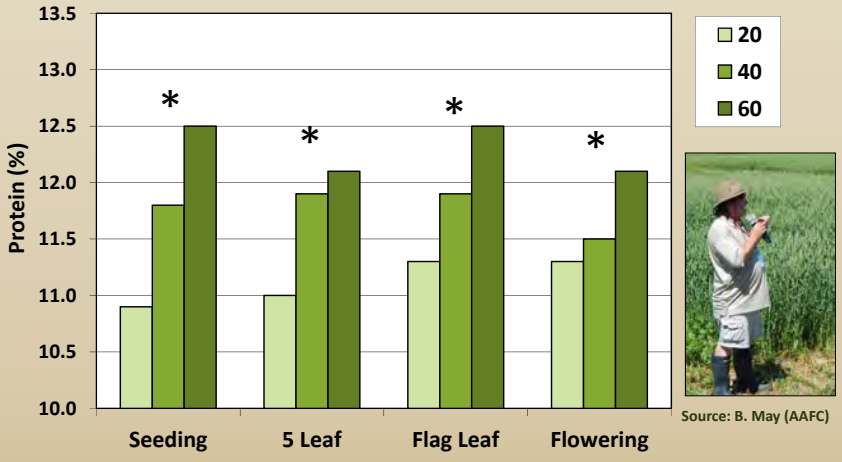
The effect on N timing on protein in **2001(both sites)** & at **Indian Head in 2002**

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019

Agriculture and Agri Food Canada | Agriculture et Agroalimentaire Canada

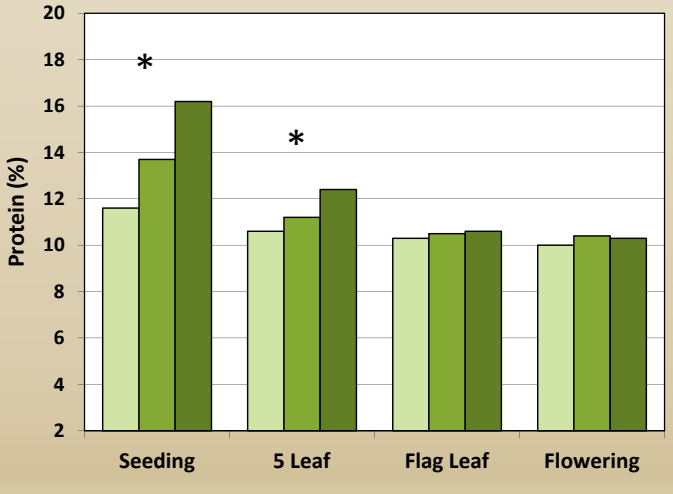
N Rate & Timing Effects on Durum Protein



Source: B. May (AAFC)

The effect of N timing & rate on protein at **Swift Current in 2002**

N Rate & Timing Effects on Durum Protein



Source: B. May (AAFC)

The effect of N timing & rate on protein at **Swift Current in 2003**

ADOPT Wheat Input Demonstration

Indian Head 2018

Objectives: To demonstrate agronomic and economic responses of CWRS wheat to various crop inputs both individually and collectively

#	Name	Seed Trt (no/yes)	Seed Rate (seeds/m^2)	Fertility (lb/ac N-P_2O_5-K_2O-S)	PGR (no/yes)	Fungicide (no/yes)
1	Low Input	No	250	80-18-9-9	No	No
2	Seed-Trt	Yes	250	80-18-9-9	No	No
3	Seed Rate	No	400	80-18-9-9	No	No
4	Fertility	No	250	120-36-18-18	No	No
5	PGR	No	250	80-18-9-9	Yes	No
6	Fungicide	No	250	80-18-9-9	No	Yes
7	High Input	Yes	400	120-36-18-18	Yes	Yes

Data Collected: plants/m^2, heads/m^2, height, lodging, biomass/harvest index, yield, seed size, test weight, protein, fus. damaged kernels

