

Wheat management in NC/NE Kansas and SE Nebraska

Fertility and fungicides

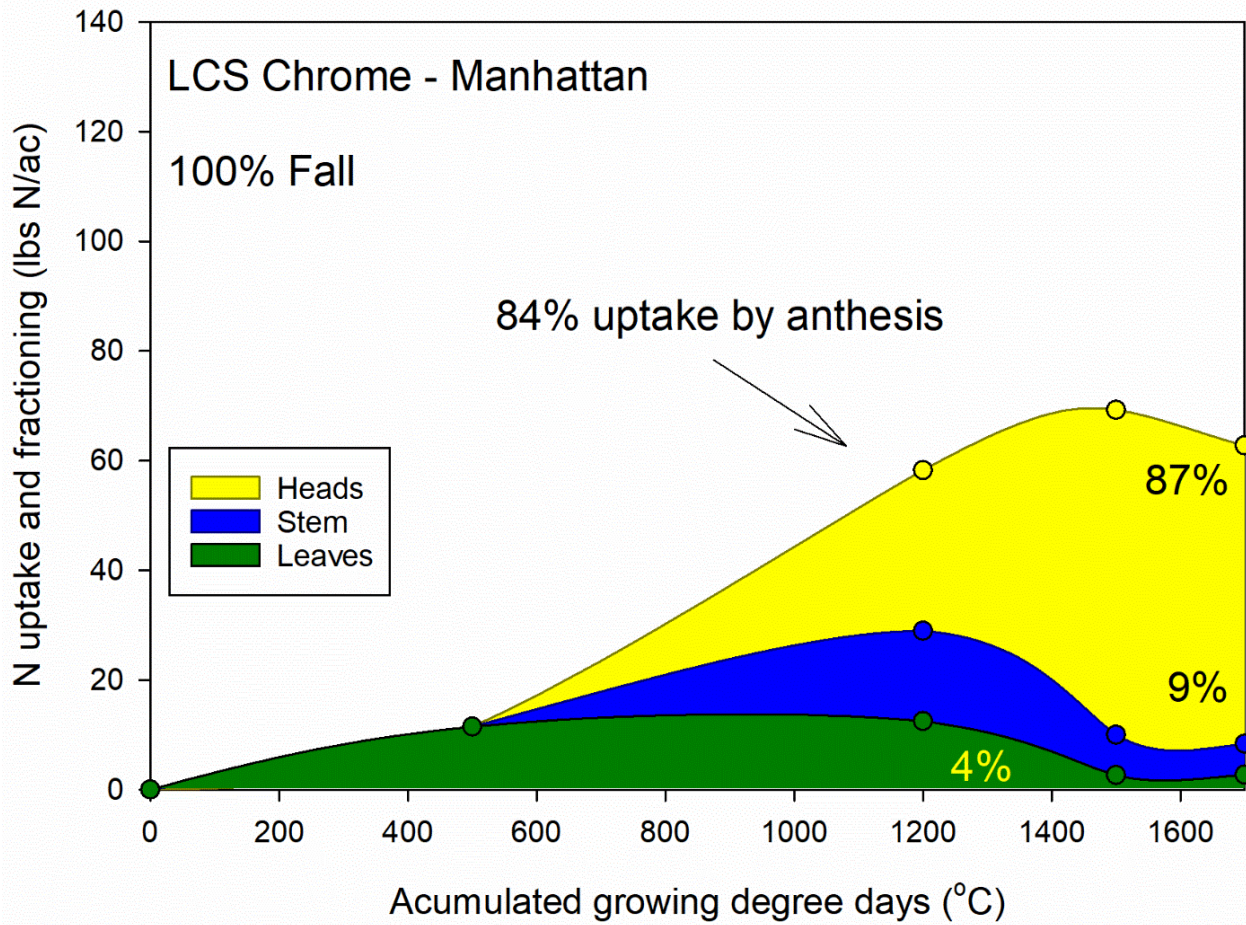
Dr. Romulo Lollato



FERTILITY MANAGEMENT



NITROGEN AND SULFUR



Nitrogen x Protein x Yield relationships (2015-17)

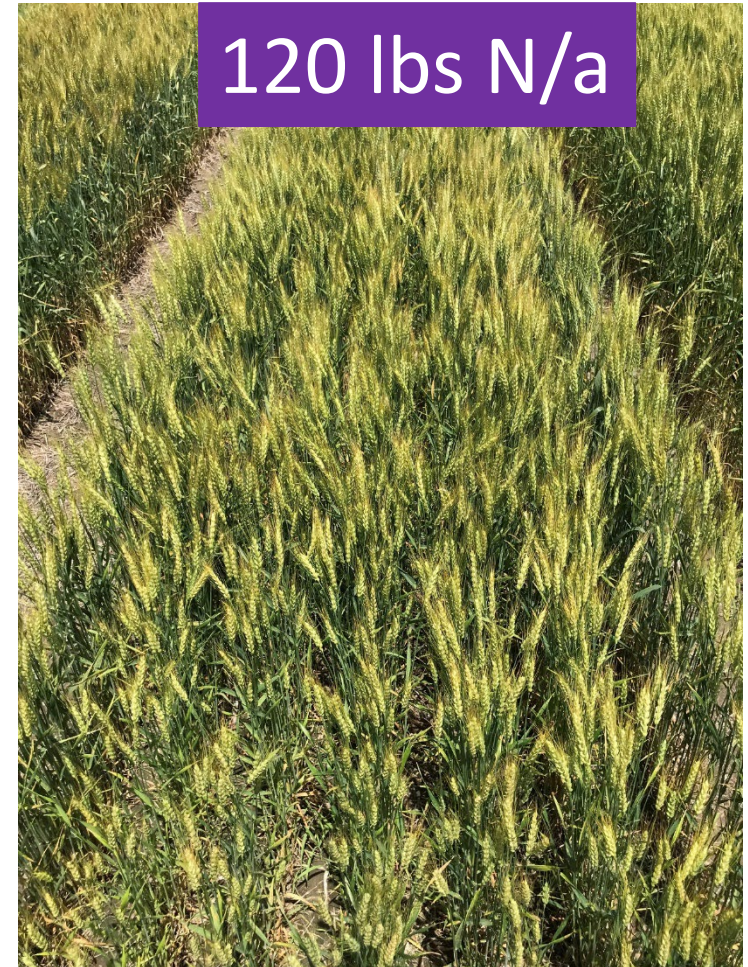
10 locations across KS

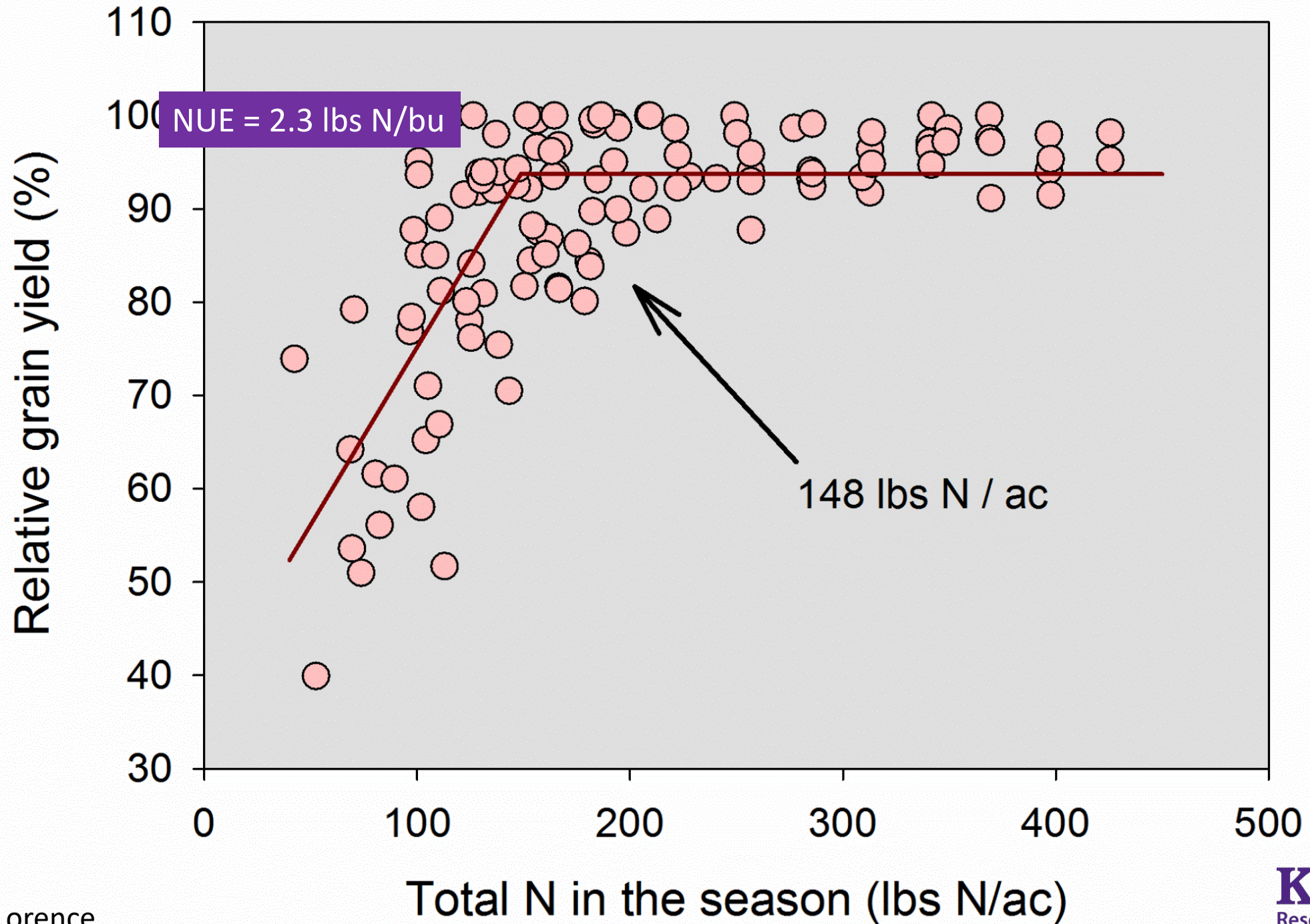
N rate: 0 to 150 lbs N/ac

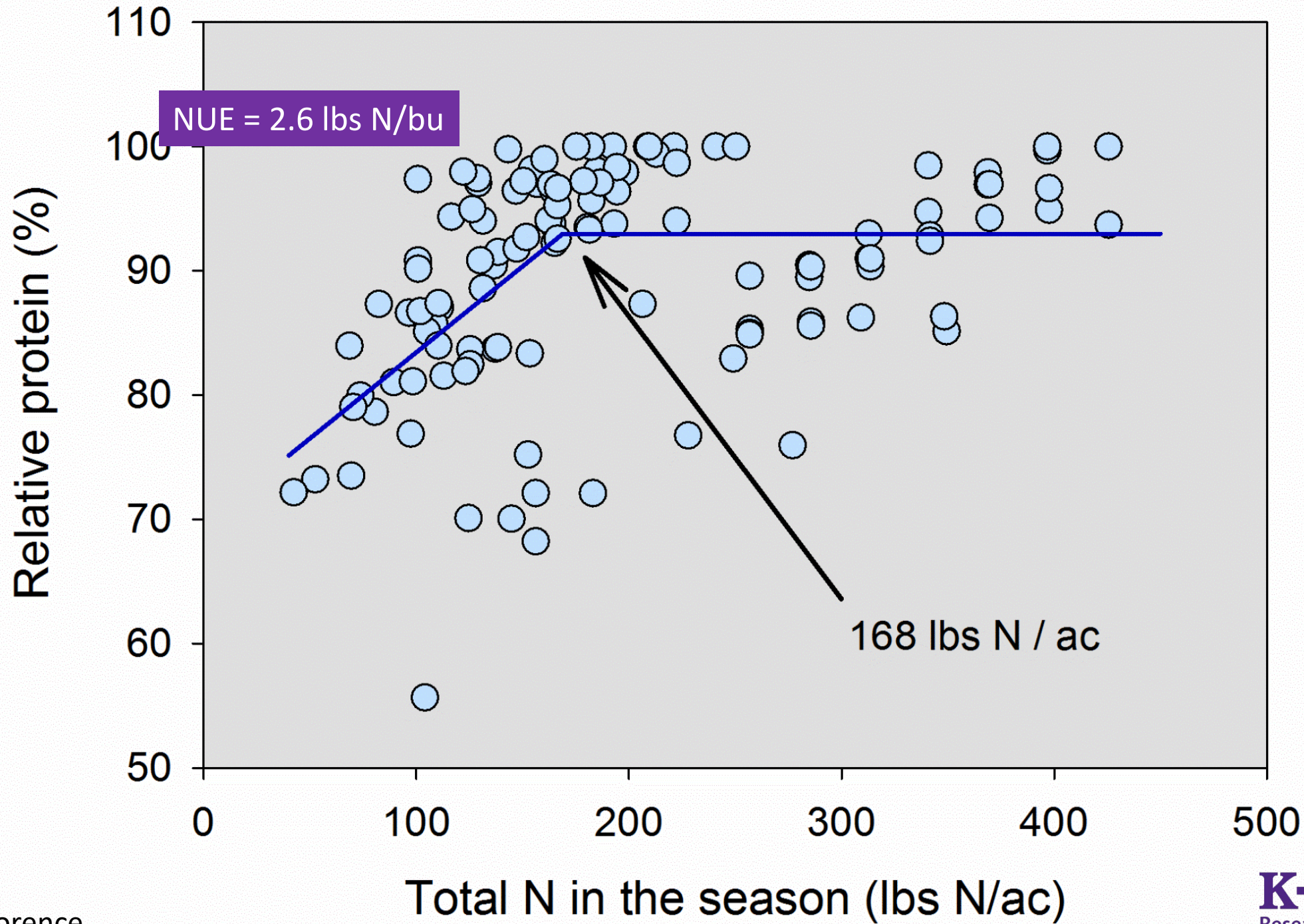
measurements: 464

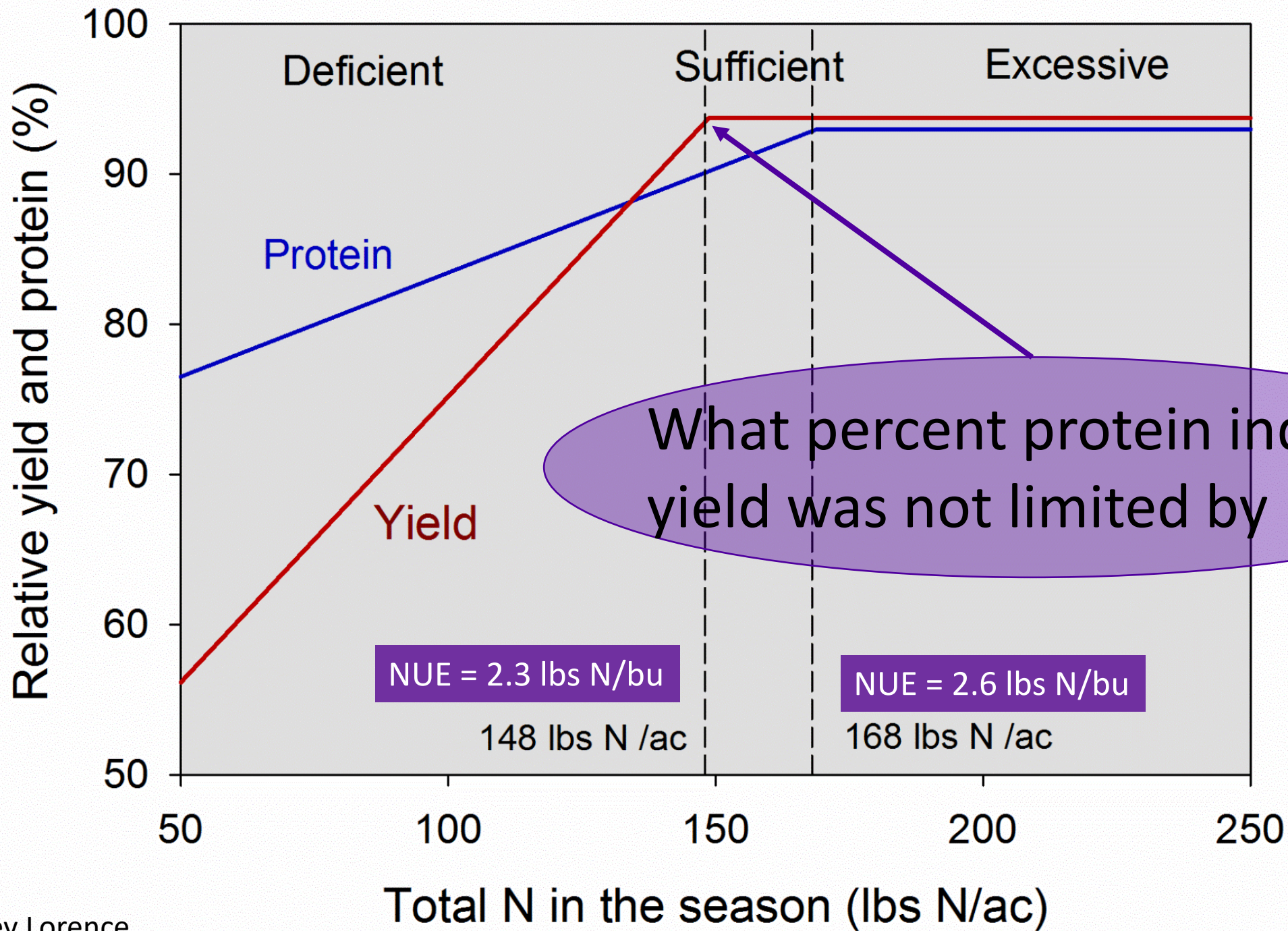
Average yield: 64.5 bu/ac

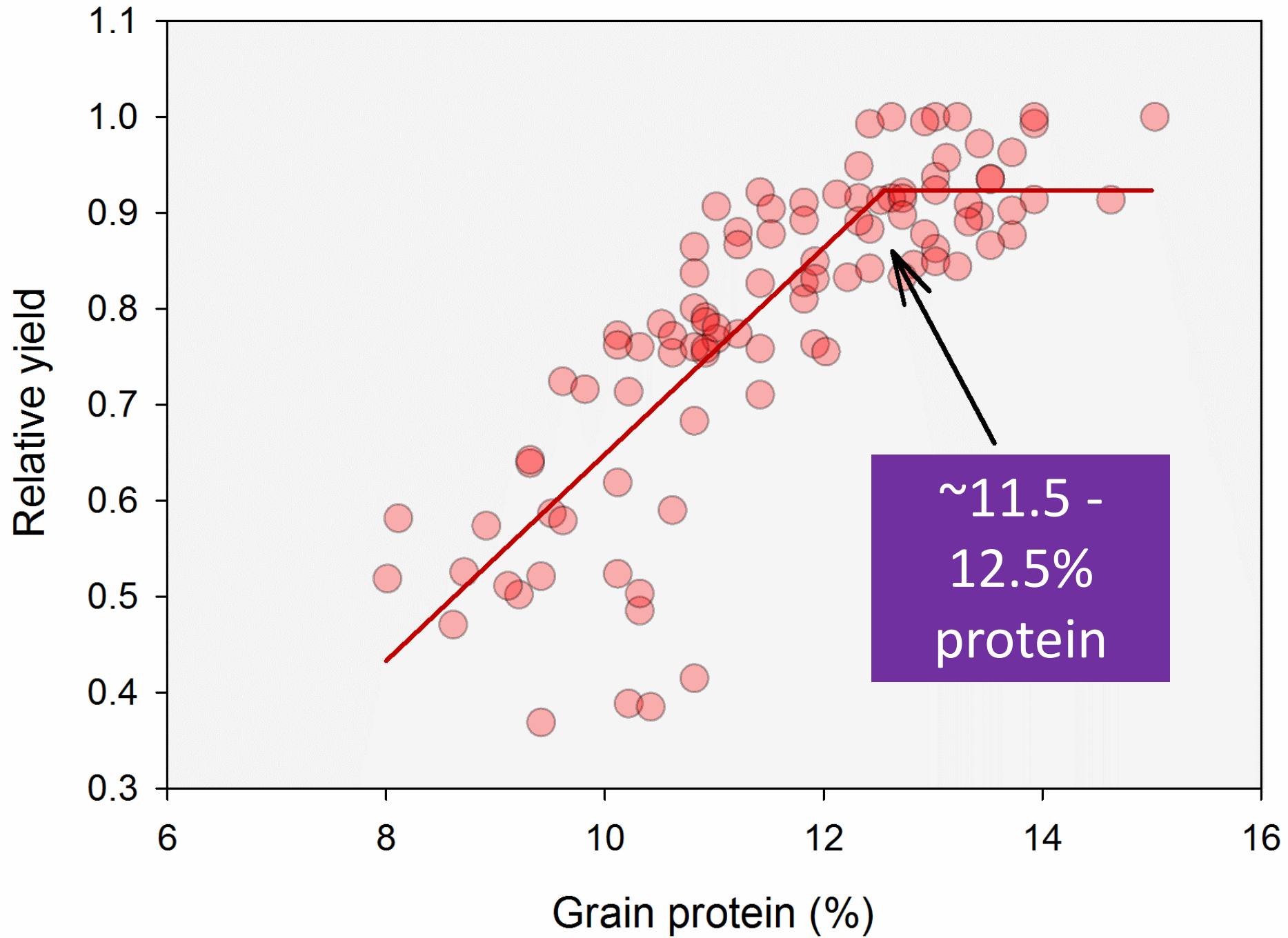
Average protein: 11.6%











N RATE AND INTERACTION WITH FUNGICIDE

Nitrogen rate (0, 30, 60, 90, 120 lb N/a)