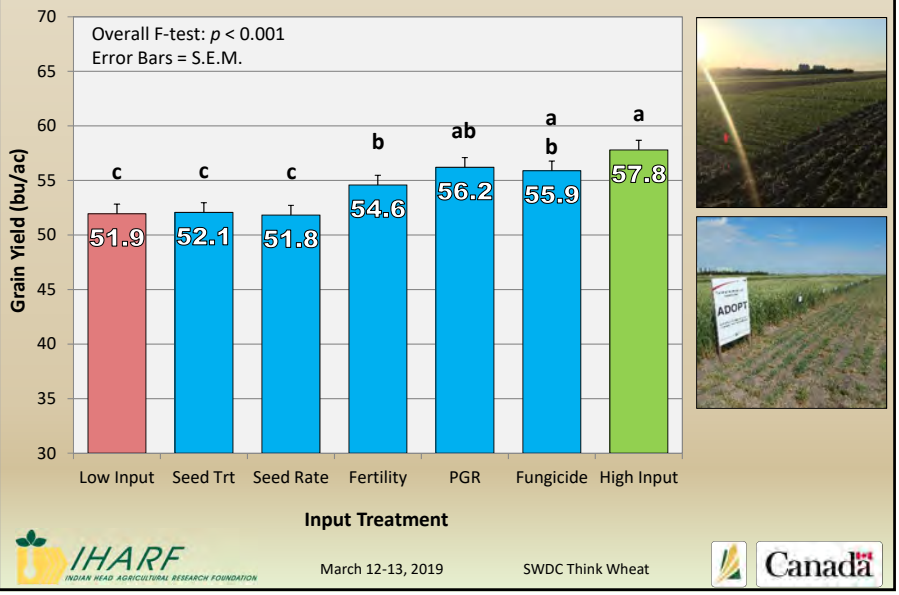
IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

Canada

Input Effects on Wheat Yield

Indian Head 2018



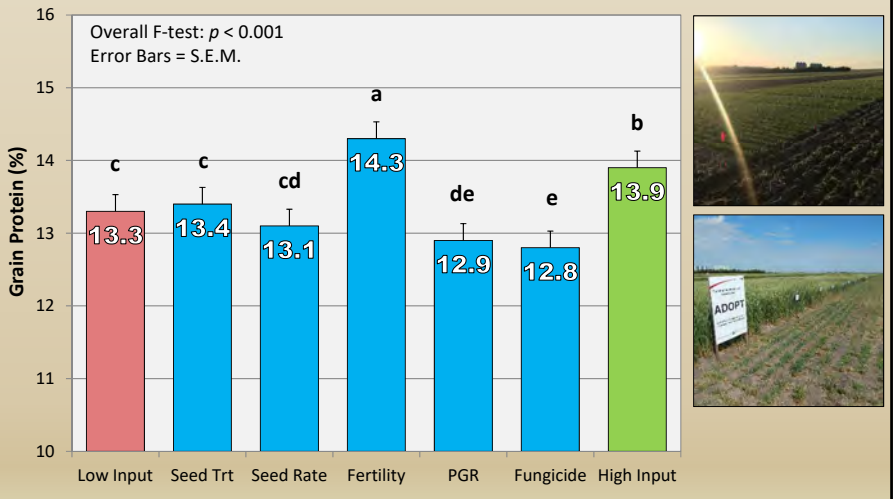
IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

Canada

Input Effects on Wheat Protein

Indian Head 2018



IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

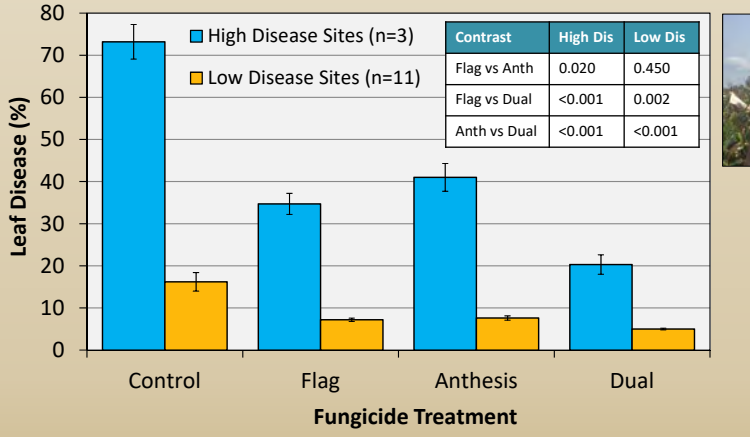
Canada

Production Challenge #3: Disease

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

Fungicide Timing Effects on Leaf Disease of Spring Wheat (Crop Prot 112: 343-349)



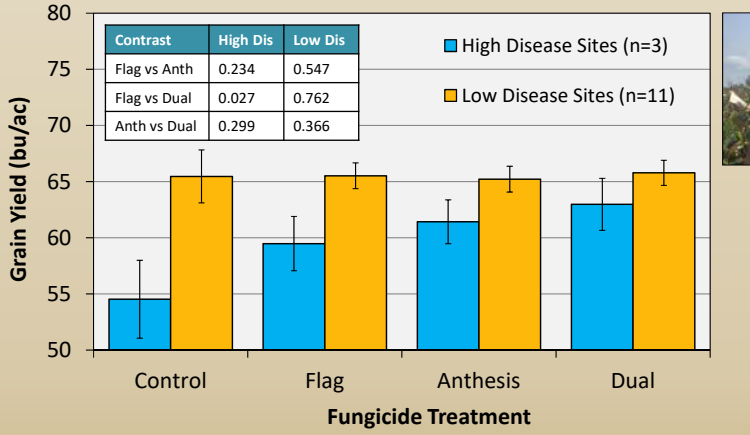
Contrast	High Dis	Low Dis
Flag vs Anth	0.020	0.450
Flag vs Dual	<0.001	0.002
Anth vs Dual	<0.001	<0.001

Adapted from **MacLean et al. 2018.** Fungicide application at anthesis of wheat provides effective control of leaf spotting diseases in western Canada. Crop Prot. **112:** 343-349

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

Fungicide Timing Effects on Grain Yield of Spring Wheat (Crop Prot 112: 343-349)



Contrast	High Dis	Low Dis
Flag vs Anth	0.234	0.547
Flag vs Dual	0.027	0.762
Anth vs Dual	0.299	0.366

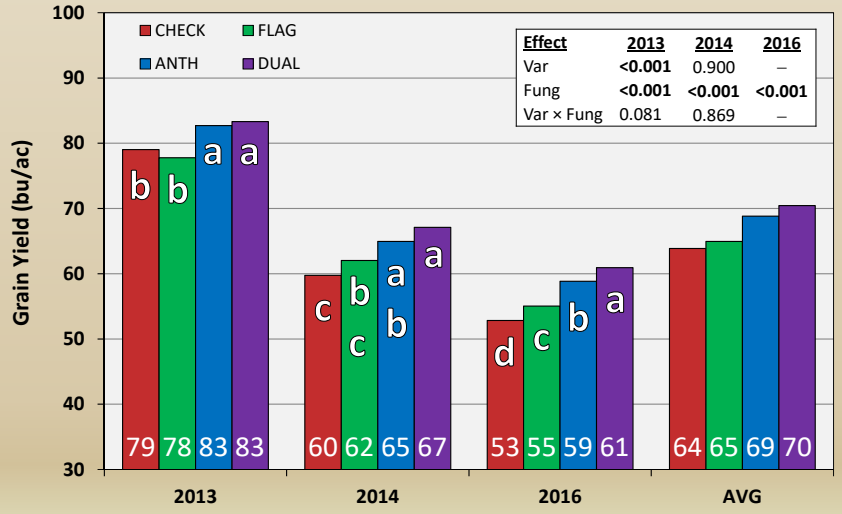
Adapted from **MacLean et al. 2018.** Fungicide application at anthesis of wheat provides effective control of leaf spotting diseases in western Canada. Crop Prot. **112:** 343-349