With / without fungicide at heading

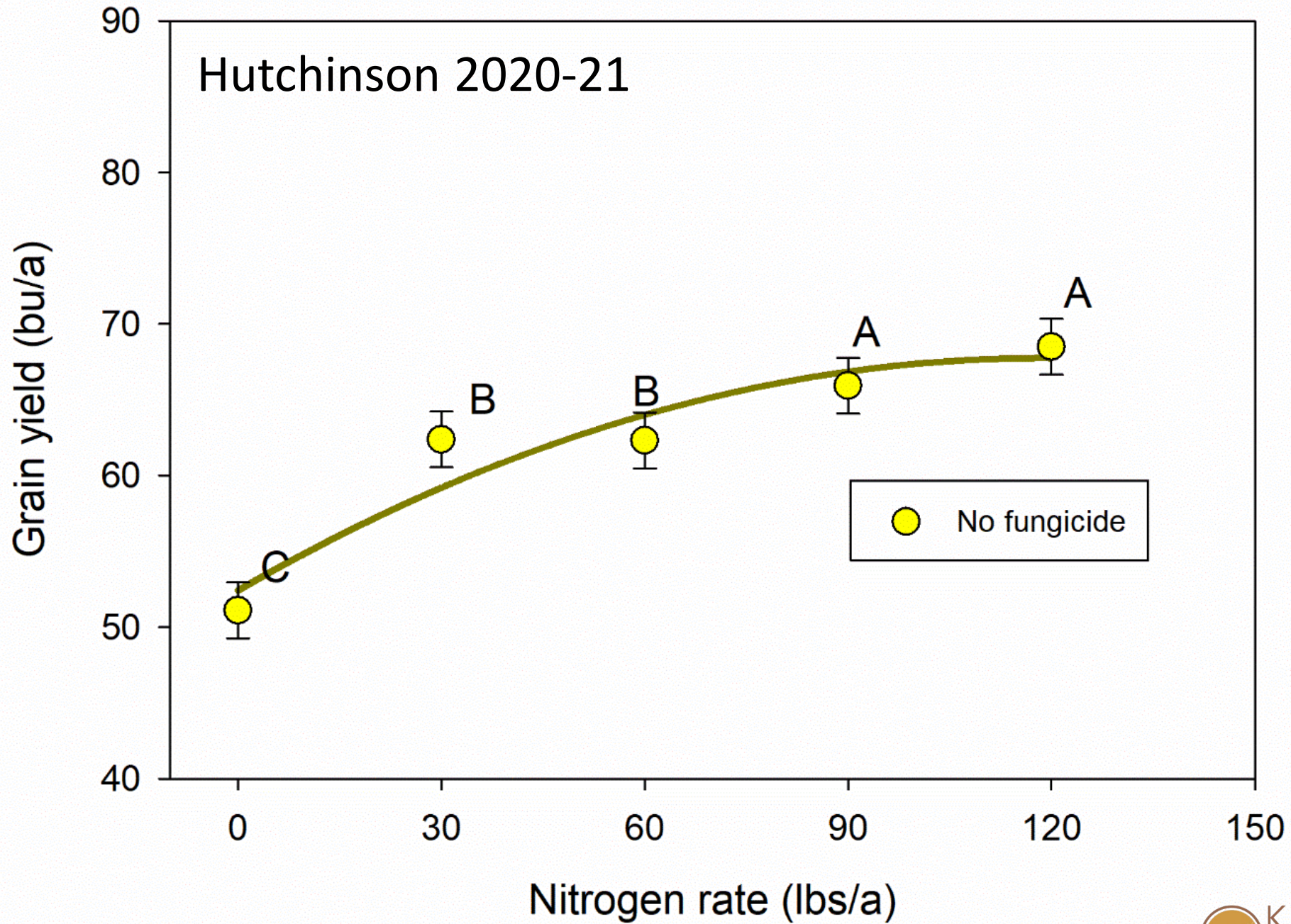
Larry wheat variety

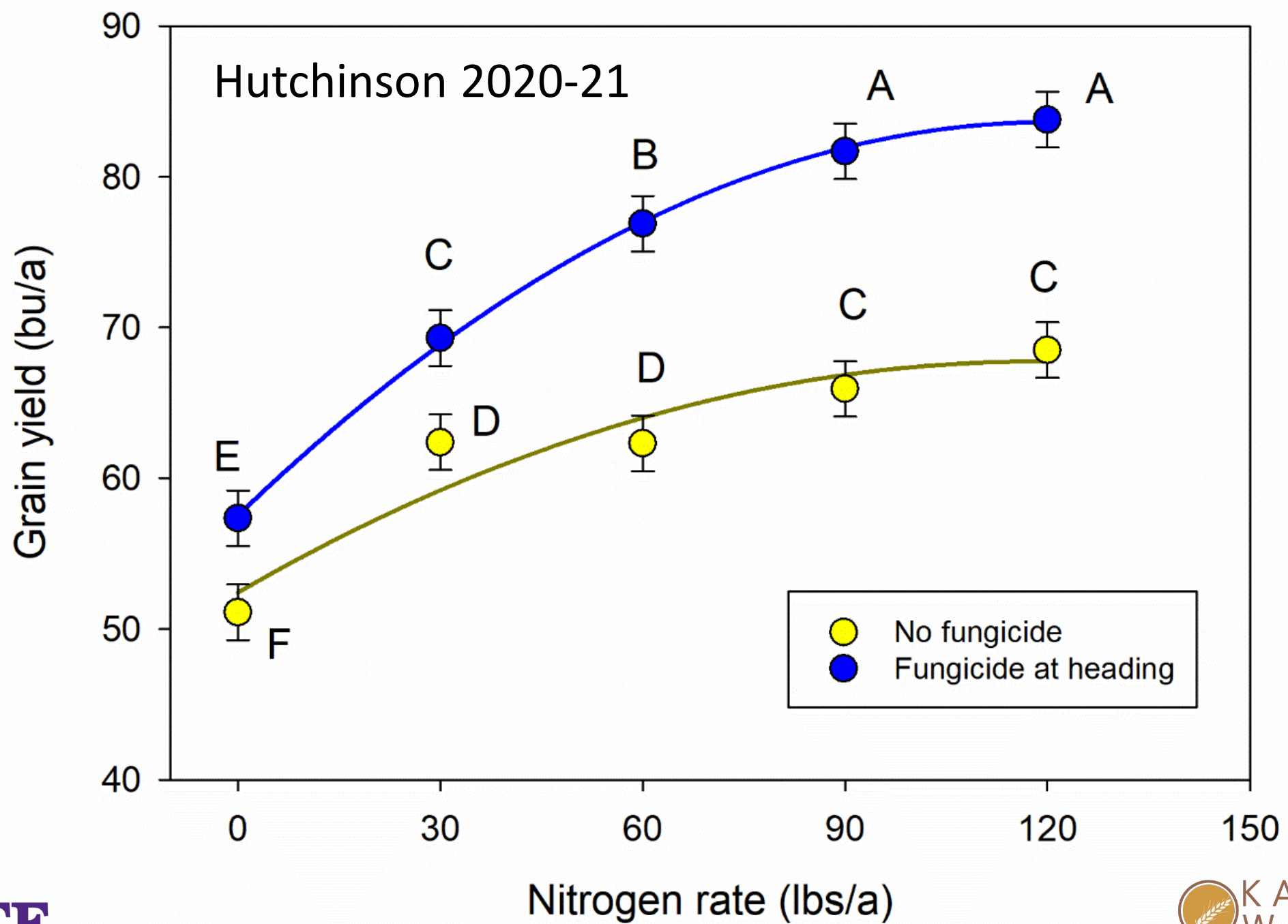
Hutchinson 2021

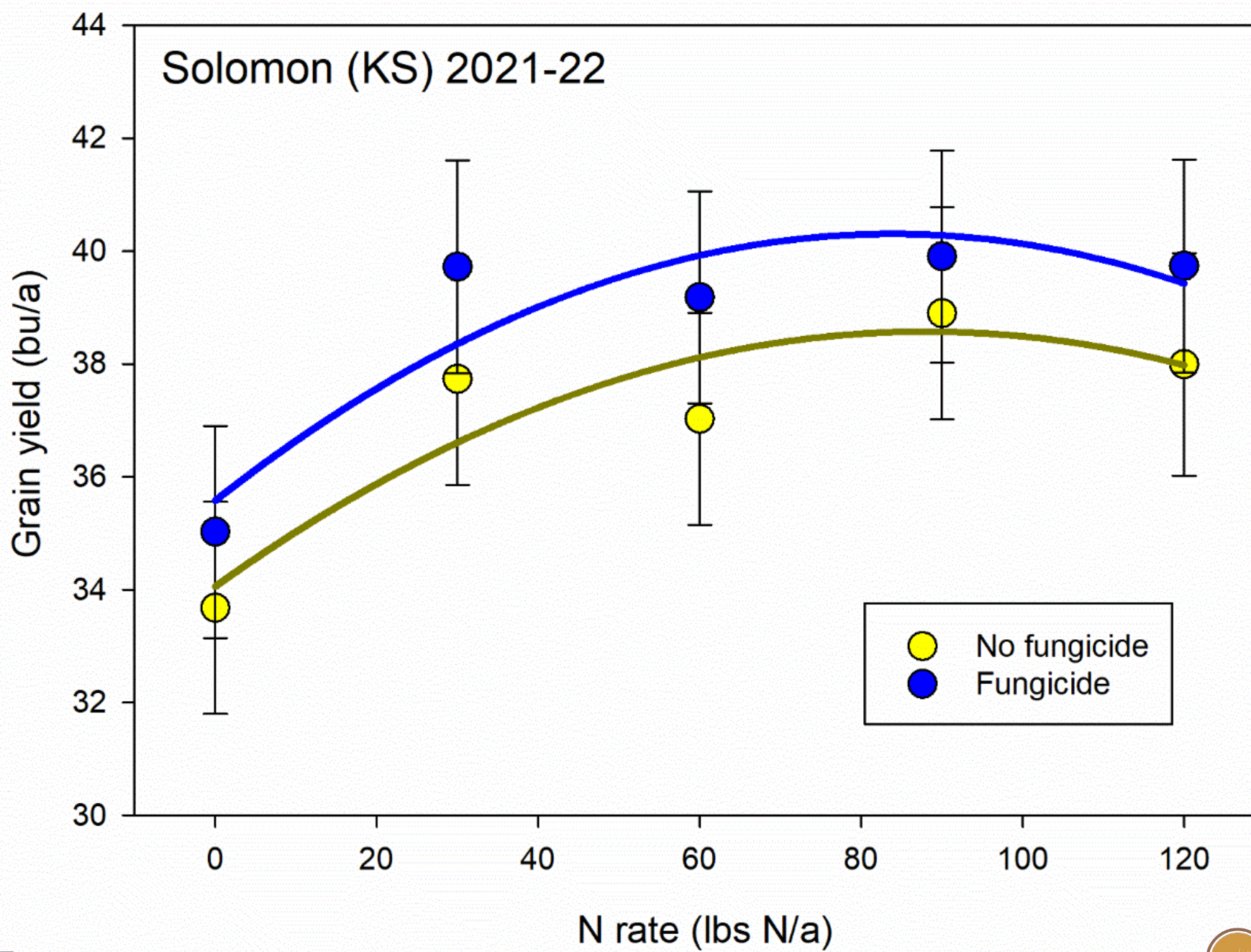
11 locations in 2022

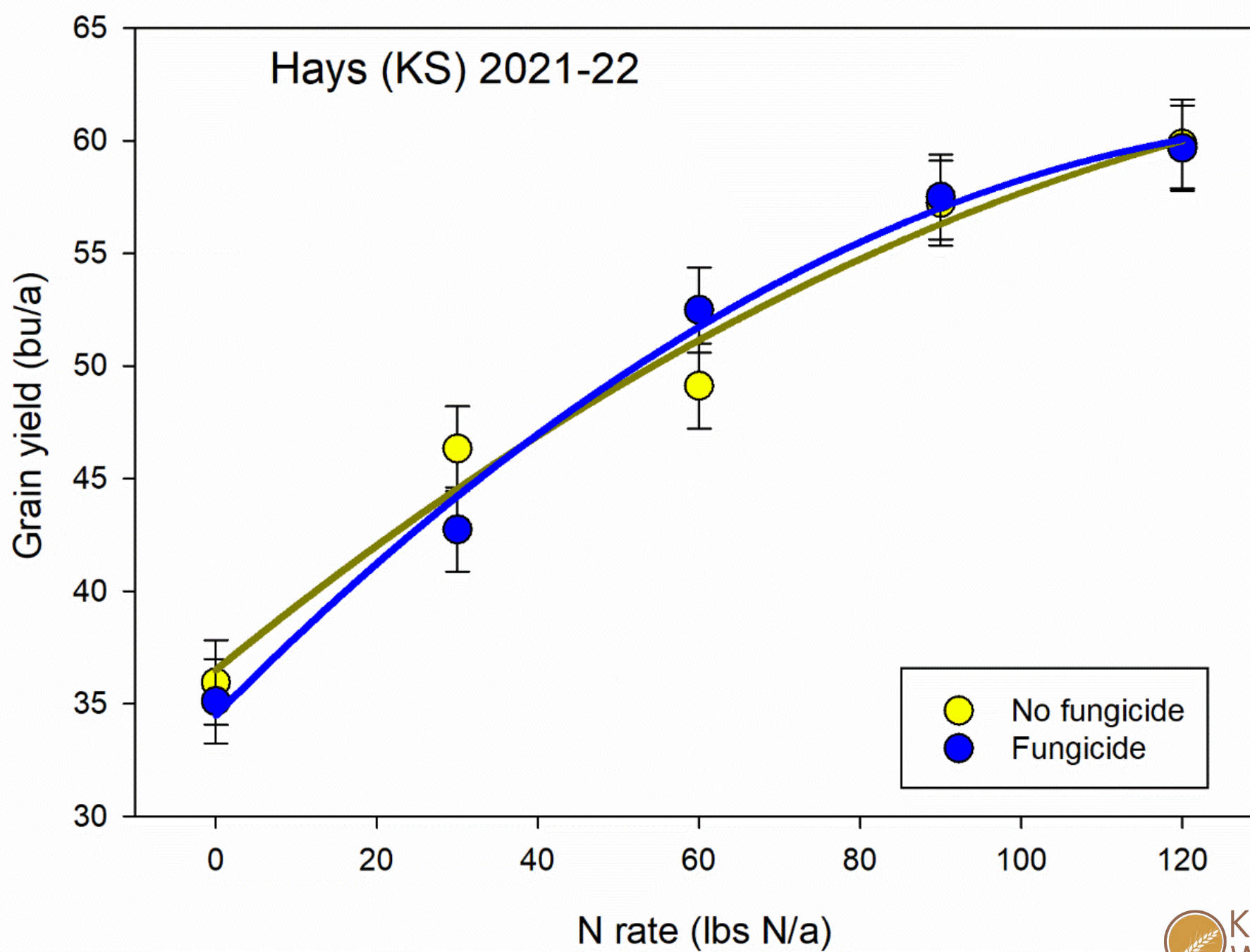
12 locations in 2023

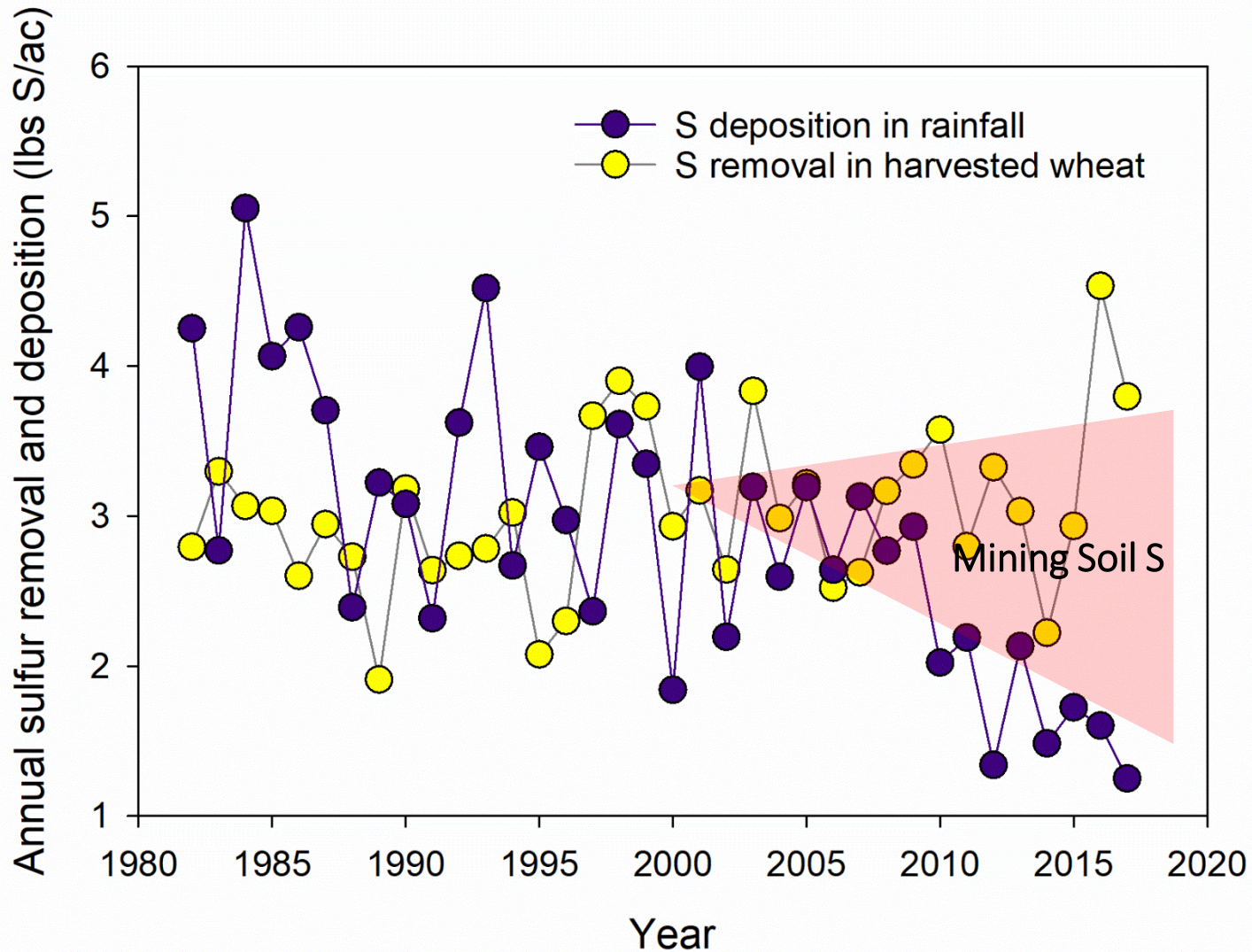












Sulfur balance

SINCE 2000
S removal by wheat
greater than
S atmospheric deposition

- S removal based on average KS wheat yields (0.08 lb S/bu)
- S deposition based on S concentration at Konza precipitation station



SULFUR
DEFICIENCY

NITROGEN AND SULFUR MANAGEMENT

Nitrogen rate (50, 100, and 150% of recommended for 60 bu/a)

Sulfur rate (0, 10, 20 and 40 lbs S/ac)