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

Fungicide Timing/Product Effects on Yield

Indian Head 2013, 2014 & 2016



Effect	2013	2014	2016
Var	**<0.001**	0.900	–
Fung	**<0.001**	**<0.001**	**<0.001**
Var × Fung	0.081	0.869	–

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

Canada

Seed Rates & Fungicides to Manage FHB

Indian Head 2015

Objectives: To demonstrate the effects of seeding rates and foliar fungicide applications to reduce the impacts of FHB on durum yield & quality

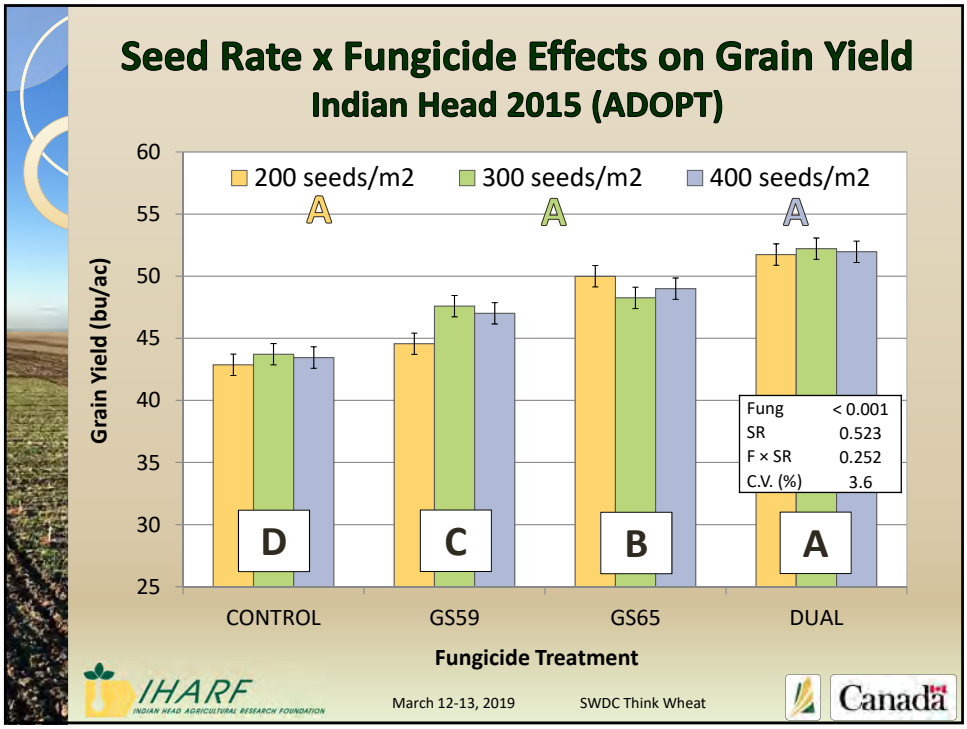
#	Seeding Rate	Foliar Fungicide
1	200 seeds/m^2	None applied
2	200 seeds/m^2	Prosaro at GS59 (early heading)
3	200 seeds/m^2	Prosaro at GS65 (anthesis)
4	200 seeds/m^2	Dual (fungicide applied at both stages)
5	300 seeds/m^2	None applied
6	300 seeds/m^2	Prosaro at GS59 (early heading)
7	300 seeds/m^2	Prosaro at GS65 (anthesis)
8	300 seeds/m^2	Dual (fungicide applied at both stages)
9	400 seeds/m^2	None applied
10	400 seeds/m^2	Prosaro at GS59 (early heading)
11	400 seeds/m^2	Prosaro at GS65 (anthesis)
12	400 seeds/m^2	Dual (fungicide applied at both stages)

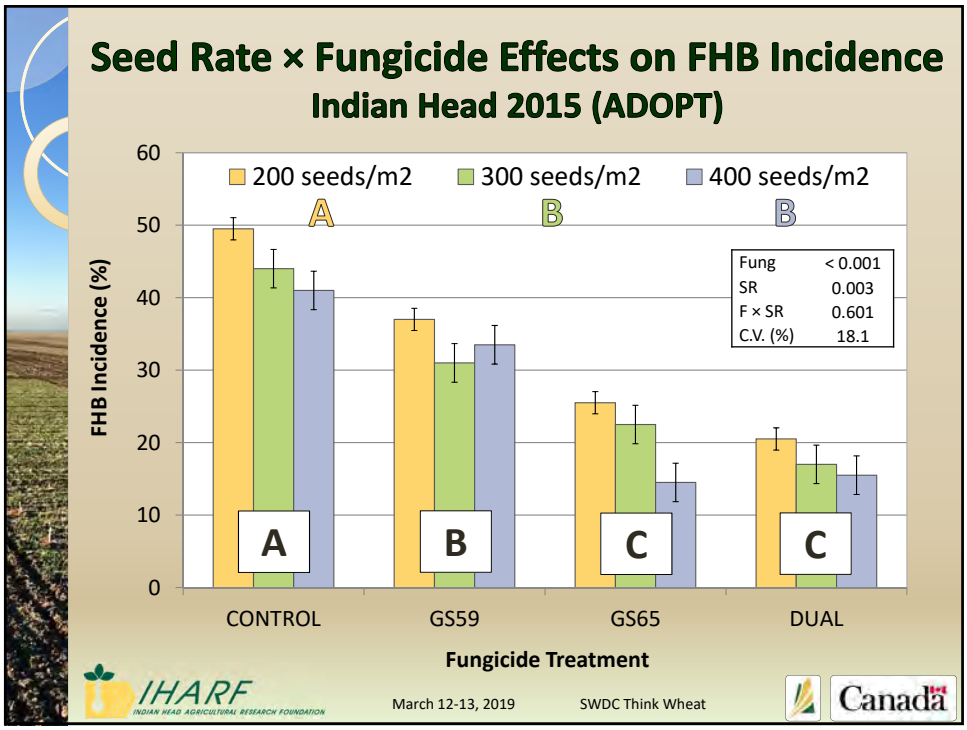
* No flag-leaf fungicide applied in any treatments

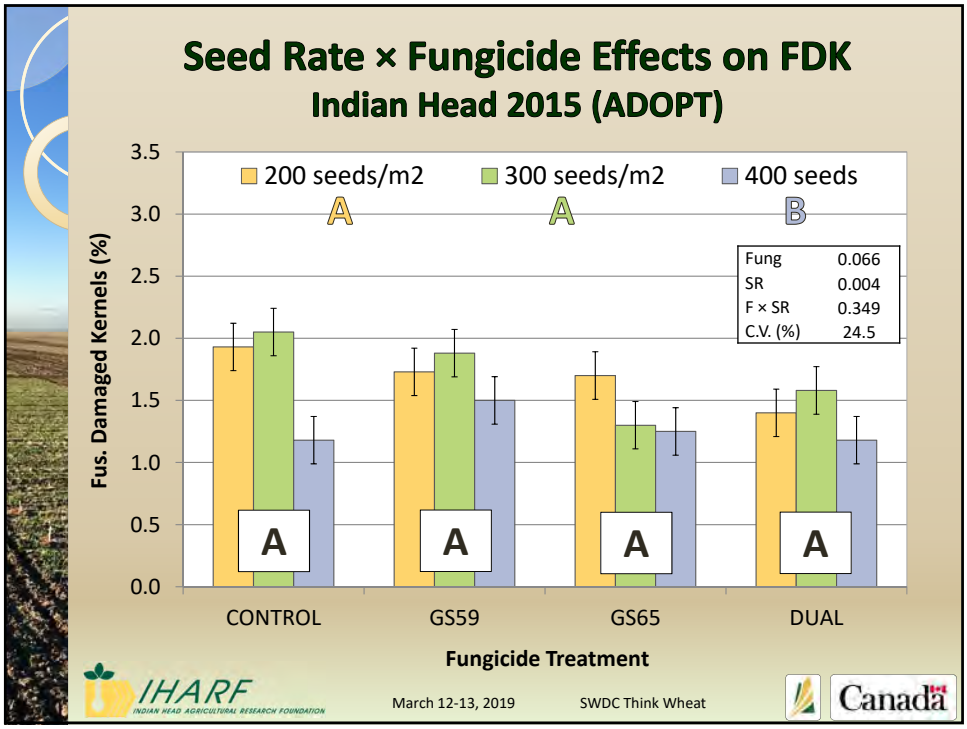
IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