Varieties differing in nitrogen use-efficiency

Three year project

0 lbs S/a

20 lbs S/a



0 lbs S/a

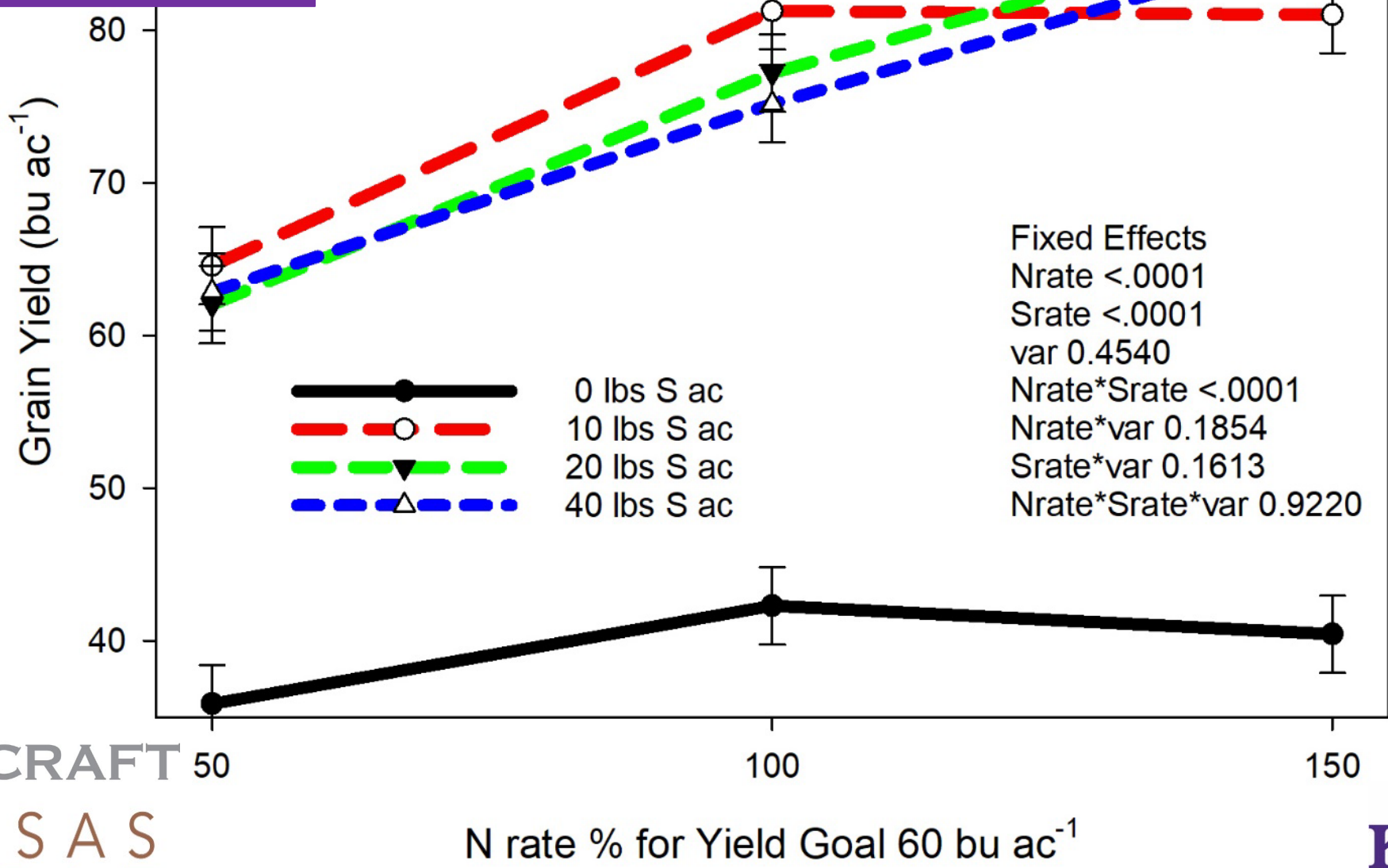


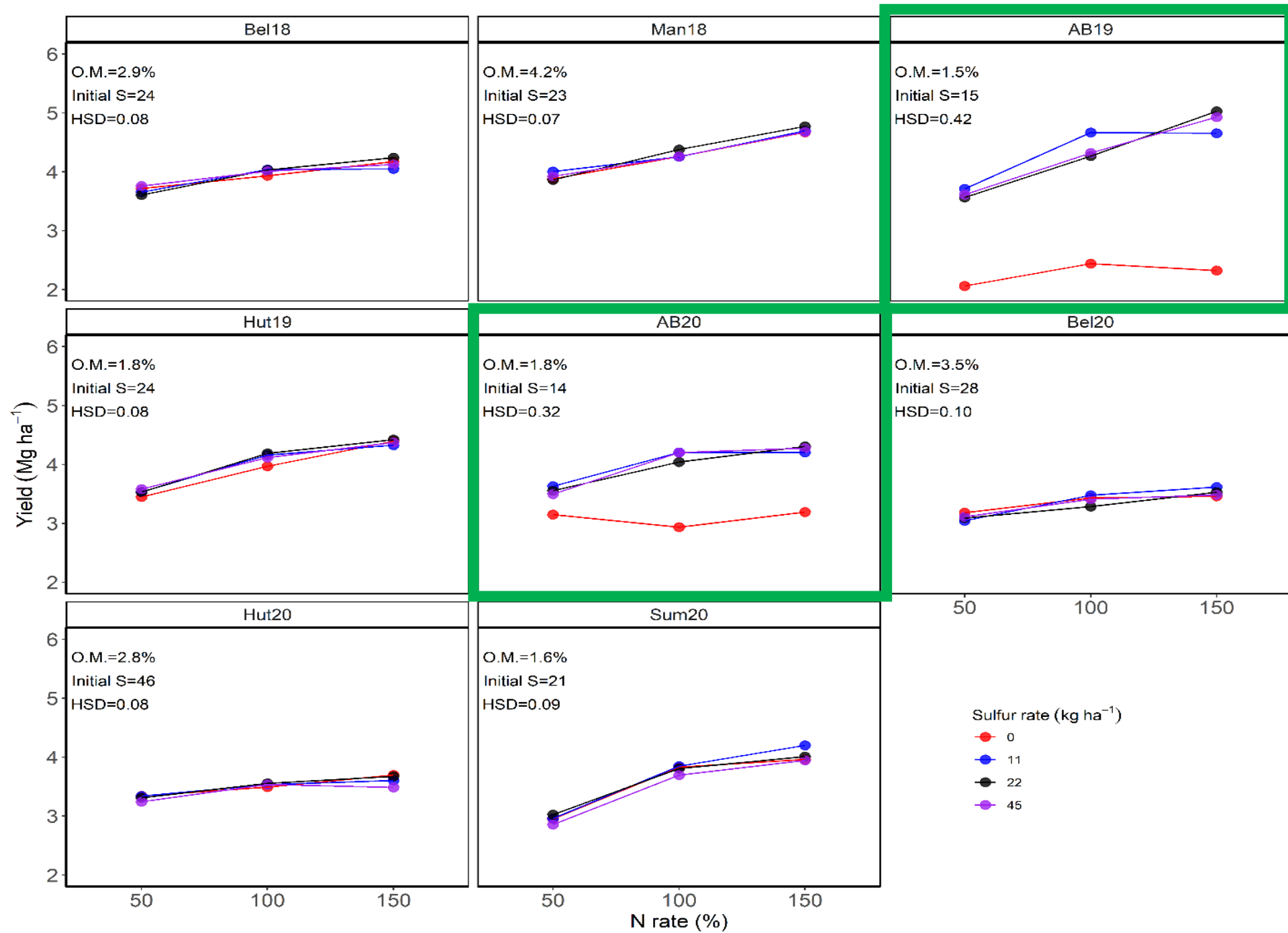
20 lbs S/a



Low organic matter
Sandy soil

Ashland Bottoms 2018-19





FOLIAR FUNGICIDES

FUNGICIDE TIMING

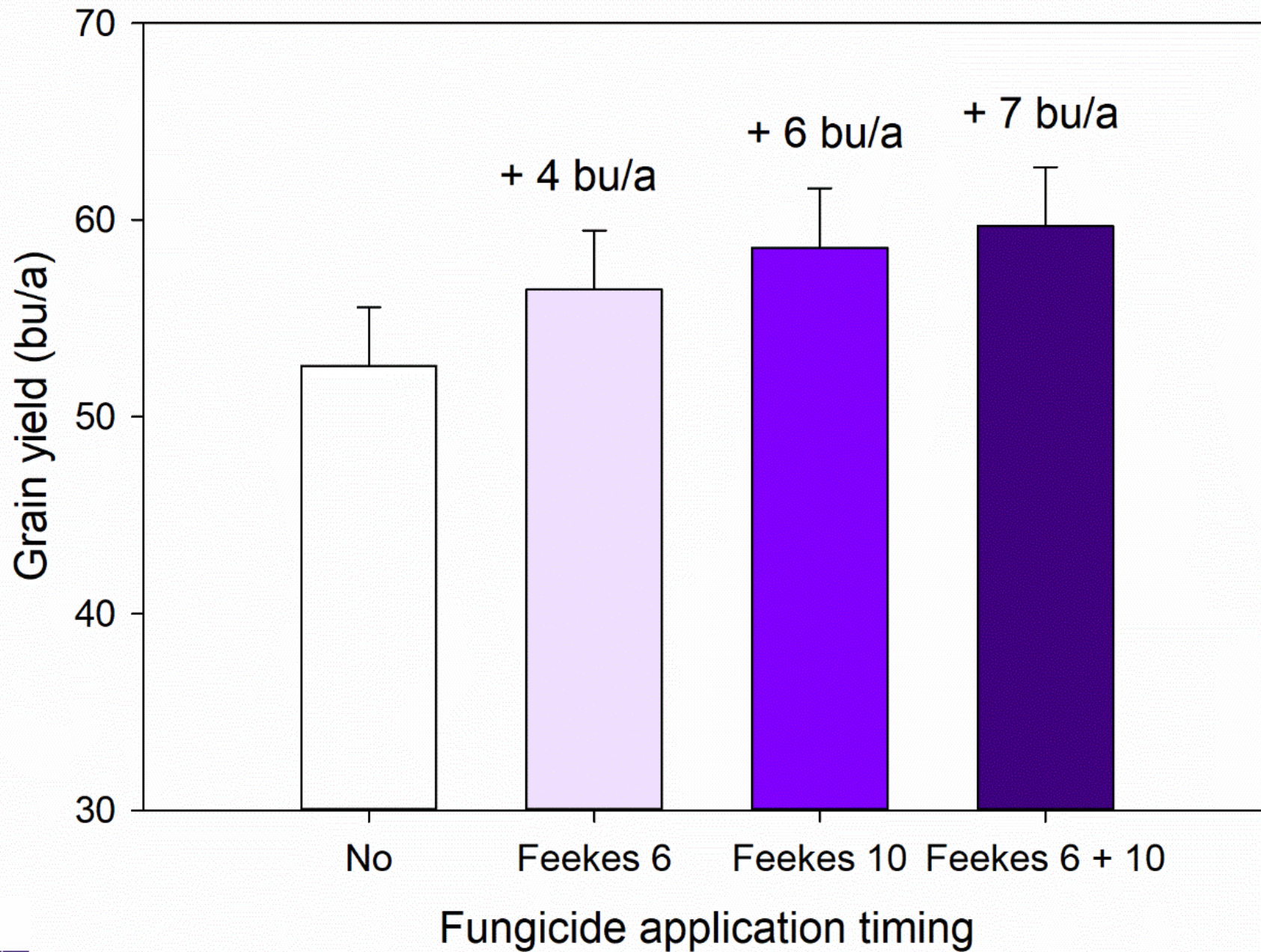
WB-Grainfield (wide adaptation)

Topguard fungicide at 5 oz/a

- No
- Feekes 6 (jointing)
- Feekes 10 (boot)
- Feekes 6 + 10

8 locations in 2020

12 locations in 2021



“Big fungicide experiment”

- 14 varieties: same as in the big N trial
- 4 fungicide managements (Topguard 5 oz/a):
 - No fungicide
 - Jointing fungicide
 - Heading fungicide
 - Jointing + heading fungicide
- 5 locations in 2019-20, 4 locations in 2020-21:
Ashland Bottoms, Conway Springs, Hutchinson, and Belleville
- Disease ratings 3 weeks after each fungicide application

Susceptible Variety



Dual fungicide

80% green cover



No fungicide

66% green cover

A close-up photograph of a wheat field showing a resistant variety. The wheat heads are densely packed and appear healthy, with a vibrant green color. The leaves are also green and show no signs of disease or damage.

Resistant variety

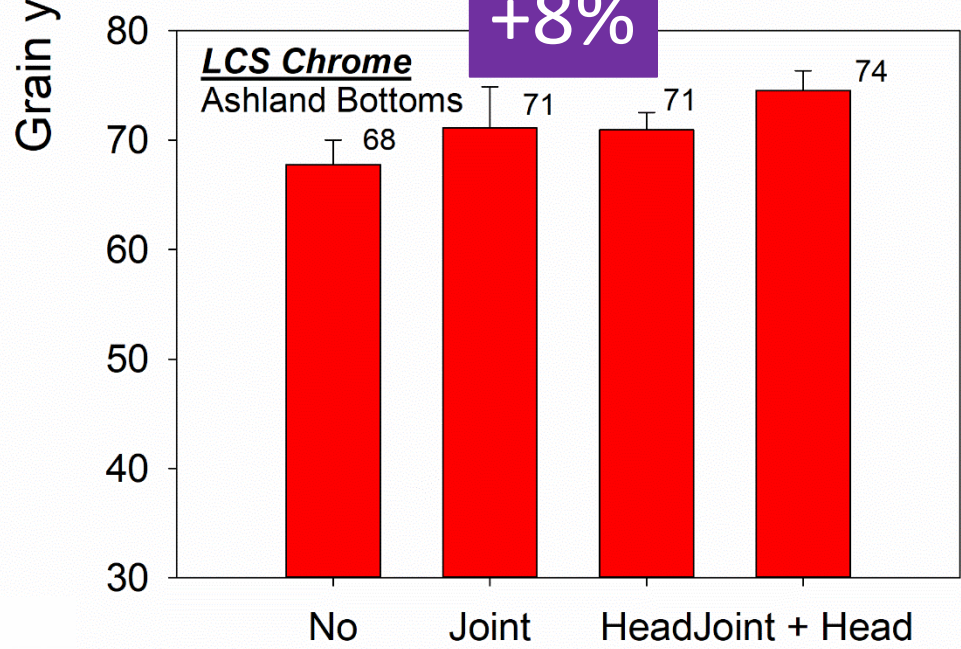
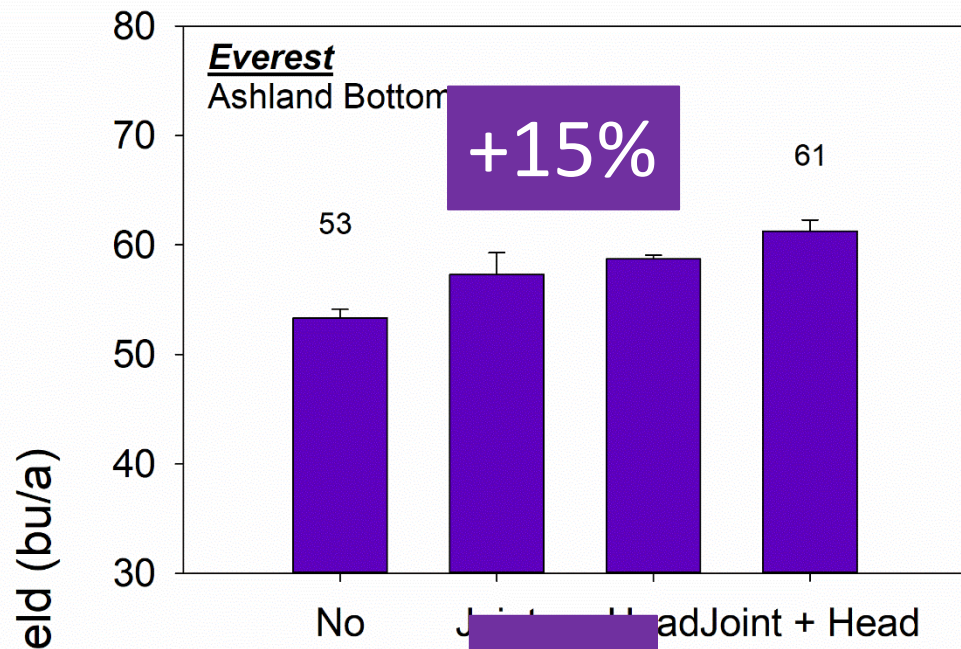
Dual fungicide

85% green cover

A close-up photograph of a wheat field showing a variety that did not receive fungicide. The wheat heads are less dense and appear somewhat sparse compared to the resistant variety. There are visible signs of disease, including yellowing and some damage to the wheat heads and leaves.

No fungicide

78% green cover



Fungicide management

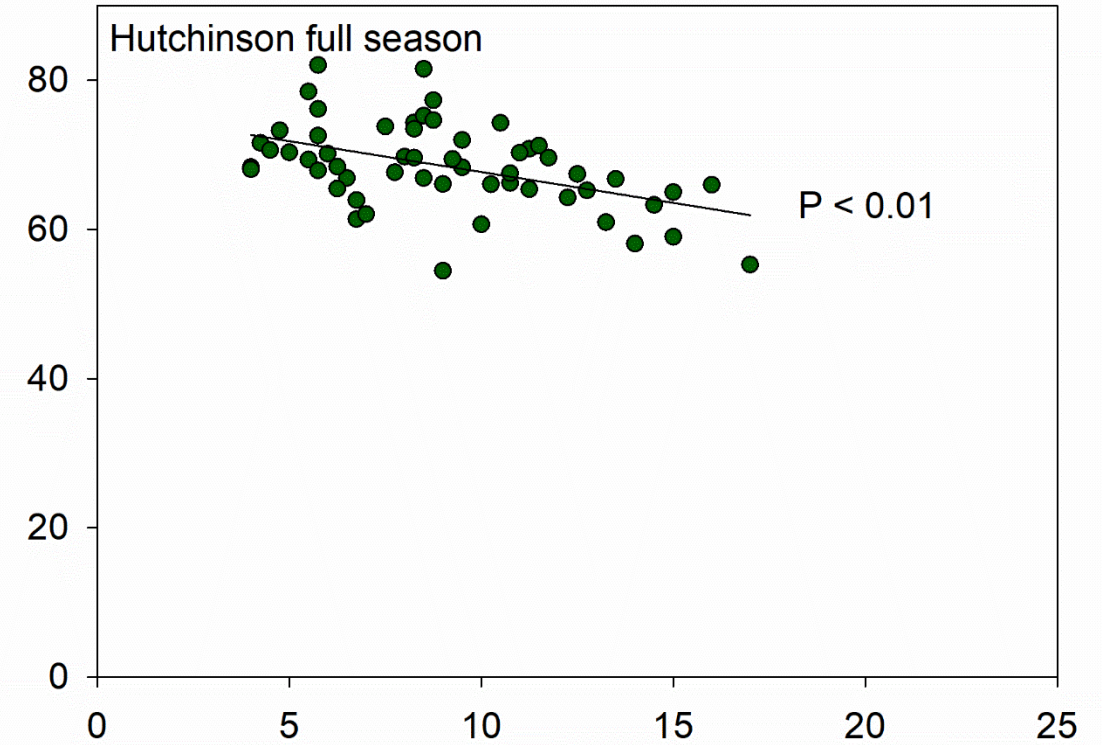
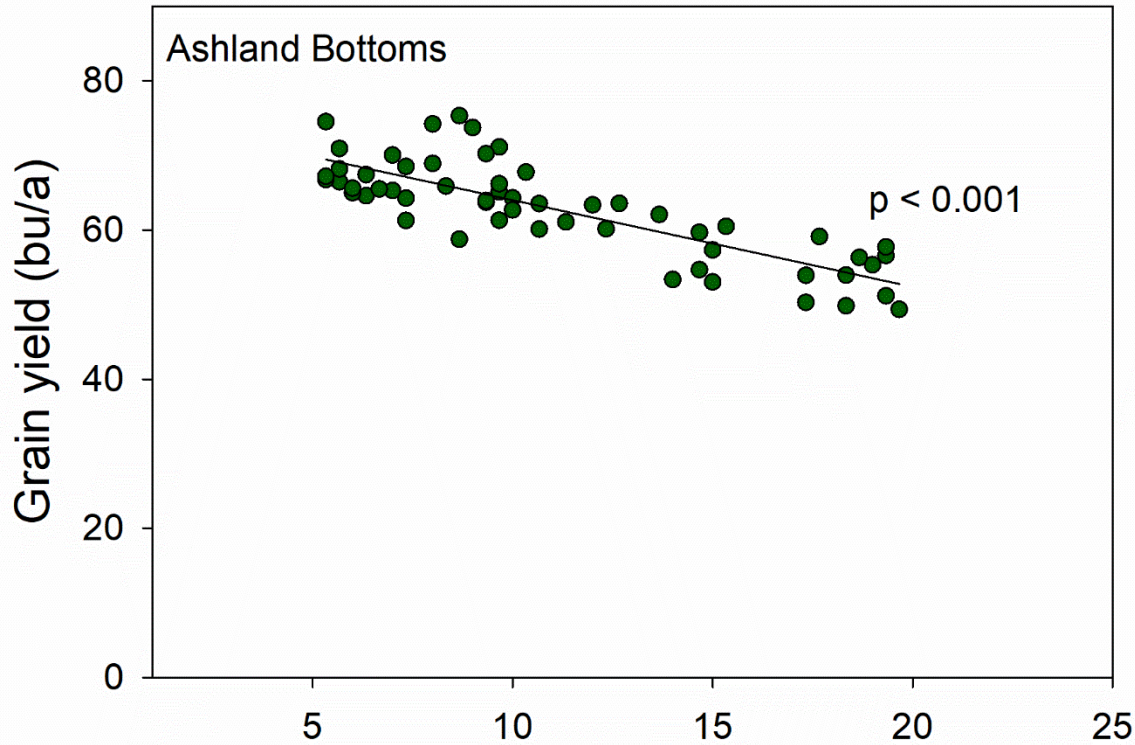
Yield gain from fungicide

Data across 5 locations

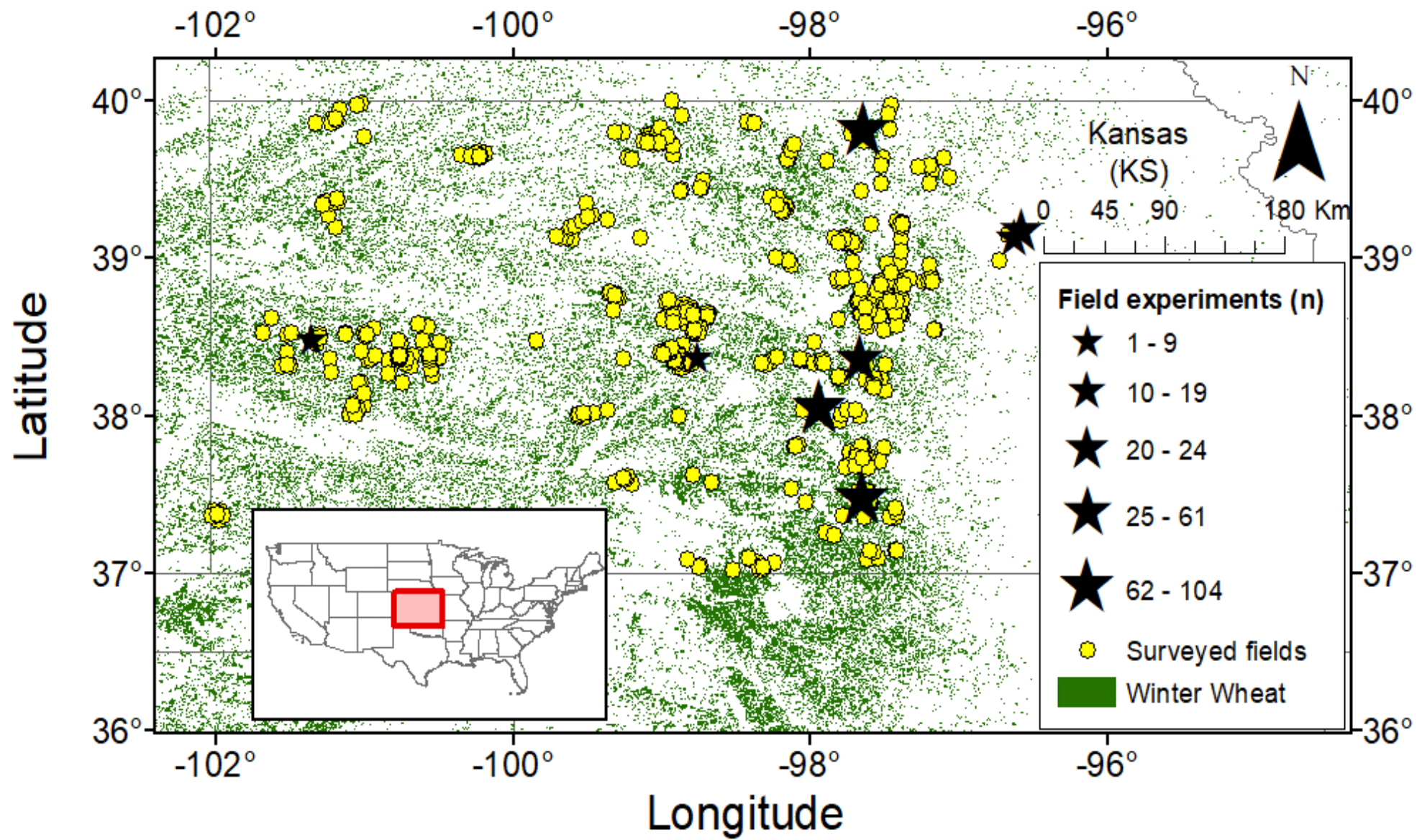
Variety	No fungicide bu/a	Fungicide time		
		FK6	FK10	FK6+10
		bu/a		
Bentley	57	1.6	7.4	7.5
Bob Dole	57	-1.3	2.2	0.7
DoubleStop CL Plus	59	1.4	1.6	0.2
Everest	53	4.3	2.2	5.4
Green Hammer	57	-2.2	-1.2	-2.5
Larry	57	3.6	4.4	6.9
LCS Chrome	59	1.1	-0.7	1.4
SY Monument	56	1.6	5.5	6.4
Tatanka	58	1.9	1.6	3.4
WB Grainfield	55	3.6	6.9	10.0
WB4269	62	1.3	1.8	2.9
WB4303	53	2.5	4.7	6.3
WB4458	49	2.8	6.5	8.9
Zenda	55	2.9	3.0	2.3
Ave.	56	1.8	3.3	4.3
Min.	49	-2.2	-1.2	-2.5
Max.	62	4.3	7.4	10.0

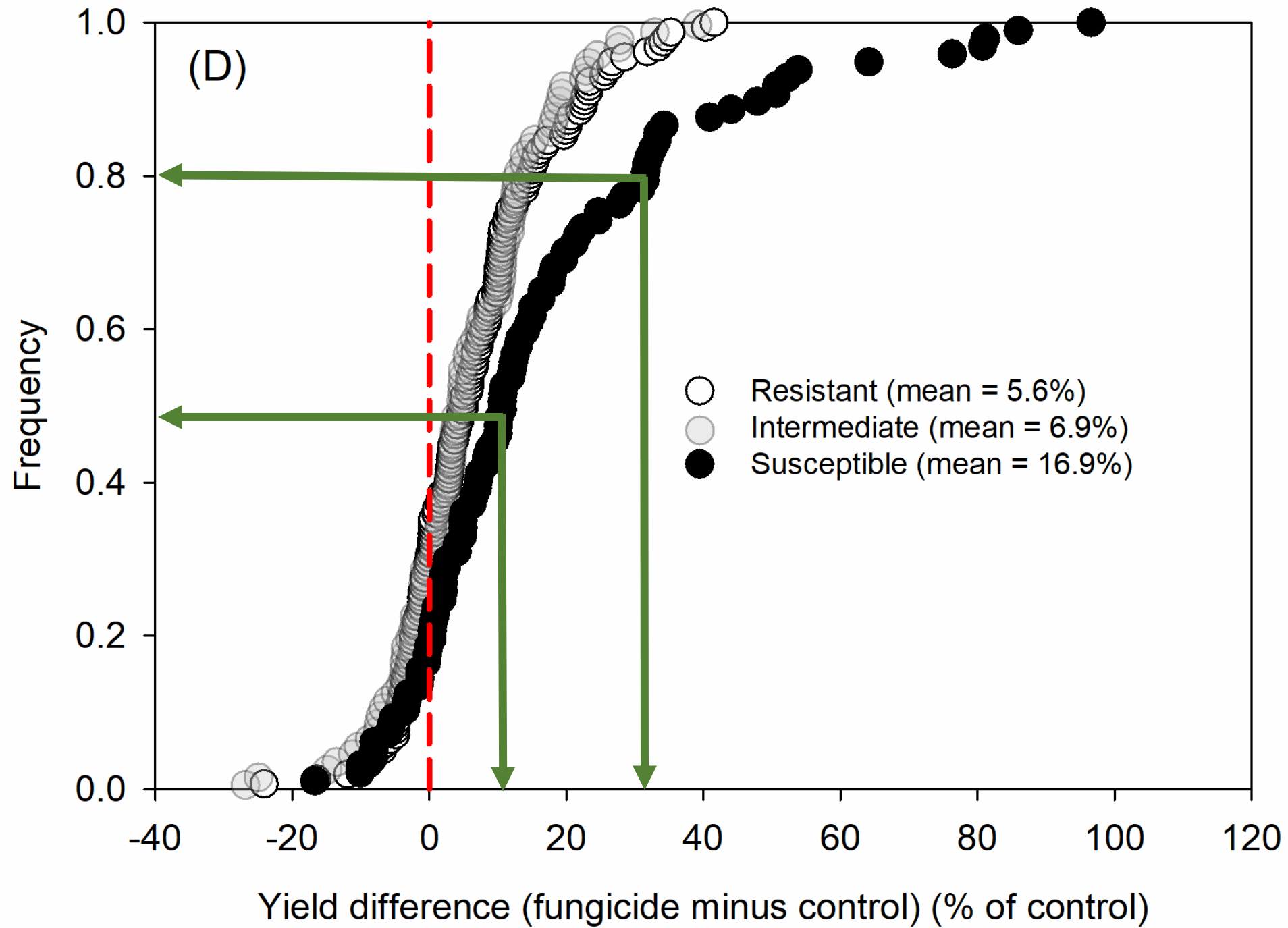


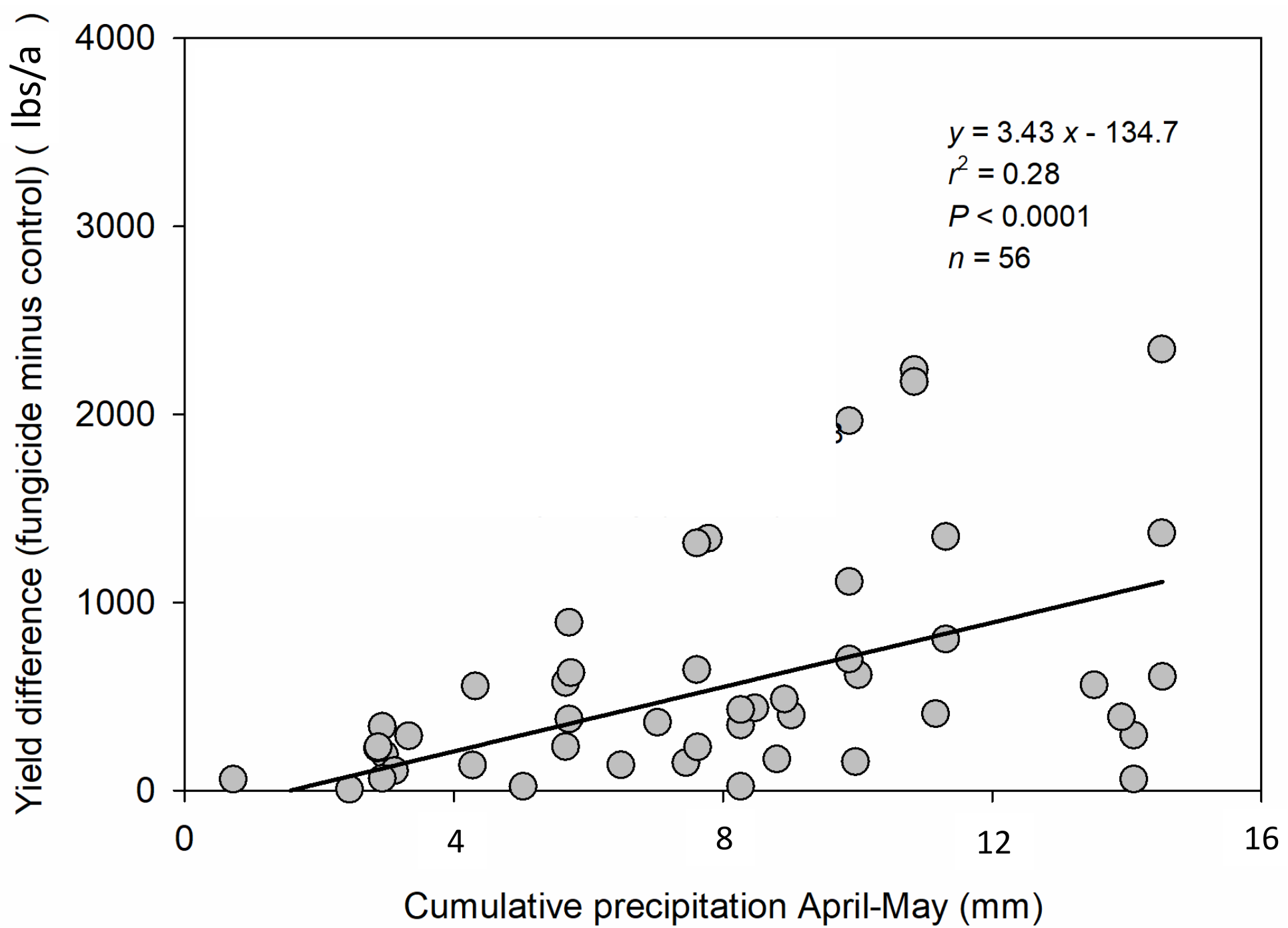
Late disease rating vs. yield



Sum of grain fill disease ratings (septoria + leaf rust + stripe rust)



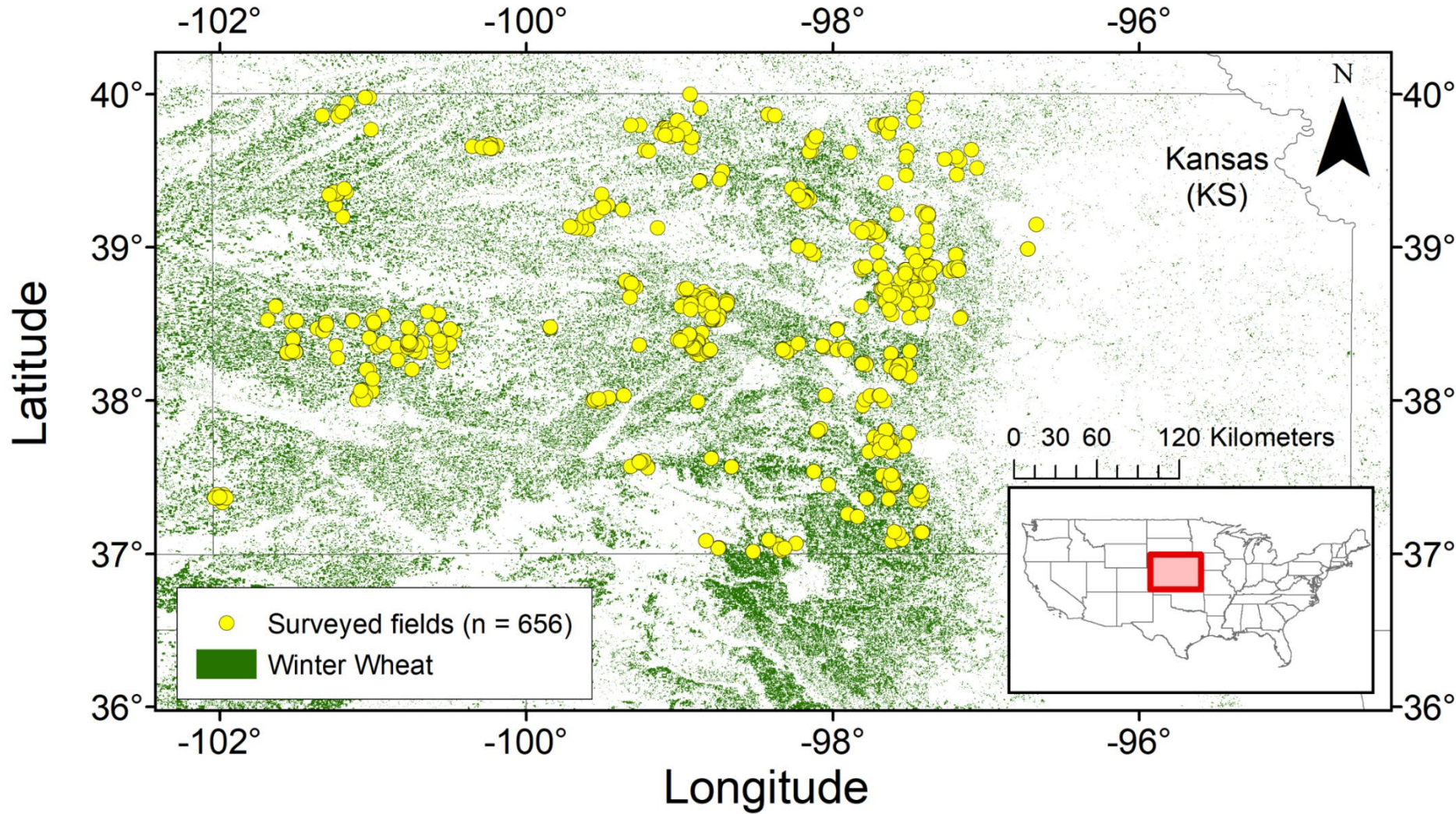




An aerial photograph of a vast, lush green wheat field. The rows of wheat are densely packed and stretch far into the distance. In the foreground, the curved dashboard of a tractor is visible, featuring several gauges and a digital display. The sky is clear and blue, and a line of trees is visible on the horizon. The overall scene conveys a sense of agricultural productivity and scale.

THE WHEAT WE
GROW *vs.*
THE WHEAT WE
COULD GROW

REPLICATING GROWER'S PRACTICES



KANSAS STATE
UNIVERSITY



Replicated Trial

Gathered data from on-farm survey

Replicated management practices adopted in:

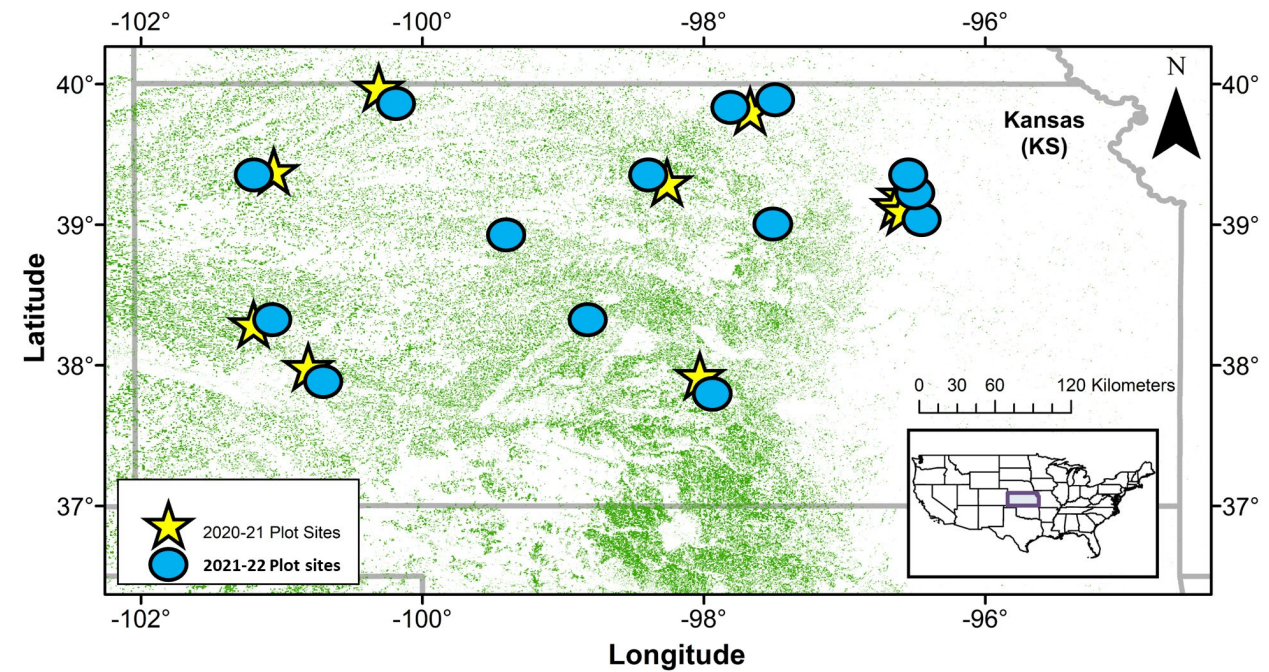
- Lowest 20% yielding fields
- Average yielding fields
- Highest 20% yielding fields
- Highest 5% yielding fields

Varieties:

- Central: Zenda and WB 4269
- Western: WB-Grainfield and KS Dallas

Systems (2021 and 2022 harvests):

- Central (13 sites): No-till after soybeans
- Western (10 sites): No-till after fallow





Practice
Yield goal (bu/a)
Seeding rate (seeds/a)
Nitrogen (lbs N/a)
Phosphorus (lbs P/a)
Sulfur (lbs S/a)
Chloride (lbs KCl/a)
Seed Treatment
Split N Application
Flag leaf Fungicide
Jointing Fungicide
Micronutrients

Wheat (Semi-Arid)	
Crop: Fallow	
High	Top
80	95
1,050,000	1,050,000
120	180
30	30
10	20
-	-
Yes	Yes
Yes	Yes
Yes	Yes
-	Yes
-	Yes



Low

Average

High

Top



Z

WB

Z

WB

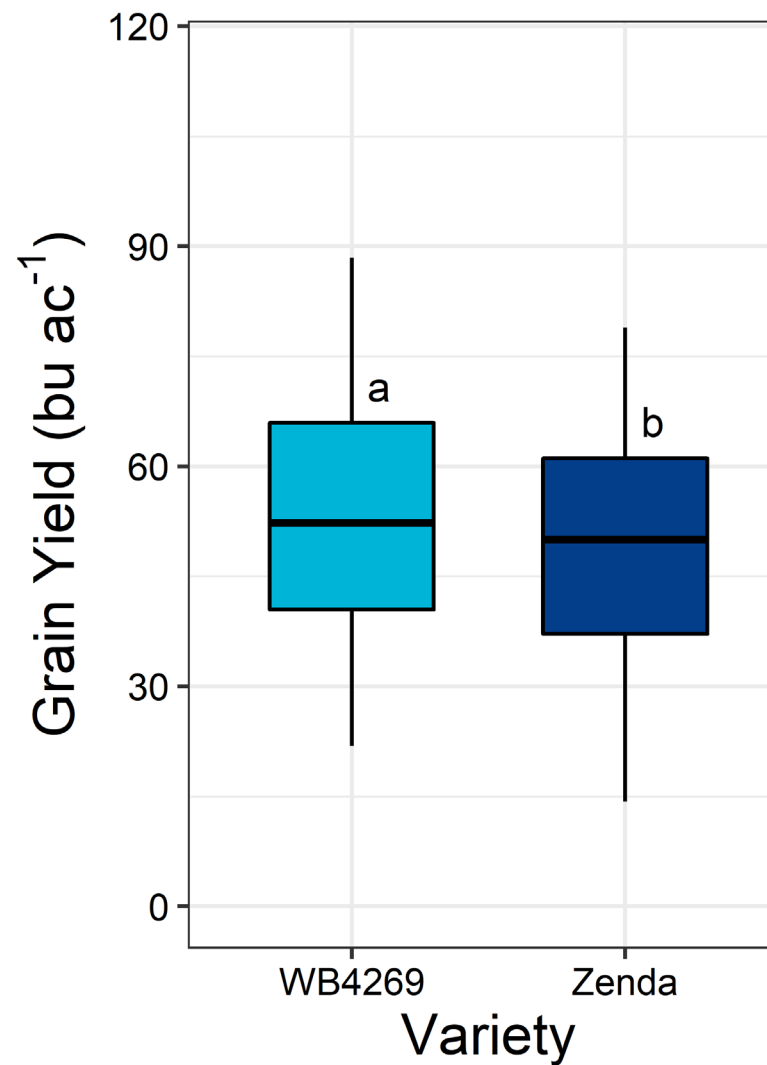
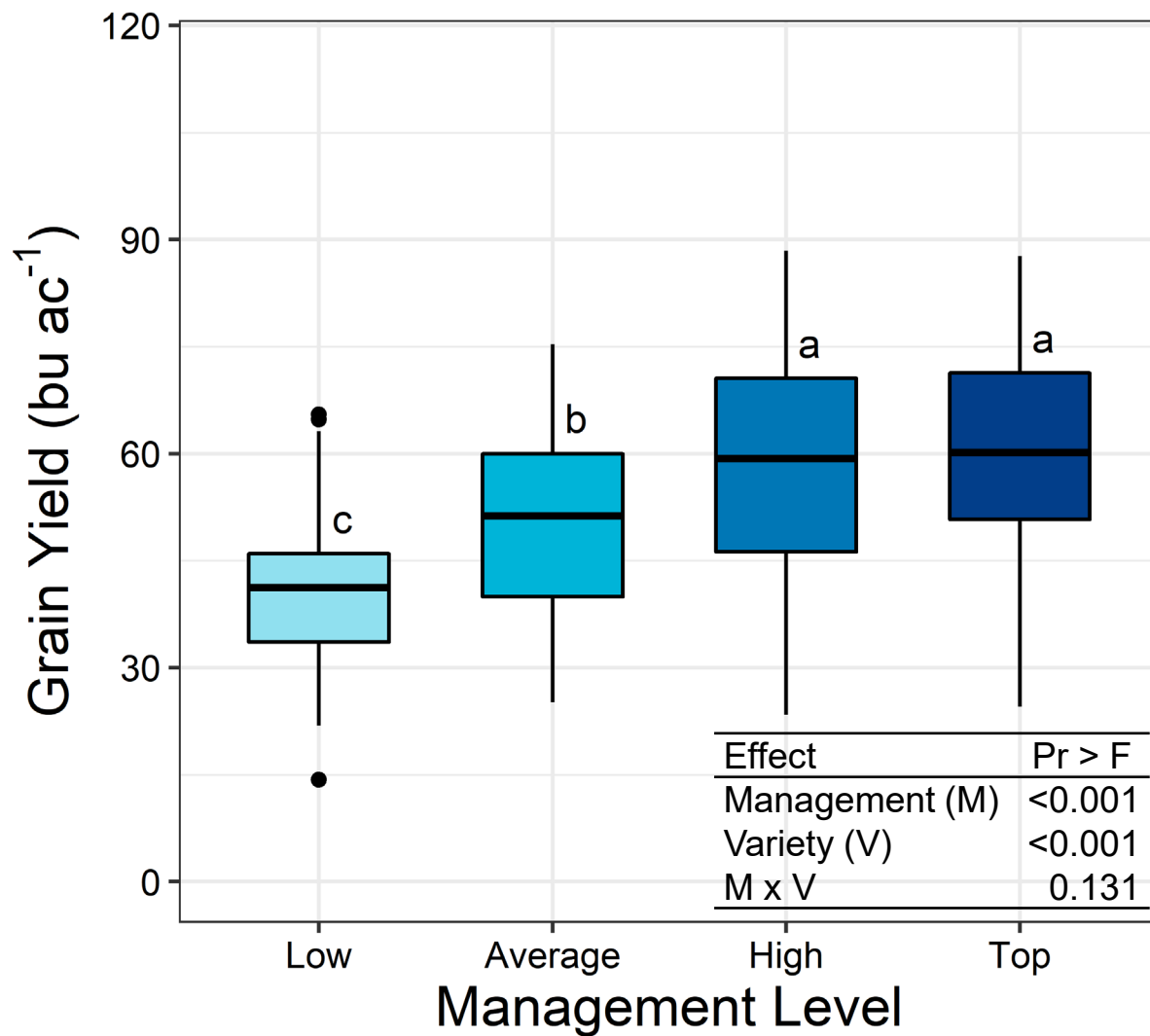
Z