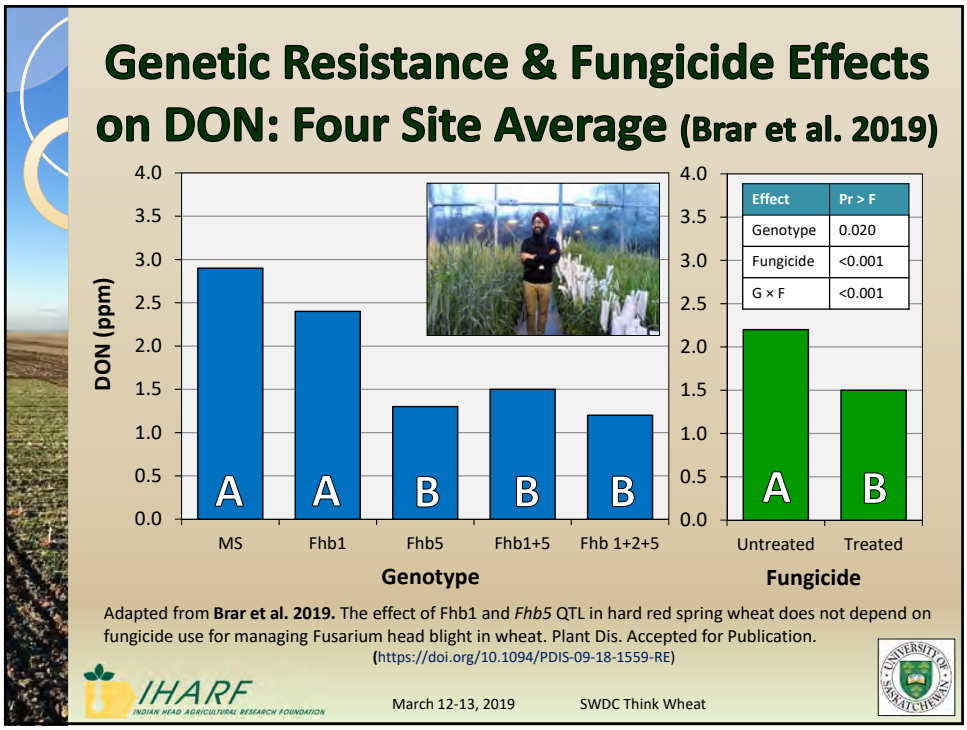
March 12-13, 2019 SWDC Think Wheat

Canada

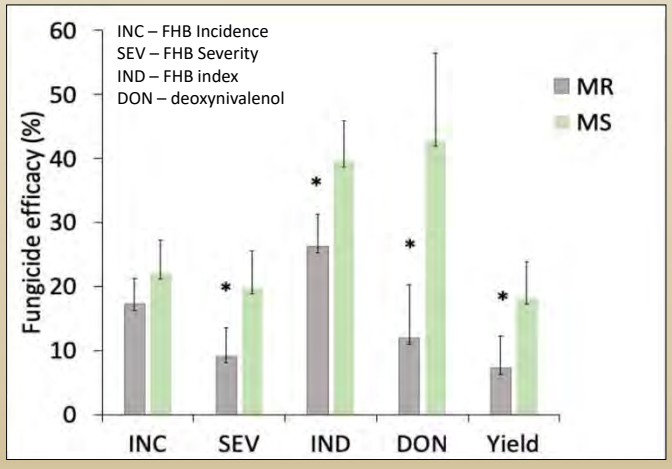

Seed Rate x Fungicide Effects on Grain Yield
Indian Head 2015 (ADOPT)
200 seeds/m2
300 seeds/m2
400 seeds/m2
Grain Yield (bu/ac)
60
55
50
45
40
35
30
25
A
A
A
D
C
B
A
Fung < 0.001
SR 0.523
F × SR 0.252
C.V. (%) 3.6
CONTROL
GS59
GS65
DUAL
Fungicide Treatment
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
Canada