WB

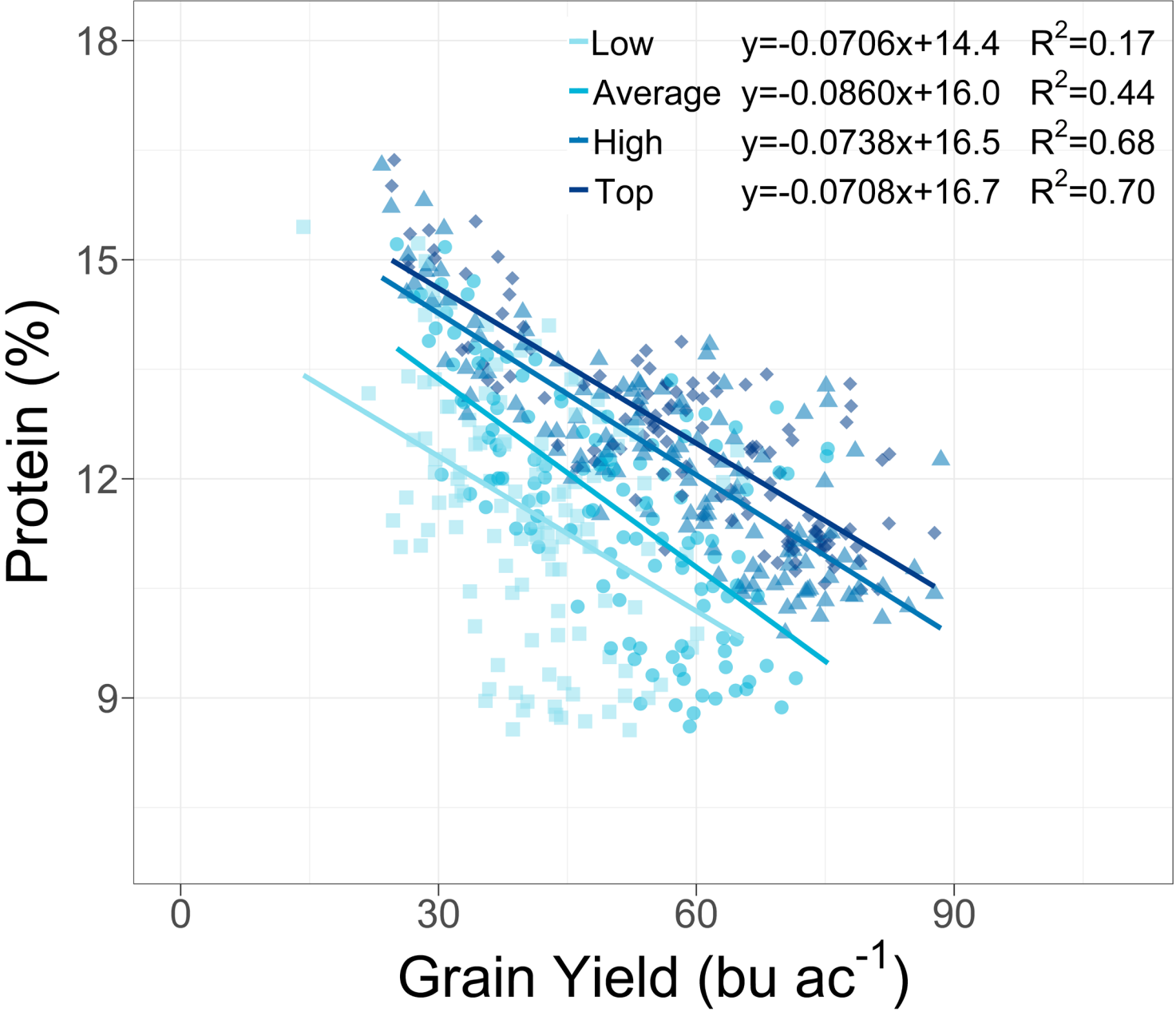
Z

WB

Central Kansas Grain Yield



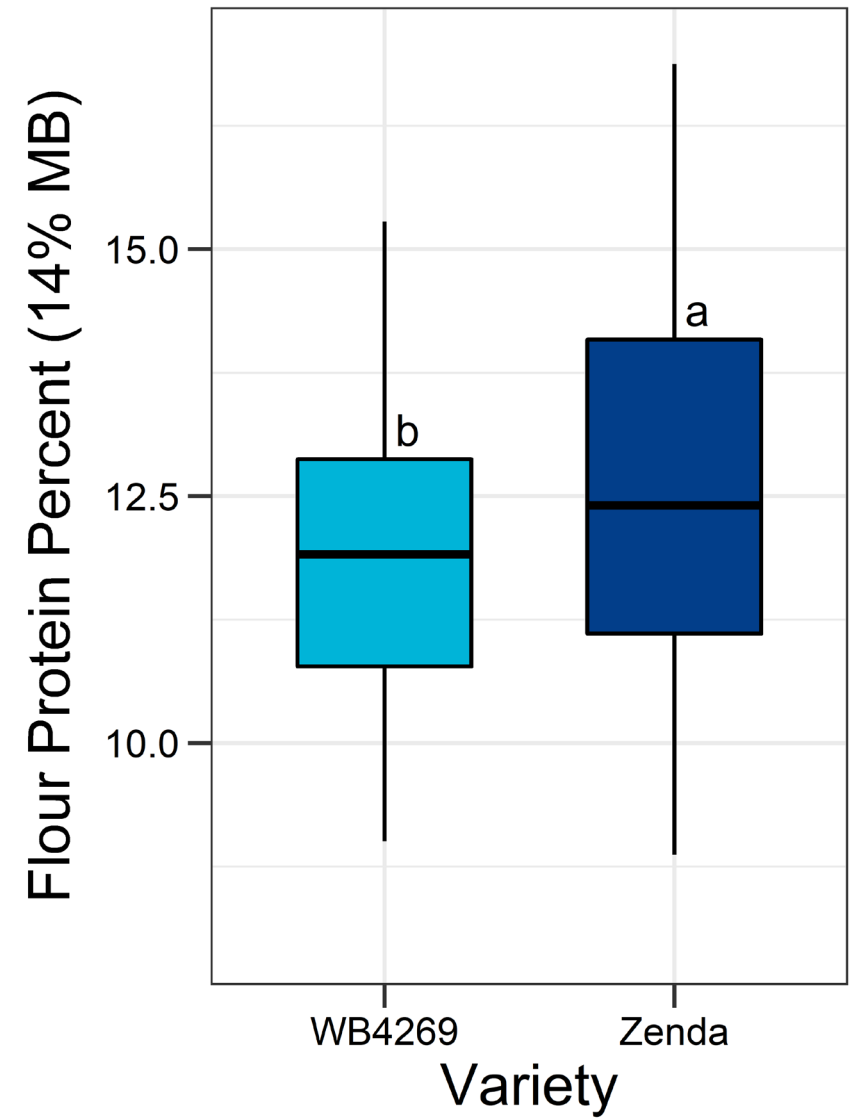
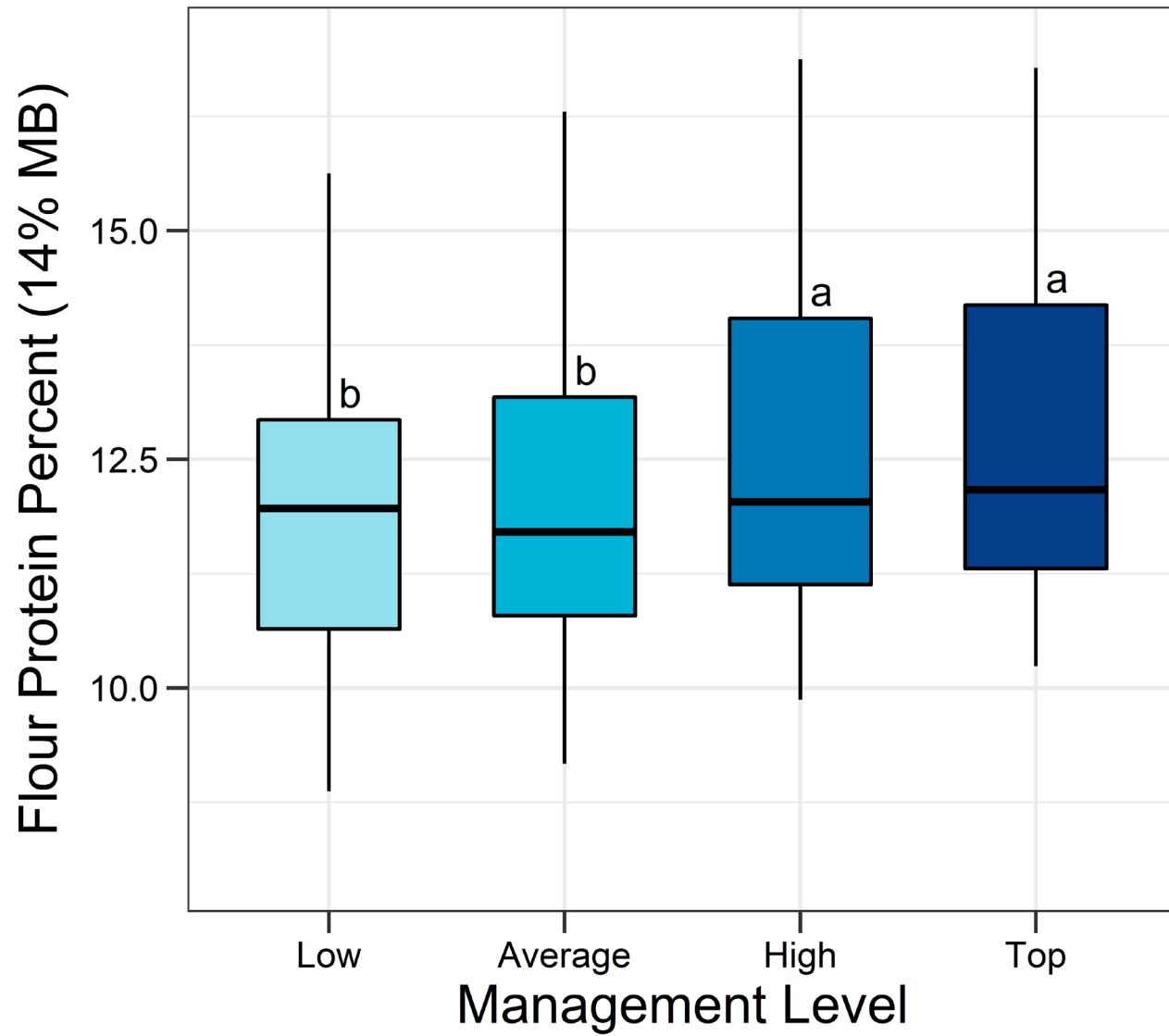
Central Kansas Protein

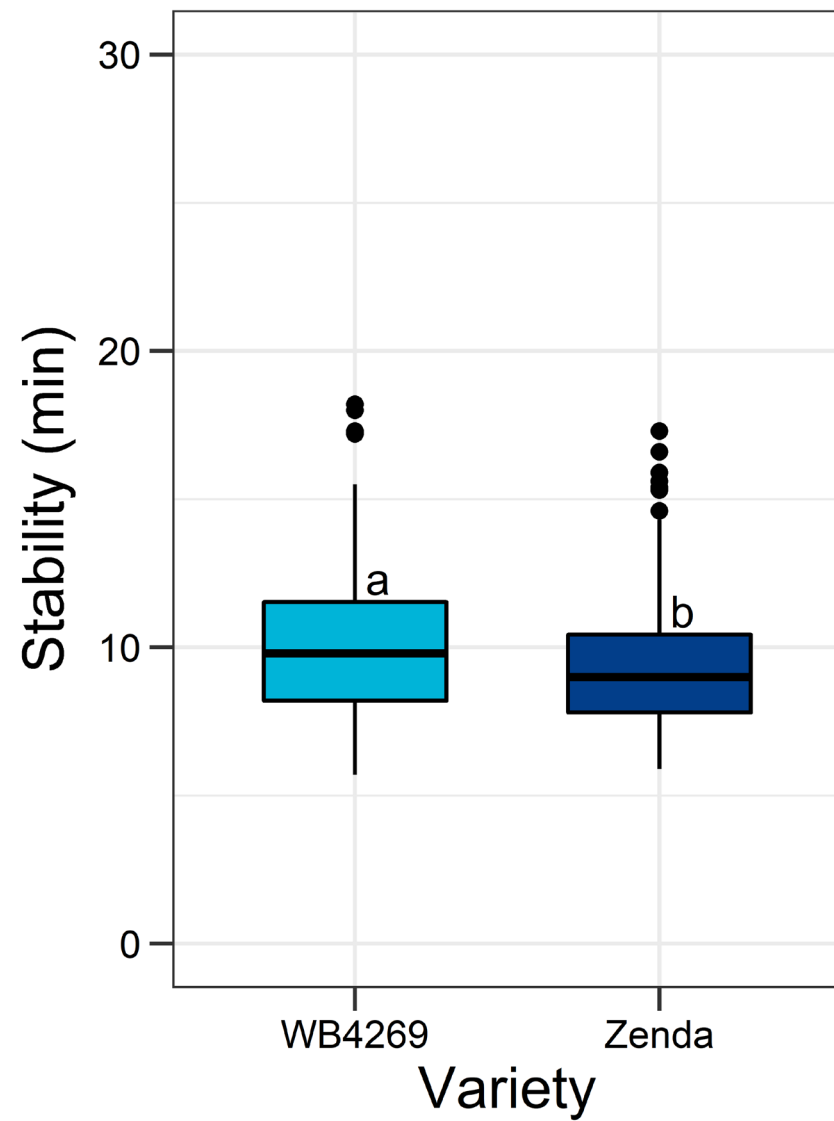
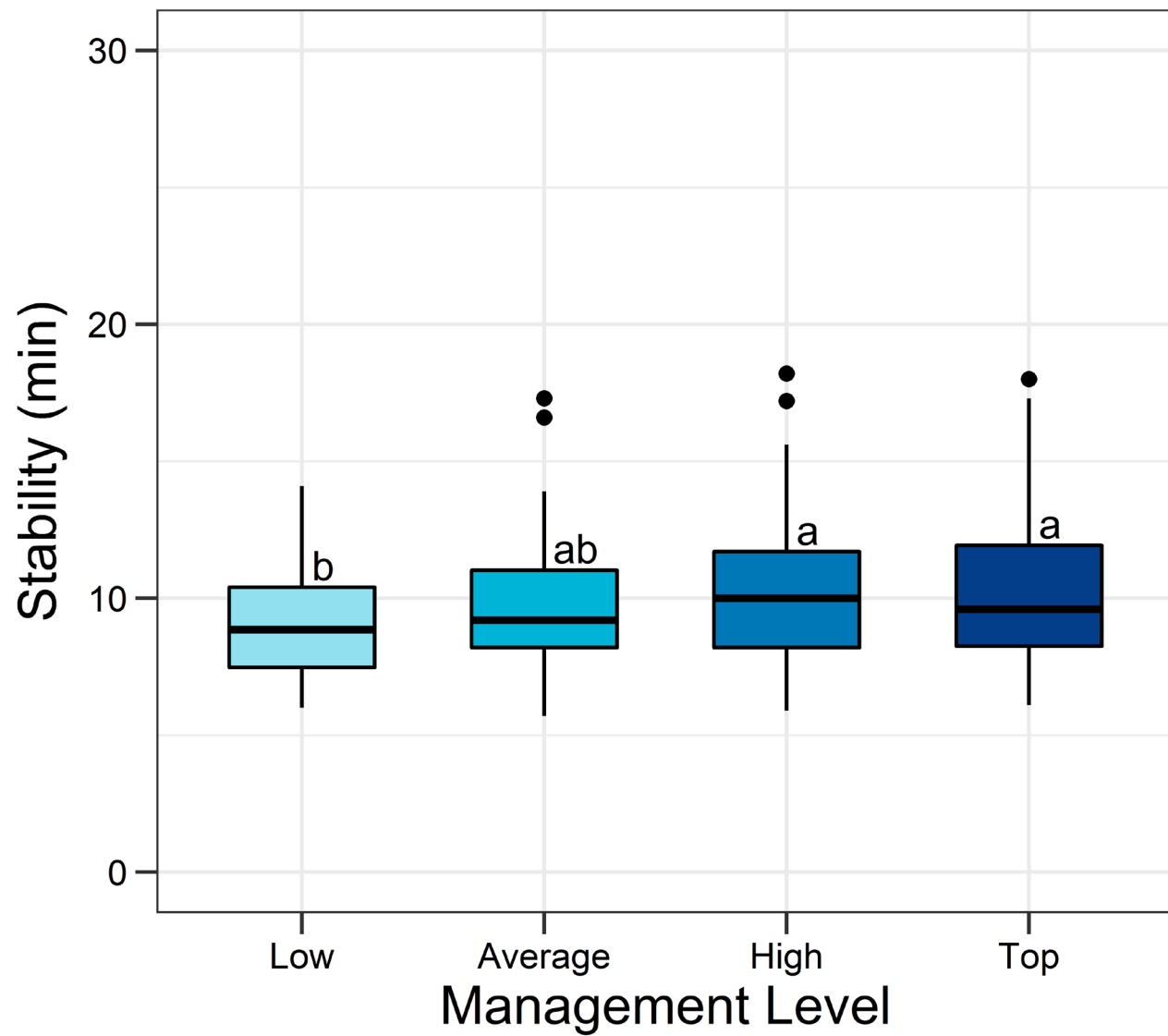


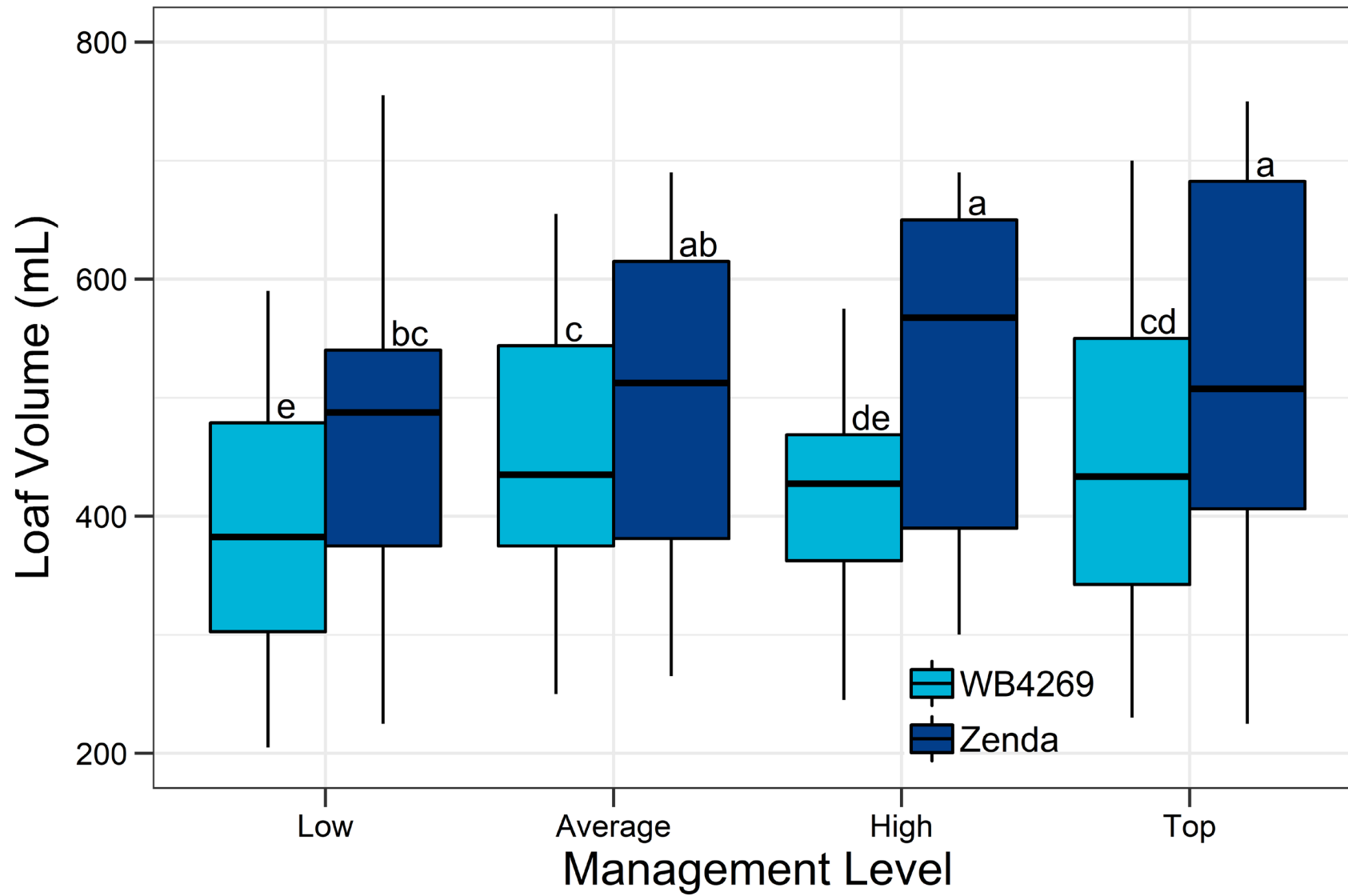
Management	Mean Protein (%)
Low	11.7c
Average	11.8c
High	12.4b
Top	12.7a

Letters indicate significant differences at <0.05 level











Questions?

Romulo Lollato

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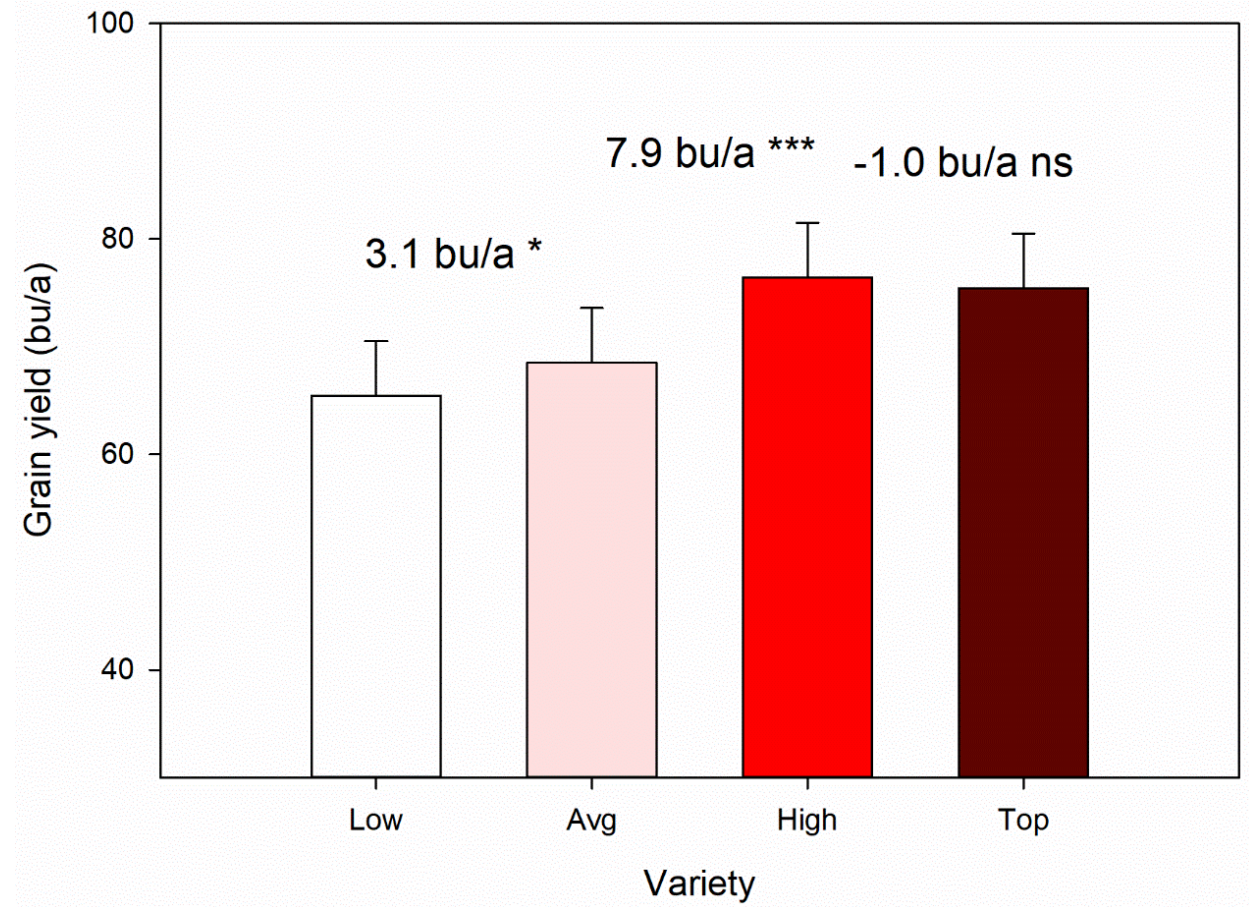


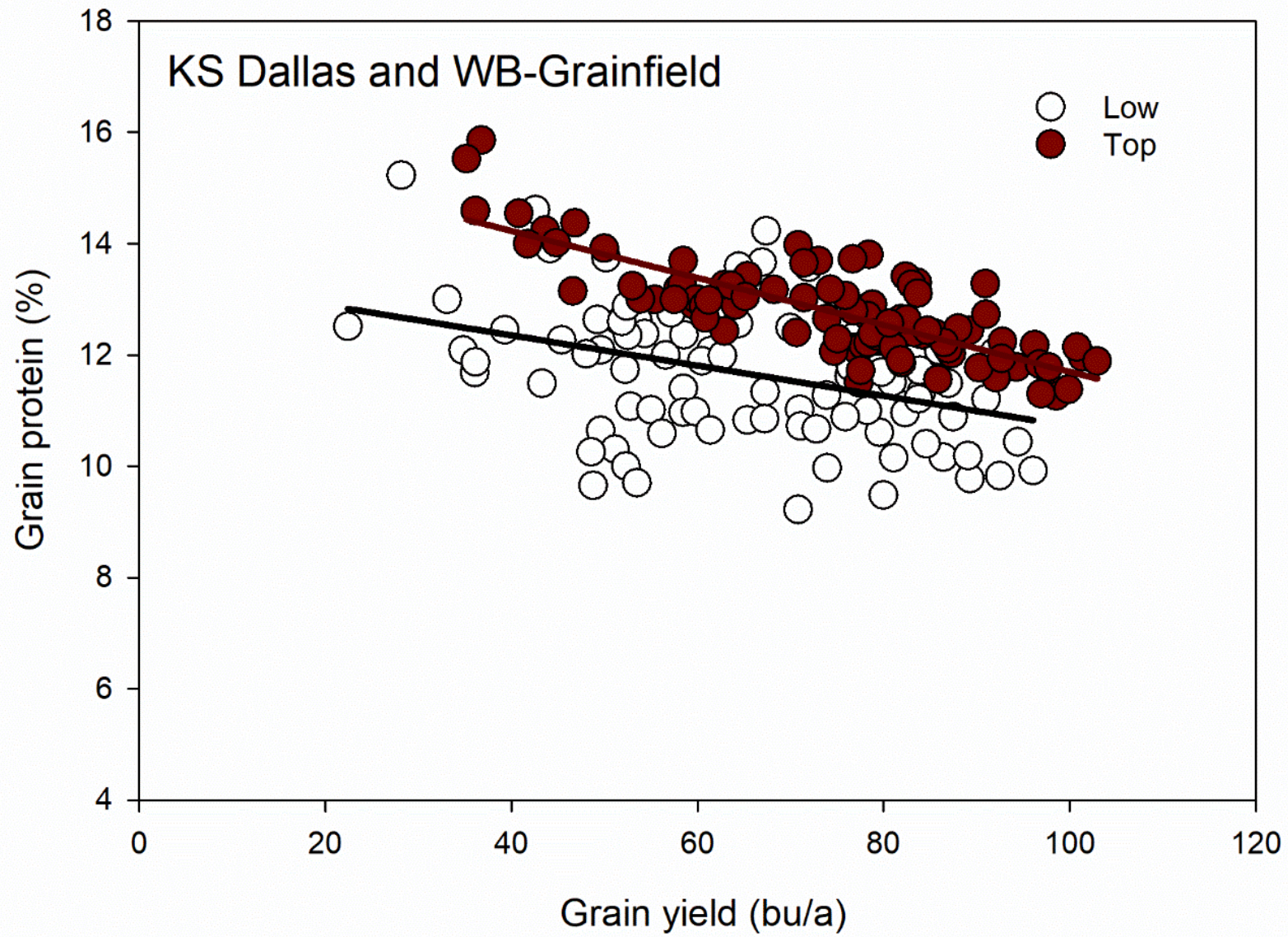
@KSUWheat

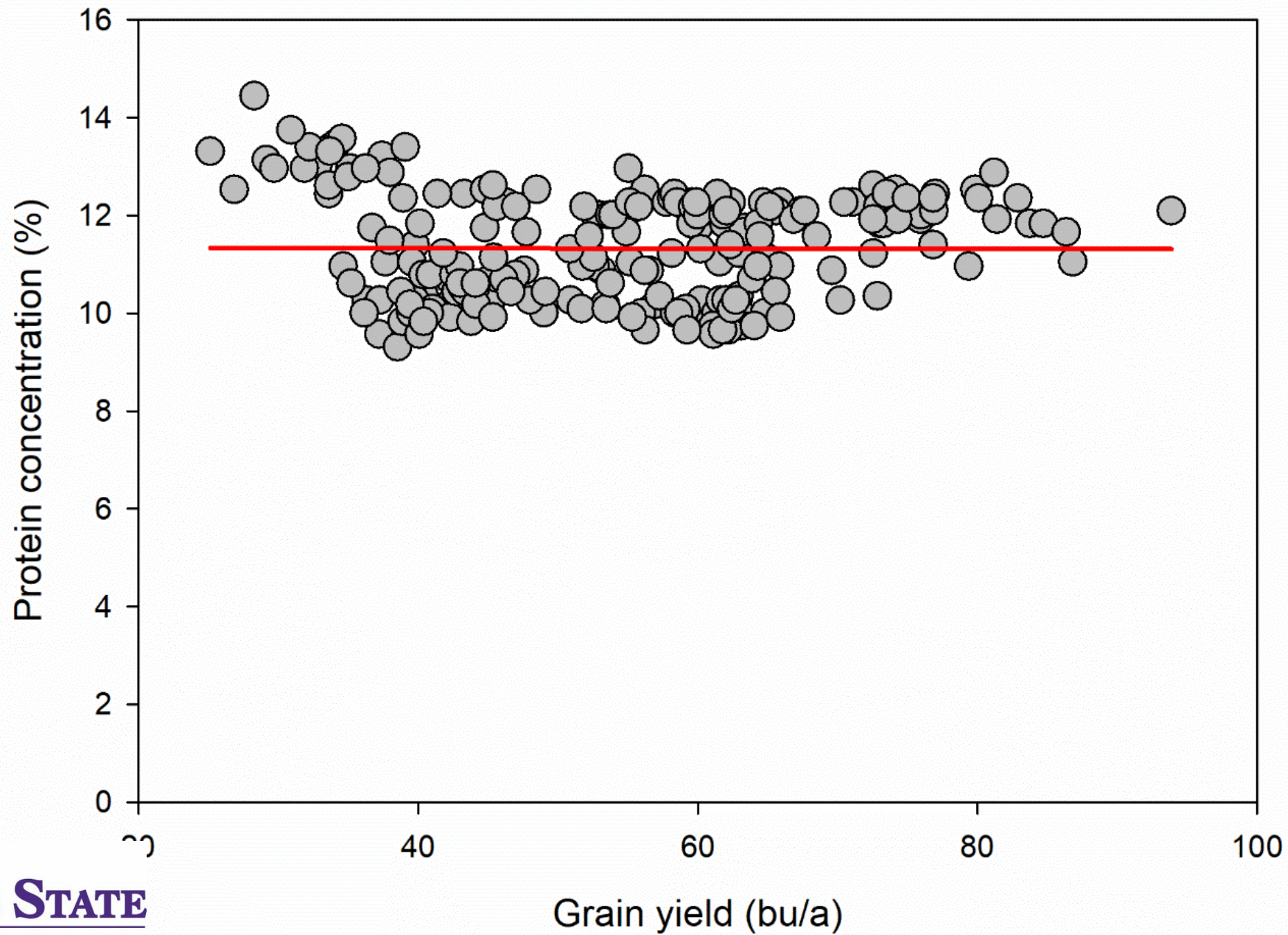


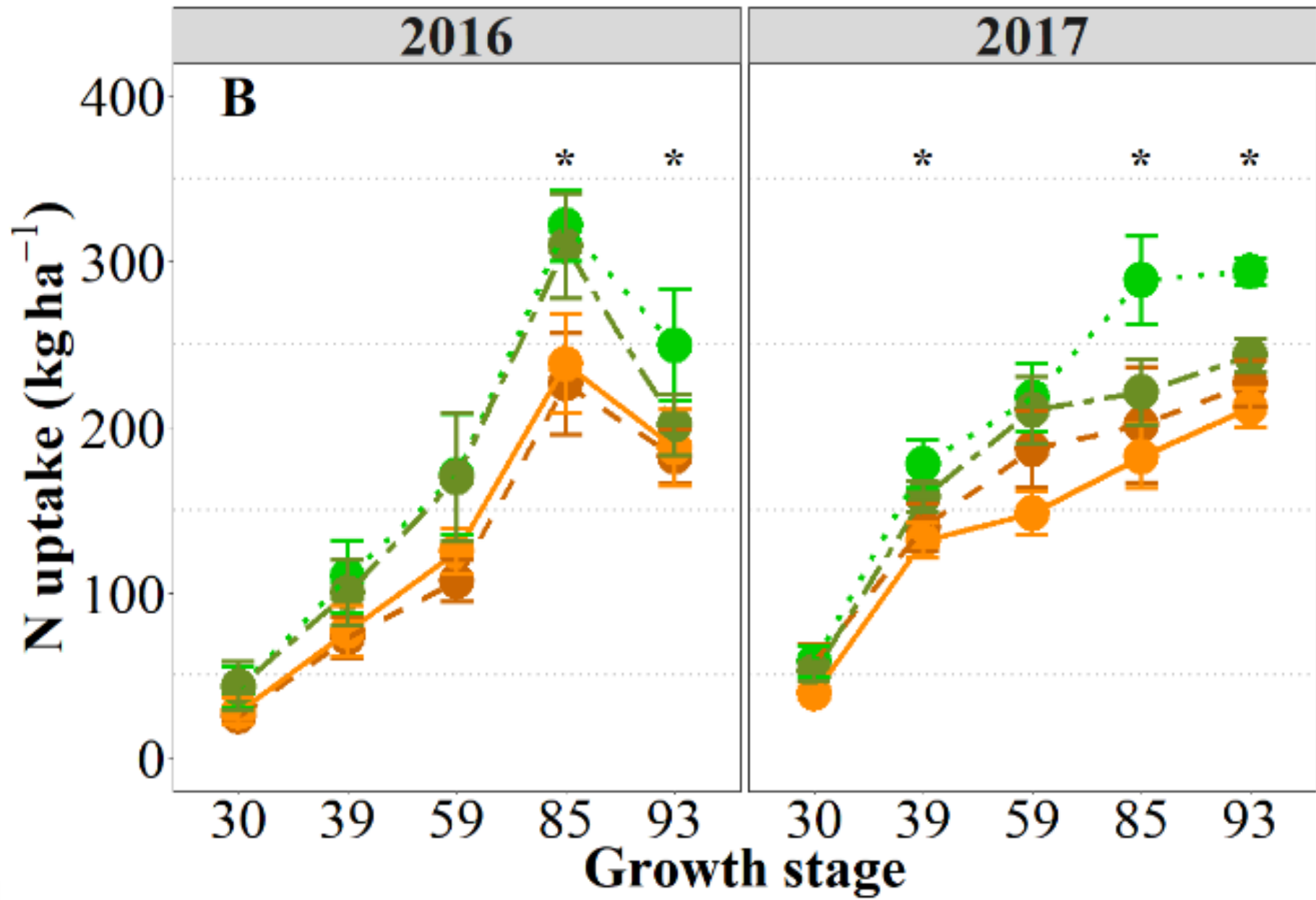
KSU Wheat

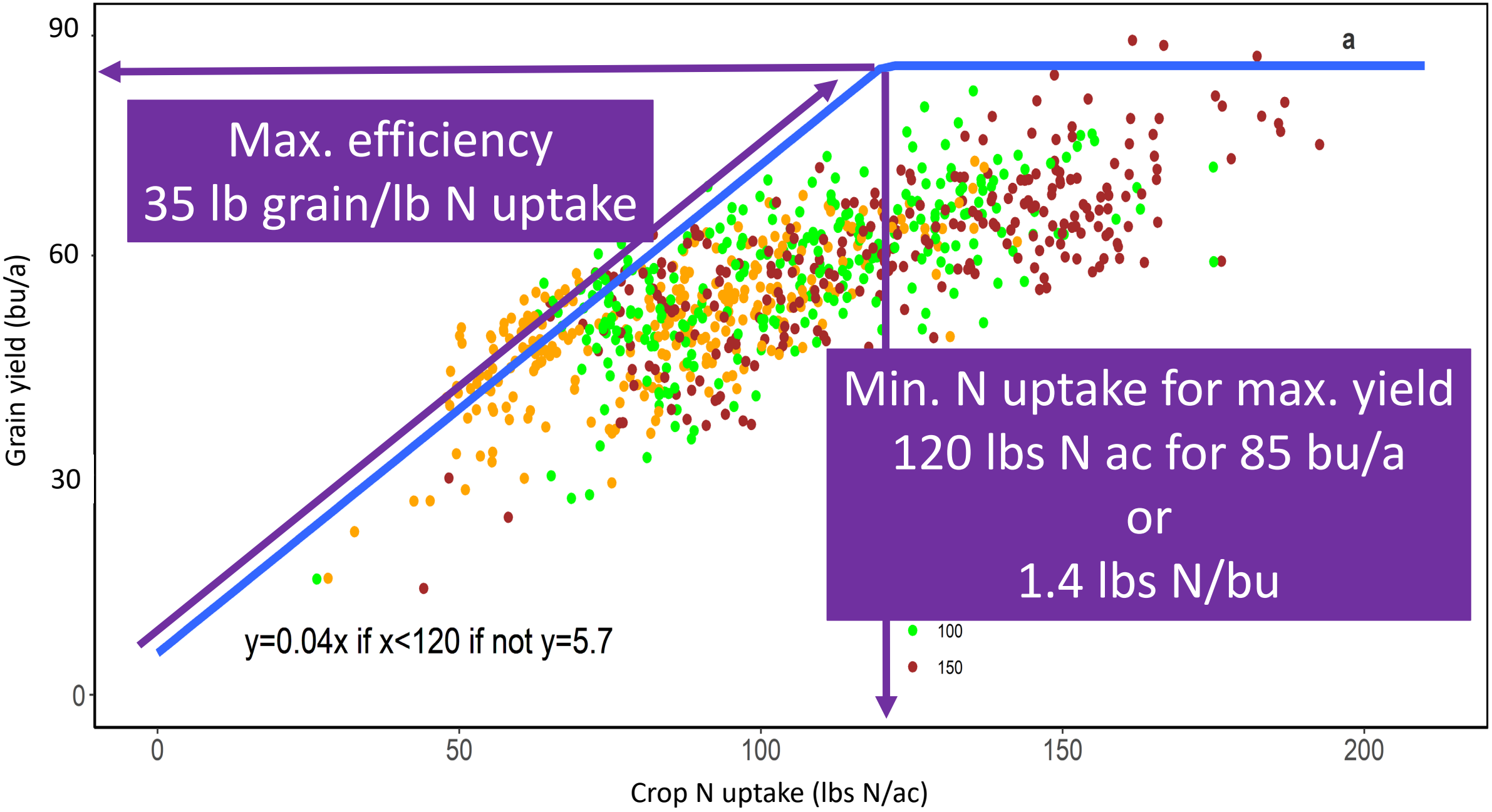
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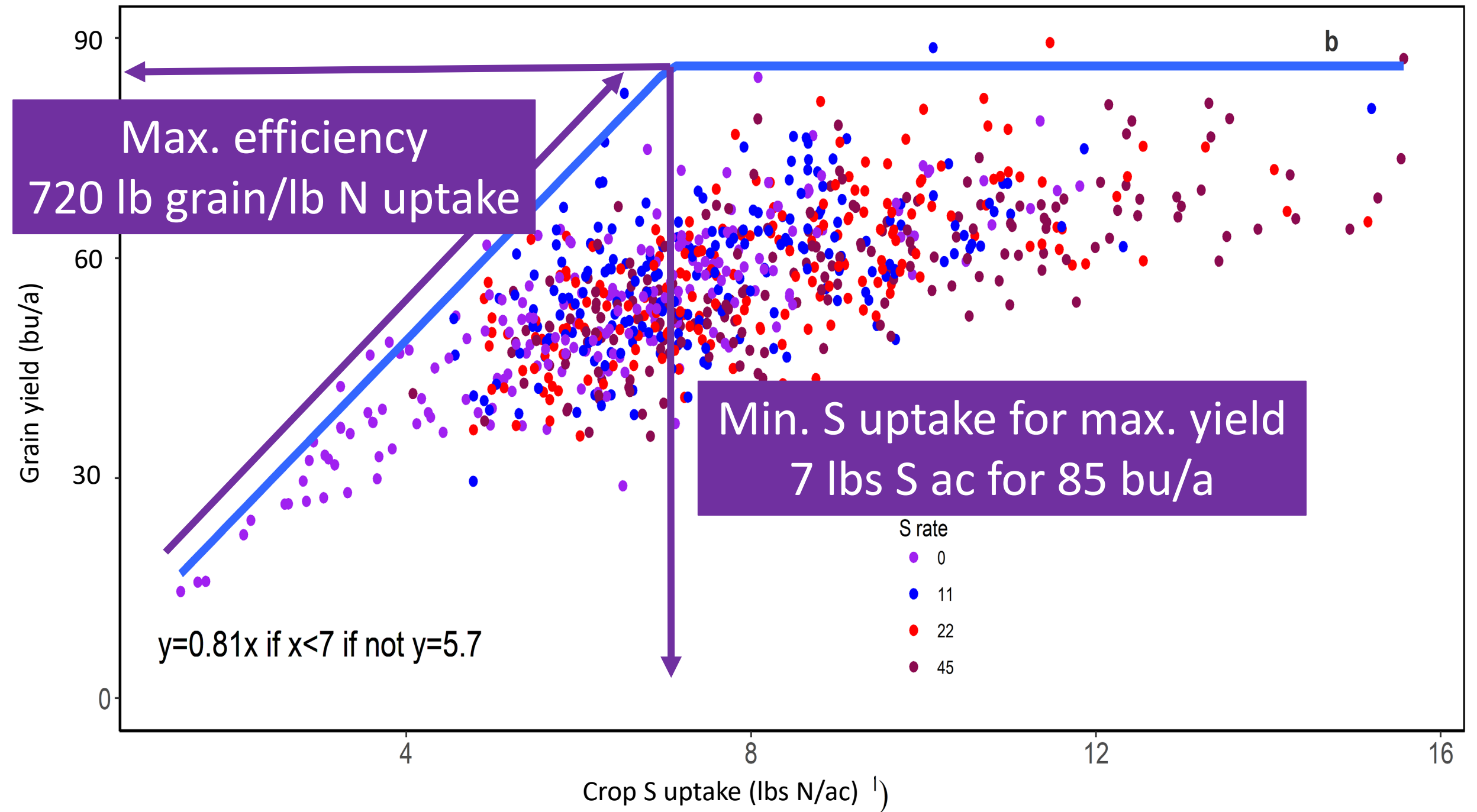










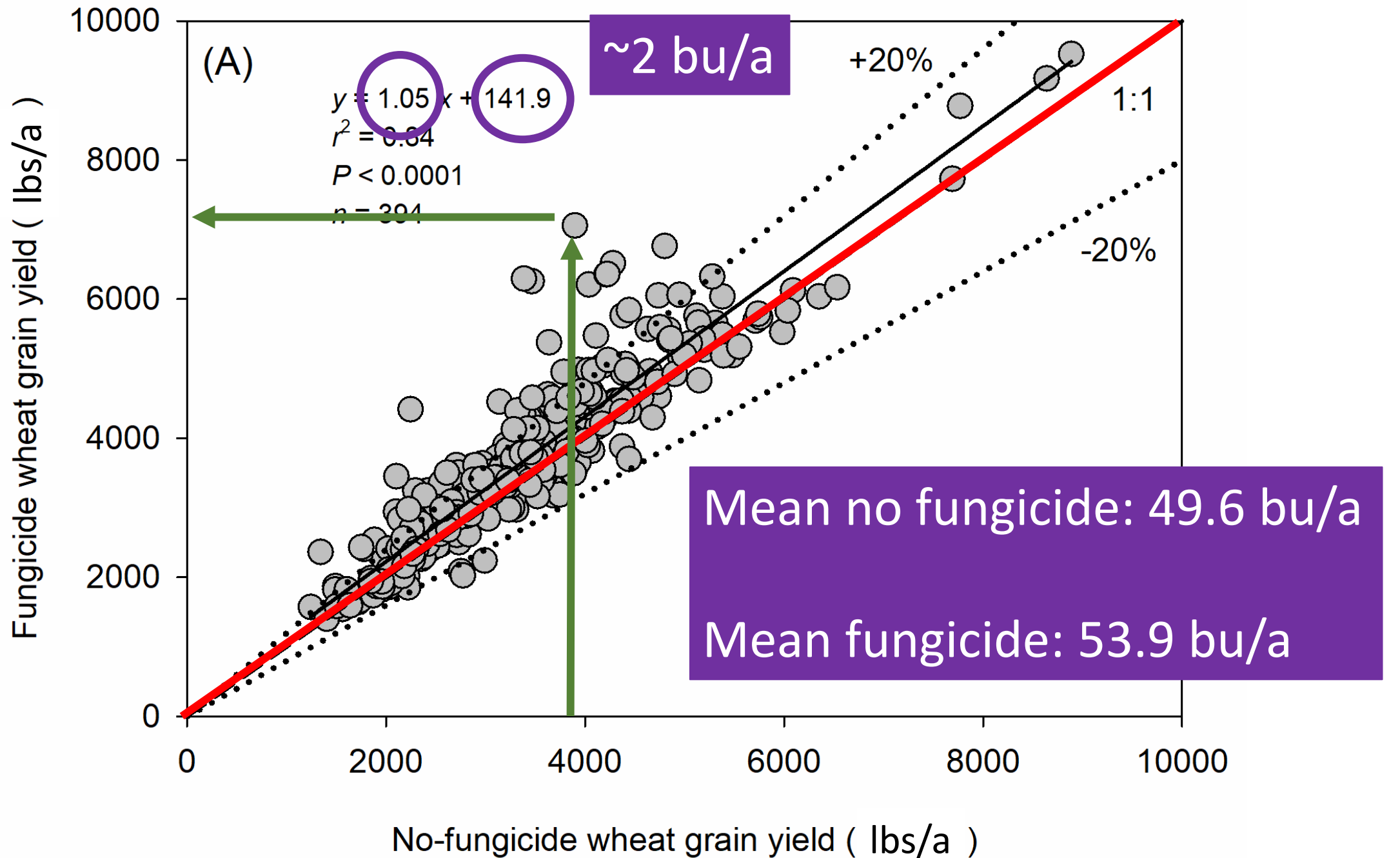


0 lbs N/a



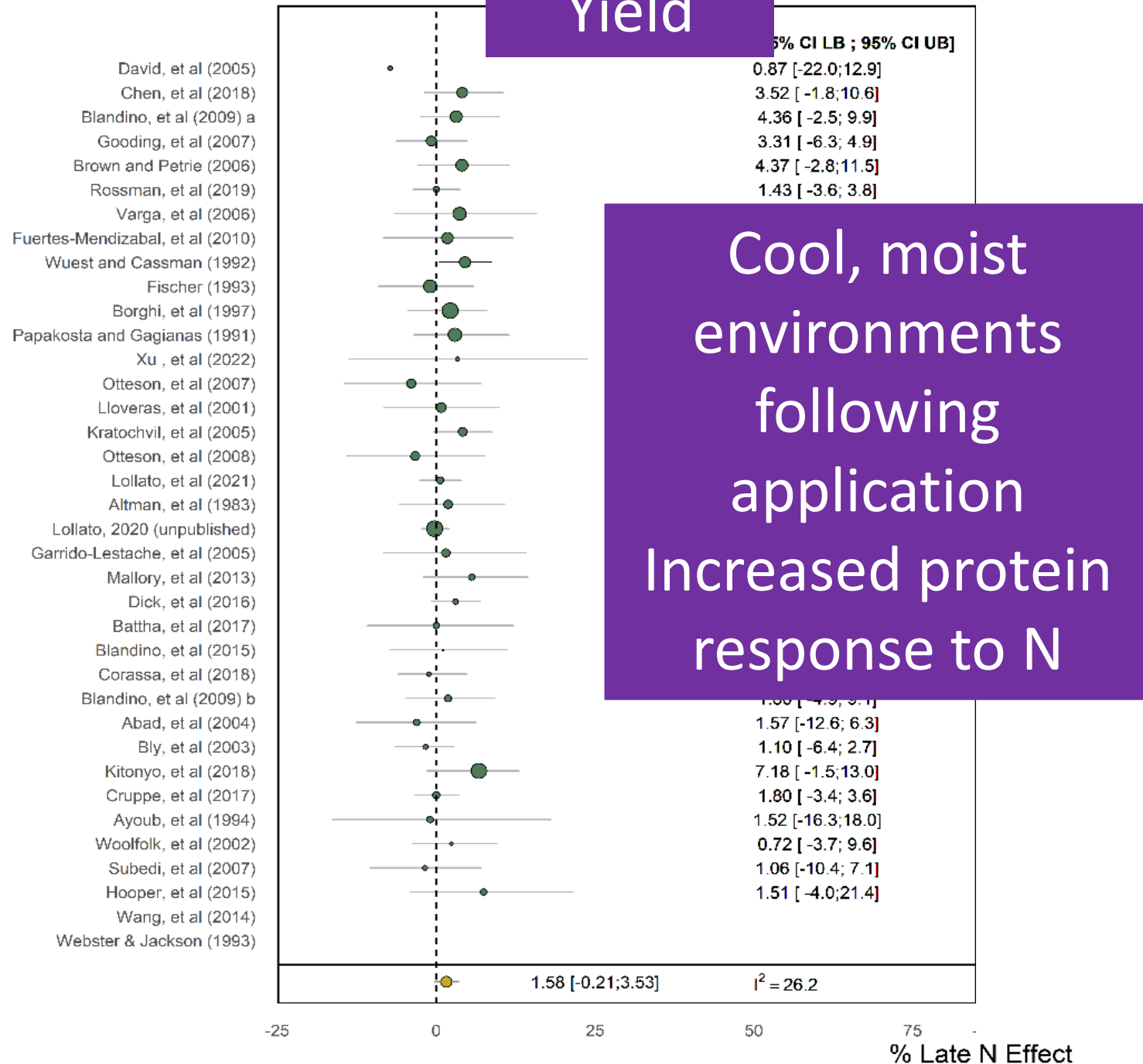
120 lbs N/a





LATE SEASON N APPLICATION?