Seed Rate × Fungicide Effects on FHB Incidence
Indian Head 2015 (ADOPT)
200 seeds/m2
300 seeds/m2
400 seeds/m2
FHB Incidence (%)
60
50
40
30
20
10
0
A
B
B
A
B
C
C
Fung < 0.001
SR 0.003
F × SR 0.601
C.V. (%) 18.1
CONTROL
GS59
GS65
DUAL
Fungicide Treatment
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
Canada


Seed Rate × Fungicide Effects on FDK
Indian Head 2015 (ADOPT)
200 seeds/m2
300 seeds/m2
400 seeds
A
A
B
Fung 0.066
SR 0.004
F × SR 0.349
C.V. (%) 24.5
Fus. Damaged Kernels (%)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
A
A
A
A
CONTROL
GS59
GS65
DUAL
Fungicide Treatment
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat
Canada


Genetic Resistance & Fungicide Effects on DON: Four Site Average (Brar et al. 2019)
DON (ppm)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
A
A
B
B
B
MS
Fhb1
Fhb5
Fhb1+5
Fhb 1+2+5
Genotype
Effect
Pr > F
Genotype 0.020
Fungicide <0.001
G × F <0.001
A
B
Untreated
Treated
Fungicide
Adapted from Brar et al. 2019. The effect of Fhb1 and Fhb5 QTL in hard red spring wheat does not depend on fungicide use for managing Fusarium head blight in wheat. Plant Dis. Accepted for Publication.
(https://doi.org/10.1094/PDIS-09-18-1559-RE)
IHARF
INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION
March 12-13, 2019
SWDC Think Wheat

Fungicide Efficacy (%) for MS vs MR CWRS Lines (Brar et al. 2019)



Brar et al. 2019. The effect of Fhb1 and *Fhb5* QTL in hard red spring wheat does not depend on fungicide use for managing Fusarium head blight in wheat. Plant Dis. Accepted for Publication. (https://doi.org/10.1094/PDIS-09-18-1559-RE)

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

Recap: Key Messages

Lodging

- Mostly managed through variety selection but often influences other decisions (i.e. N rate)
- PGR proven to be an effective tool to manage lodging – increases input costs but frequently comes with yield benefits, can improve harvest efficiency, & may give growers more flexibility in variety selection & other management considerations

Protein

- Aside from genetics & environment, primarily affected by nitrogen fertility
- Optimum nitrogen rate for protein is generally higher than that required to maximize yield
- Other inputs that increase yield (i.e fungicide, PGR) can reduce protein if N rate not adjusted
- Haven't seen consistent benefits to EFFs but they can occur, particularly when environment timing/placement methods result in higher potential for loss
- Regardless of form, it is difficult to improve up banding all N beneath the soil surface during seeding under field conditions in Saskatchewan

Disease

- Except when early-season pressure is high, spraying for FHB can provide adequate leaf disease protection, but fungicides alone are not always enough to minimize quality loss
- Higher seed rates can contribute to minimizing quality loss by narrowing infection the window & increasing field uniformity (easier to time, more effective spraying)
- Integrated approach required – start with the best genetic resistance & sound overall agronomy – foliar fungicides are effective but the last line of defense

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019 SWDC Think Wheat

THANK YOU

Chris Holzapfel, MSc PAg
Phone: 306-695-4200
Email: cholzapfel@iharf.ca
Website: www.iharf.ca
Twitter: @CBHolz13, @IHARF_SK

SAVE THE DATE!!!

IHARF Annual Field Day, Tuesday July 16

IHARF INDIAN HEAD AGRICULTURAL RESEARCH FOUNDATION

March 12-13, 2019

Sask Wheat DEVELOPMENT COMMISSION

Canada