Yield



Treatment	Exception	Rate
1 - Standard	-	N for 70 bu/ac yield goal
2	- Split-Nitrogen	Intensive – N
3	- Fungicide	Intensive - Fungicide
4 – High input	-	+N, S, Cl, Fungicide, PGR

Varieties

- 1 – WB Grainfield**
- 2 – WB4458**
- 3 – WB4303**
- 4 – WB4515**
- 5 – WB4269**

% IMPORTANCE OF VARIETY, MGM, ENV.

Component	Yield	Test Wt.	Protein	Flour yield	Flour Ash	Flour prot.	Fall. Numb.	Farino. Abs.	Farino. Peak	Farino. MTI	Farino. Stab.
Environment (E)	51	37	65	35	45	68	25	66	43	28	36
Variety (V)	4	17	6	11			1	6	4	11	15
V x E	6	11	3					3	5	10	7
Management (M)	12	11	16					7	14	0	7
M x E	10	6	4					1	2	8	6
V x M	1	2							1	0	0
V x M x E	3	3	1					0	7	2	2
Rep.	4	0	1					1	1	1	3
Residual	9	13	5	48			56	14	23	39	24
Total	100	100	100	100	100	100	100	100	100	100	100

**EVALUATING
ALREADY GOOD
AND ADAPTED
VARIETIES**

% IMPORTANCE OF VARIETY, MGM, ENV.

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V x E	6	11	3	2	2	3	3	3	5	10	7
Management (M)	12	11	16	0	3	16	1	7	14	0	7
M x E	10	6	4	2	4	3	4	1	2	8	6
V x M	1	2	0	0	0	0	0	0	1	0	0
V x M x E	3	3	1	0	0	0	4	0	7	2	2
Rep.	4	0	1	2	8	1	7	1	1	1	3
Residual	9	13	5	48	31	4	56	14	23	39	24
Total	100	100	100	100	100	100	100	100	100	100	100

% IMPORTANCE OF VARIETY, MGM, ENV.

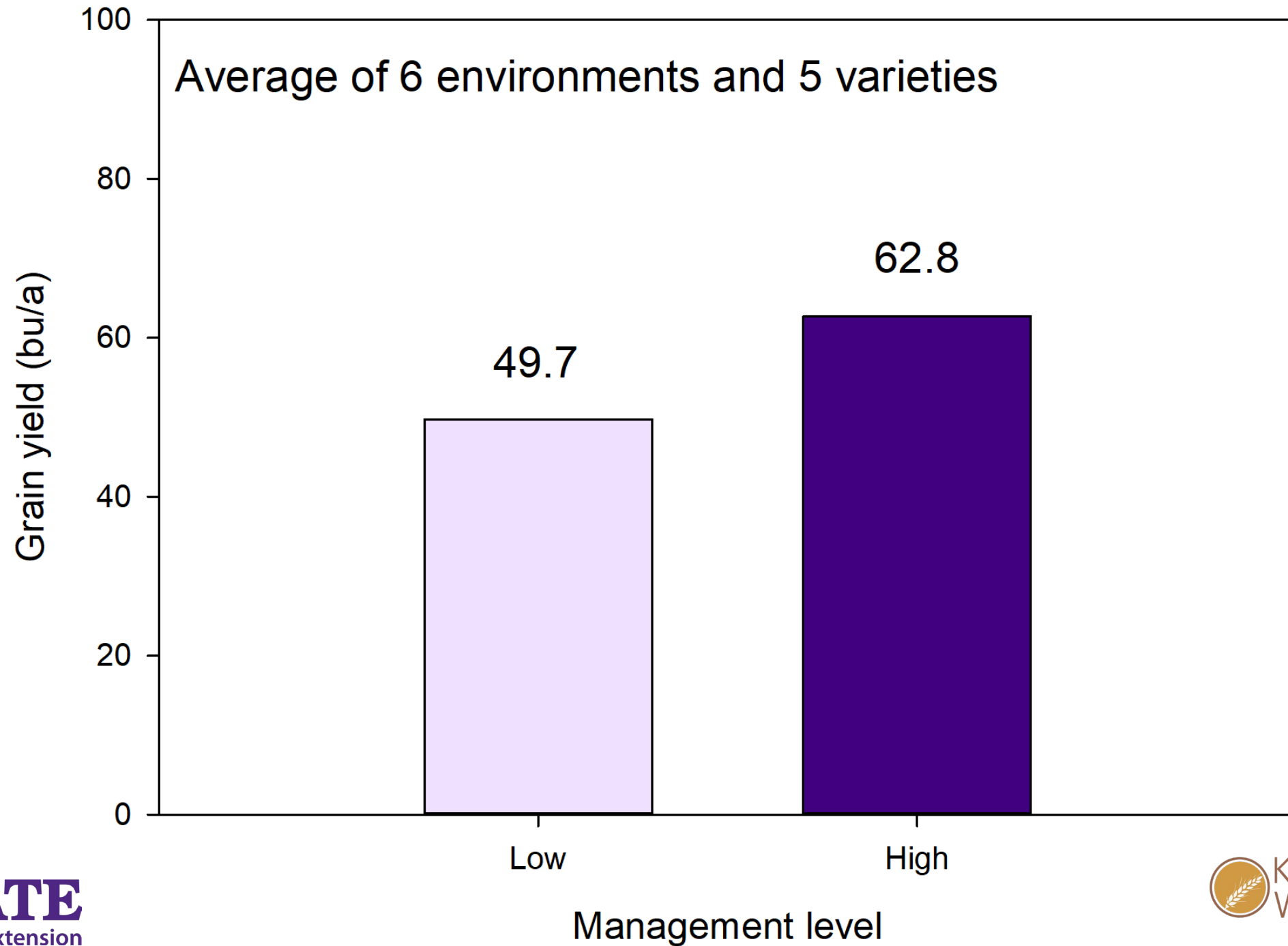
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M x E	10	6	4	2	4	3	4	1	2	8	6
V x M	1	2	0	0	0	0	0	0	1	0	0
V x M x E	3	3	1	0	0	0	4	0	7	2	2
Rep.	4	0	1	2	8	1	7	1	1	1	3
Residual	9	13	5	48	31	4	56	14	23	39	24
Total	100	100	100	100	100	100	100	100	100	100	100

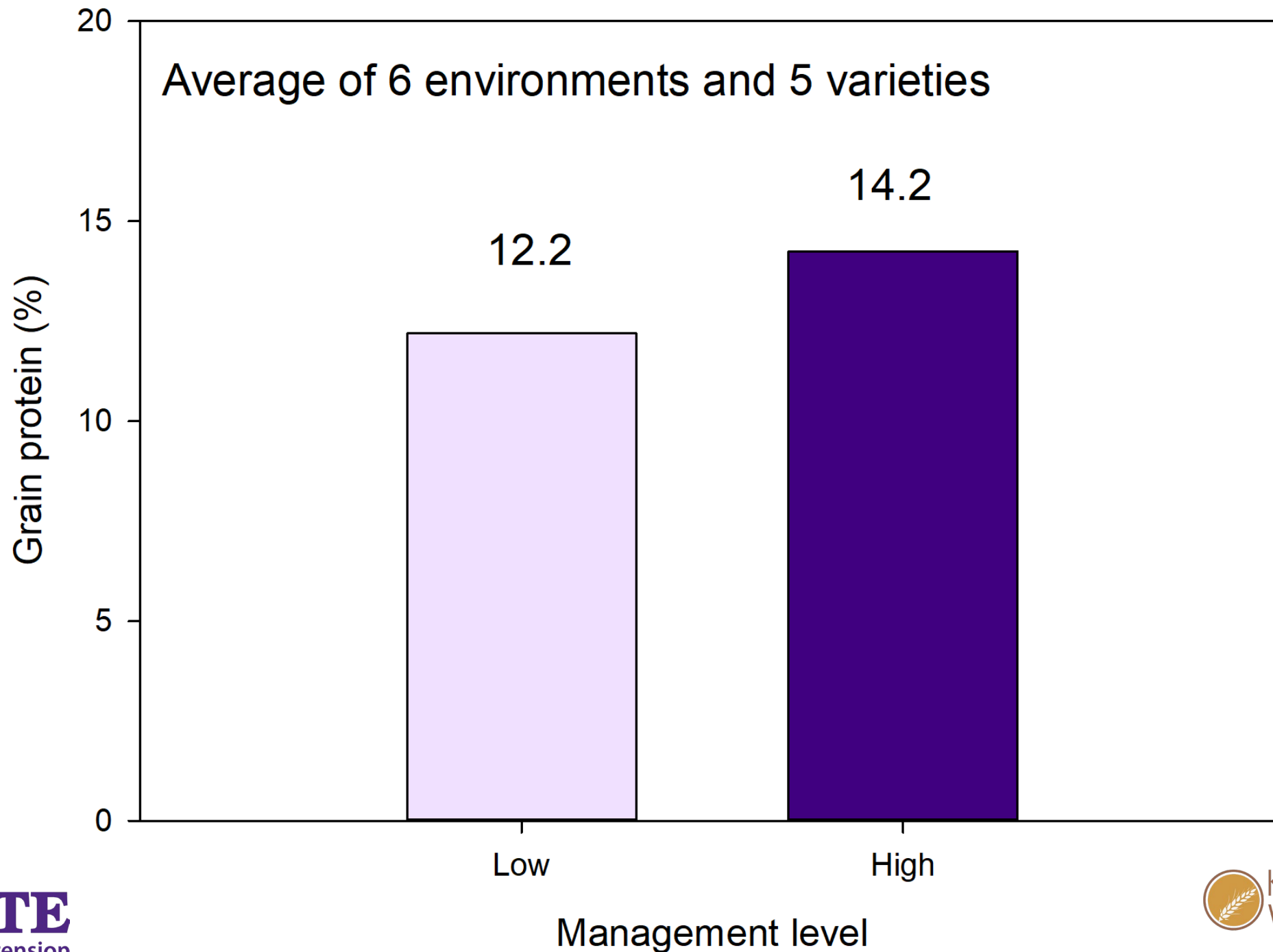
% IMPORTANCE OF VARIETY, MGM, ENV.

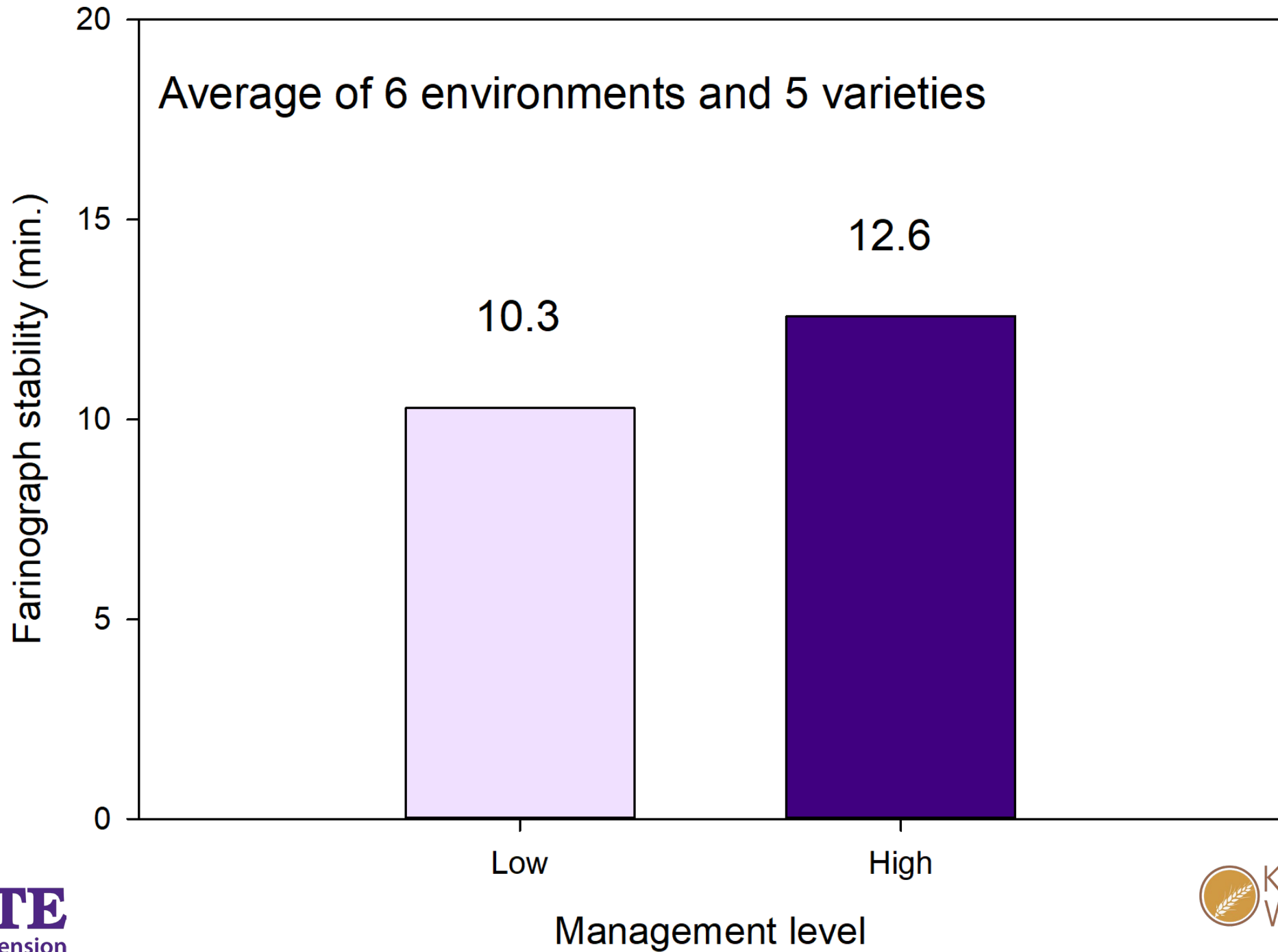
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Management (M)	12	11	16	0	3	16	1	7	14	0	7
M x E	10	6	4	2	4	3	4	1	2	8	6
V x M	1	2	0	0	0	0	0	0	1	0	0
V x M x E	3	3	1	0	0	0	4	0	7	2	2
Rep.	4	0	1	2	8	1	7	1	1	1	3
Residual	9	13	5	48	31	4	56	14	23	39	24
Total	100	100	100	100	100	100	100	100	100	100	100

% IMPORTANCE OF VARIETY, MGM, ENV.

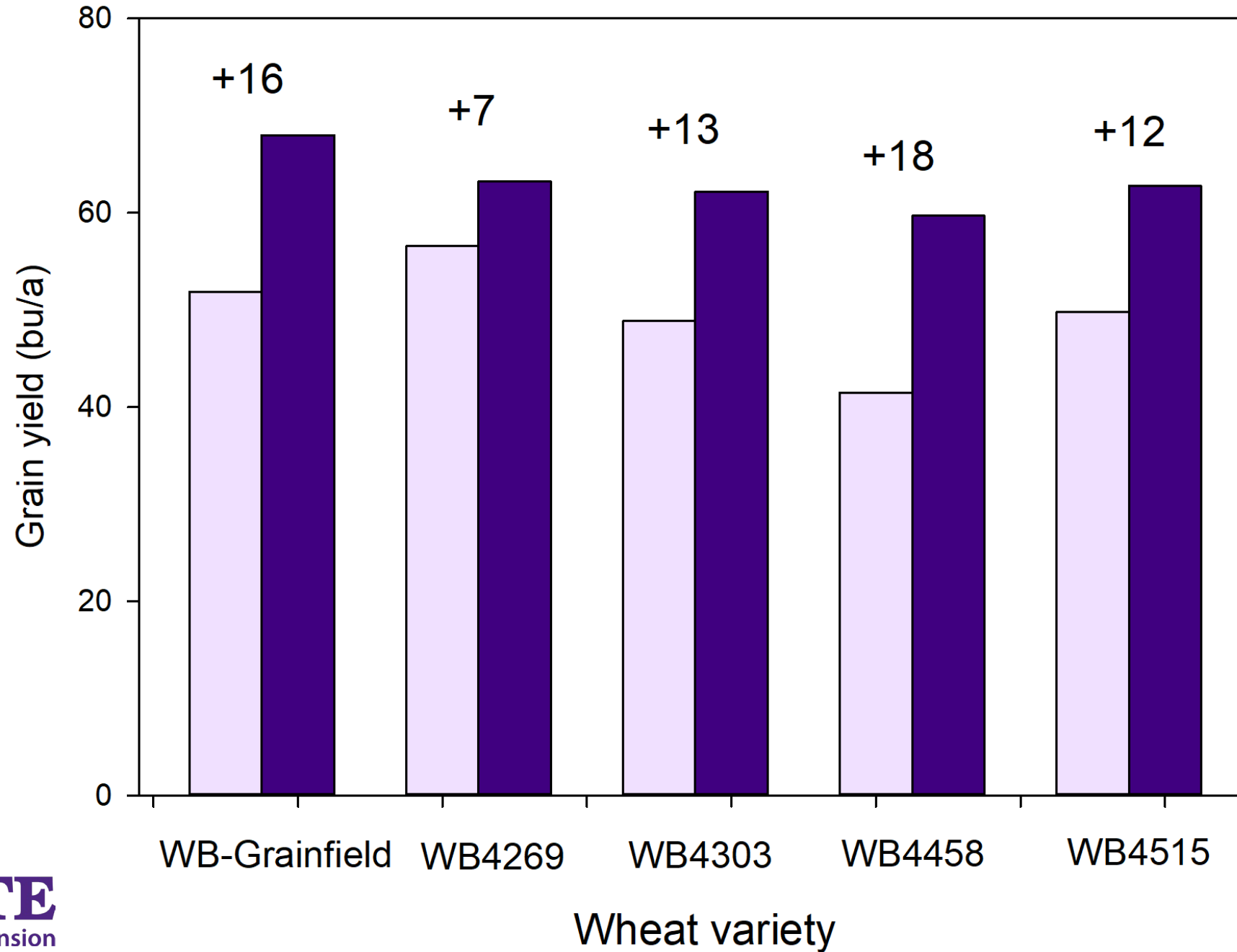
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M x E	10	6	4	2	4	3	4	1	2	8	6
V x M	1	2	0	0	0	0	0	0	1	0	0
V x M x E	3	3	1	0	0	0	4	0	7	2	2
Rep.	4	0	1	2	8	1	7	1	1	1	3
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Total	100	100	100	100	100	100	100	100	100	100	100



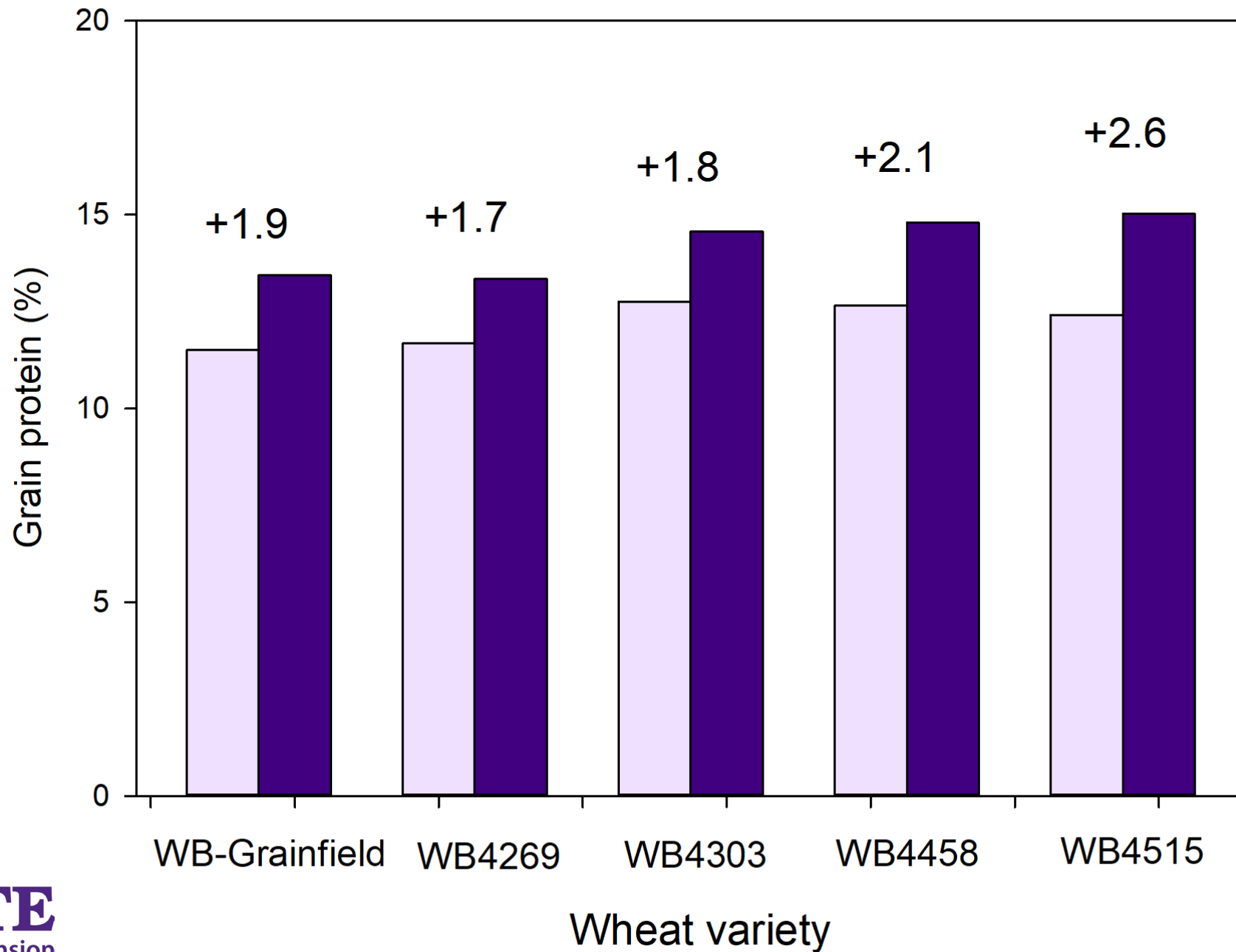




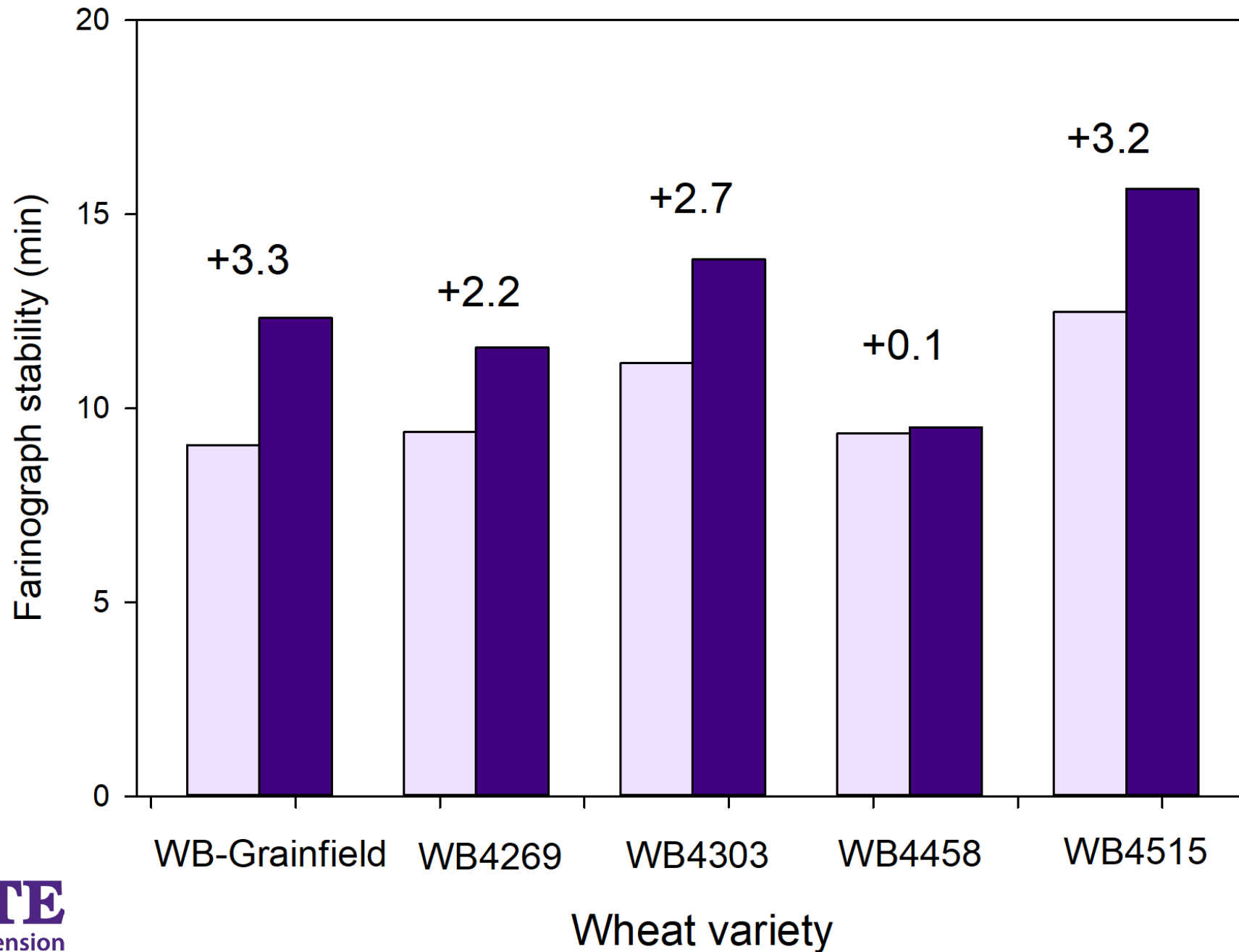
Average of 6 environments

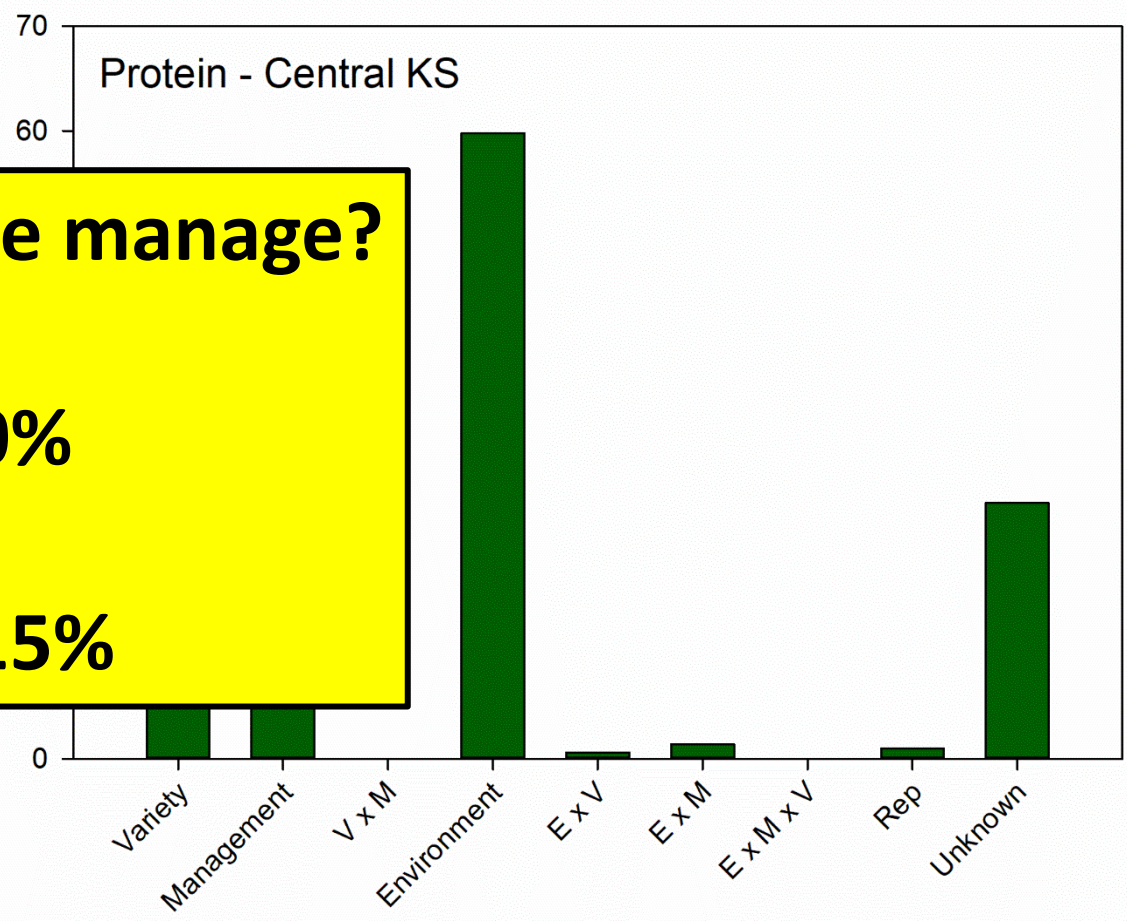
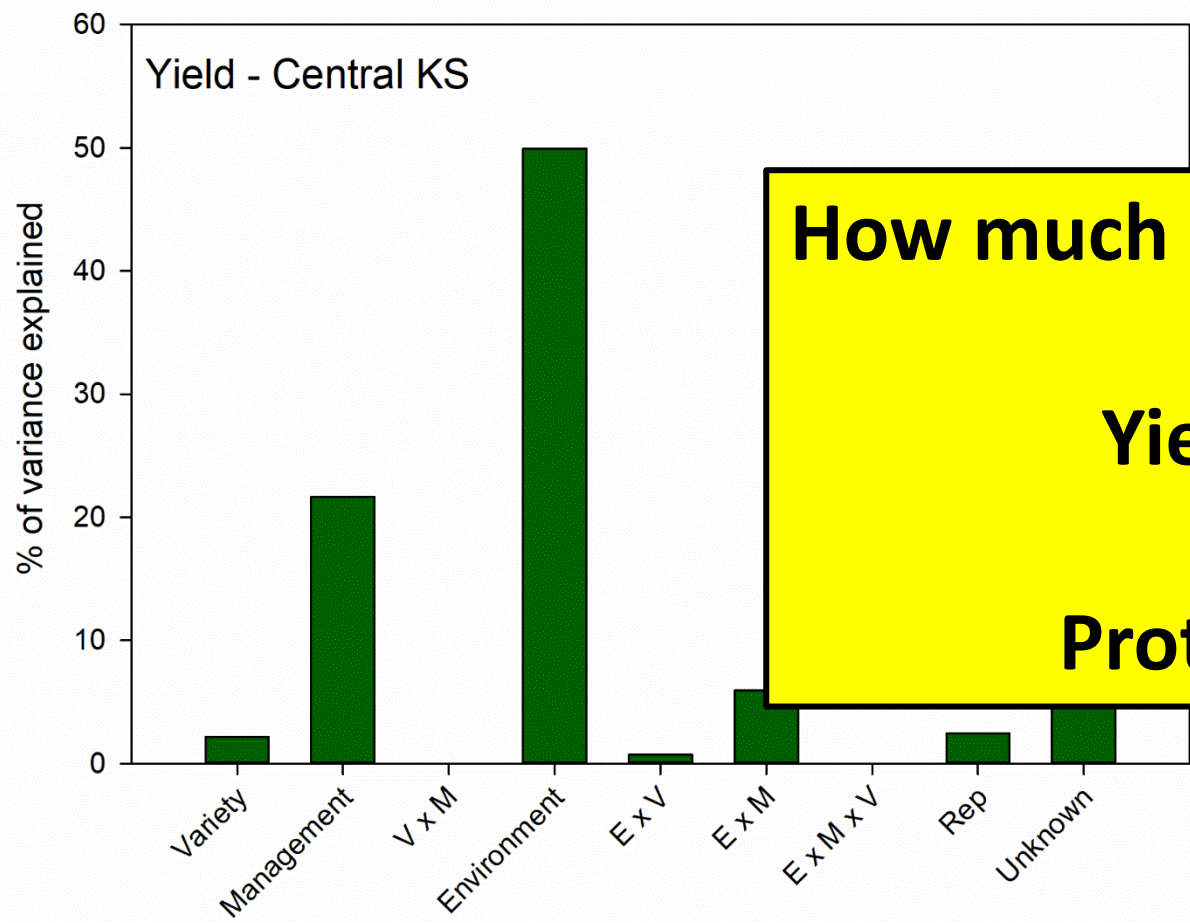


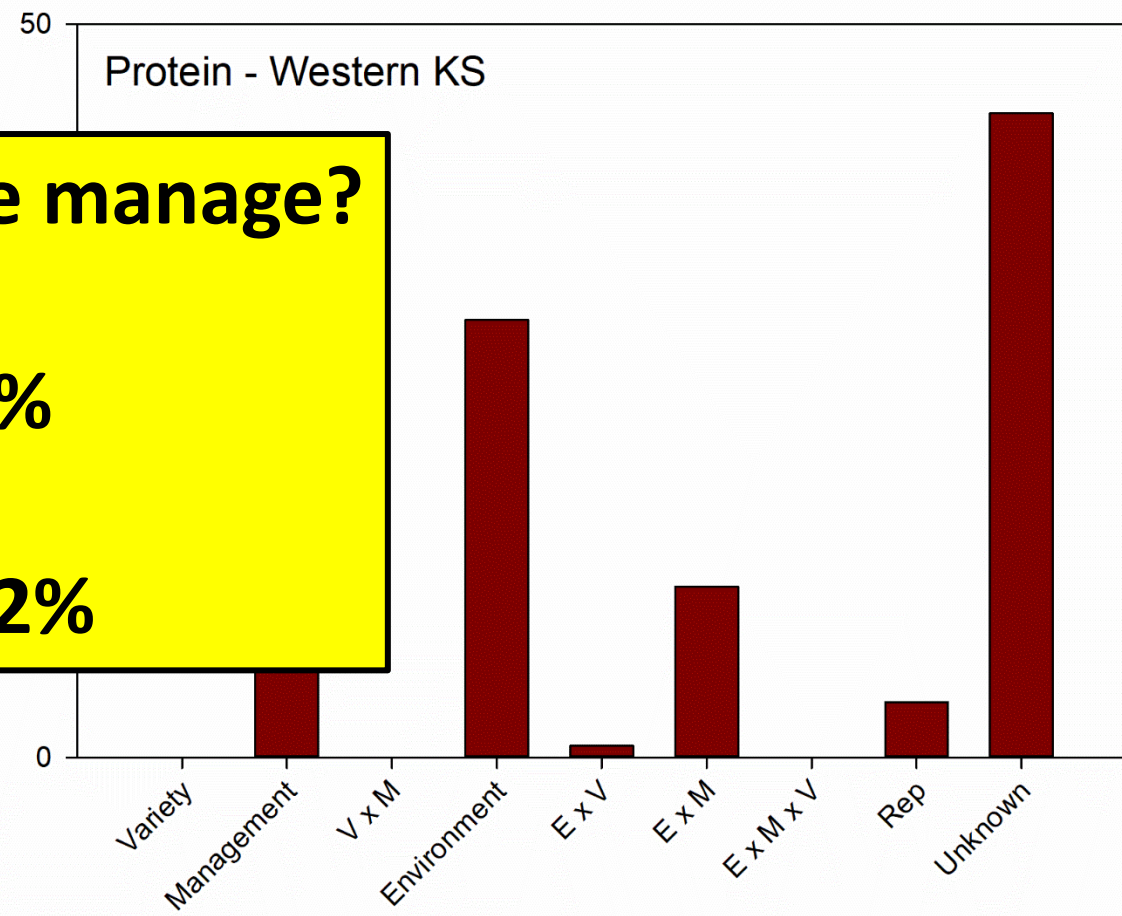
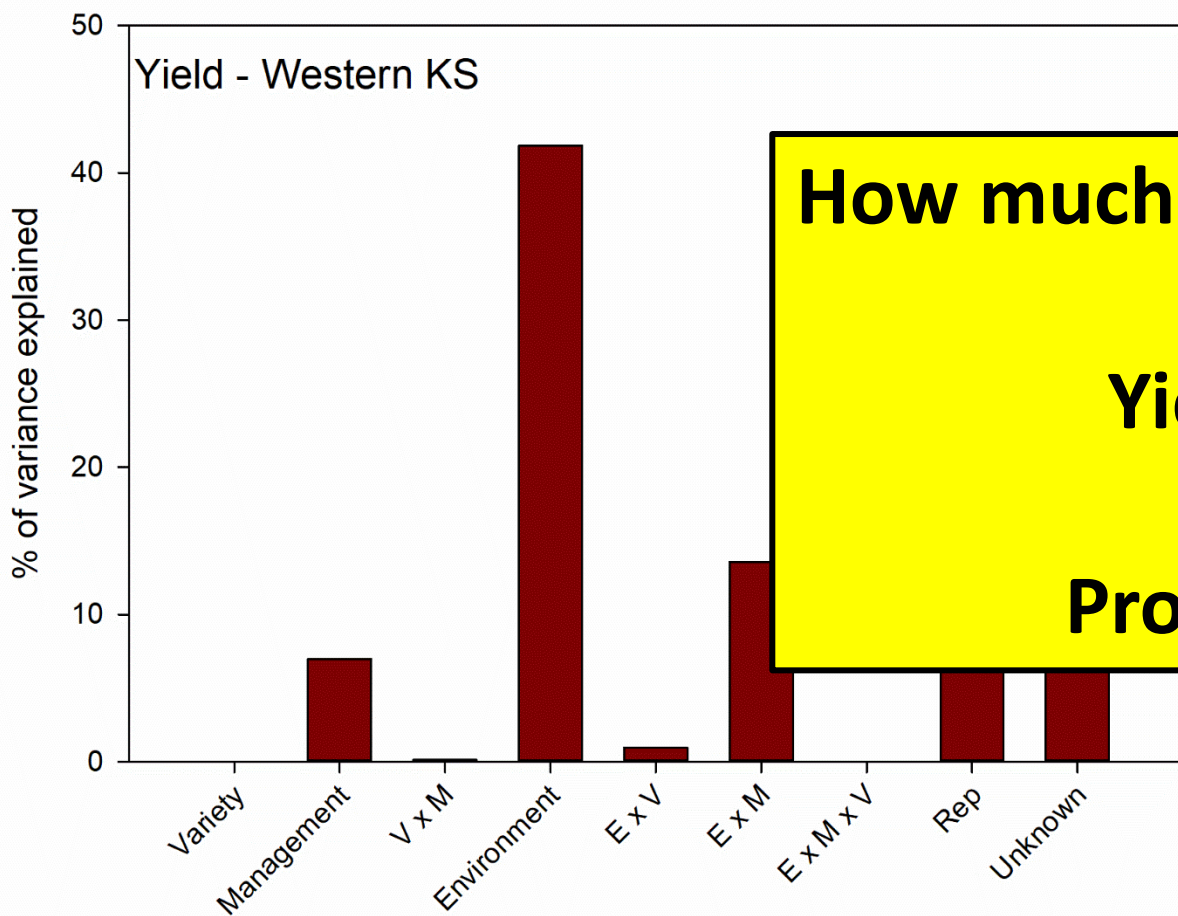
Average of 6 environments

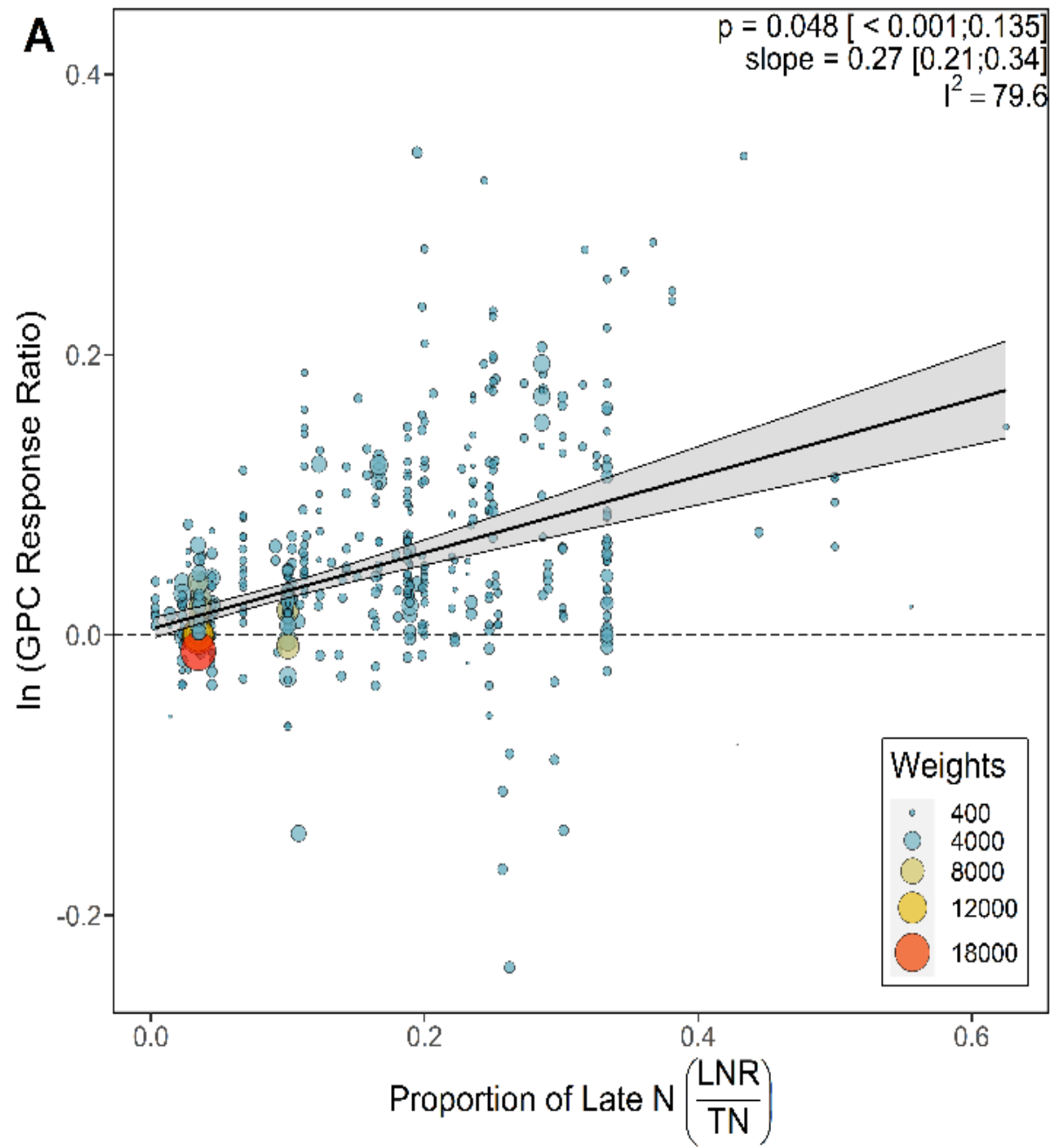


Average of 6 environments

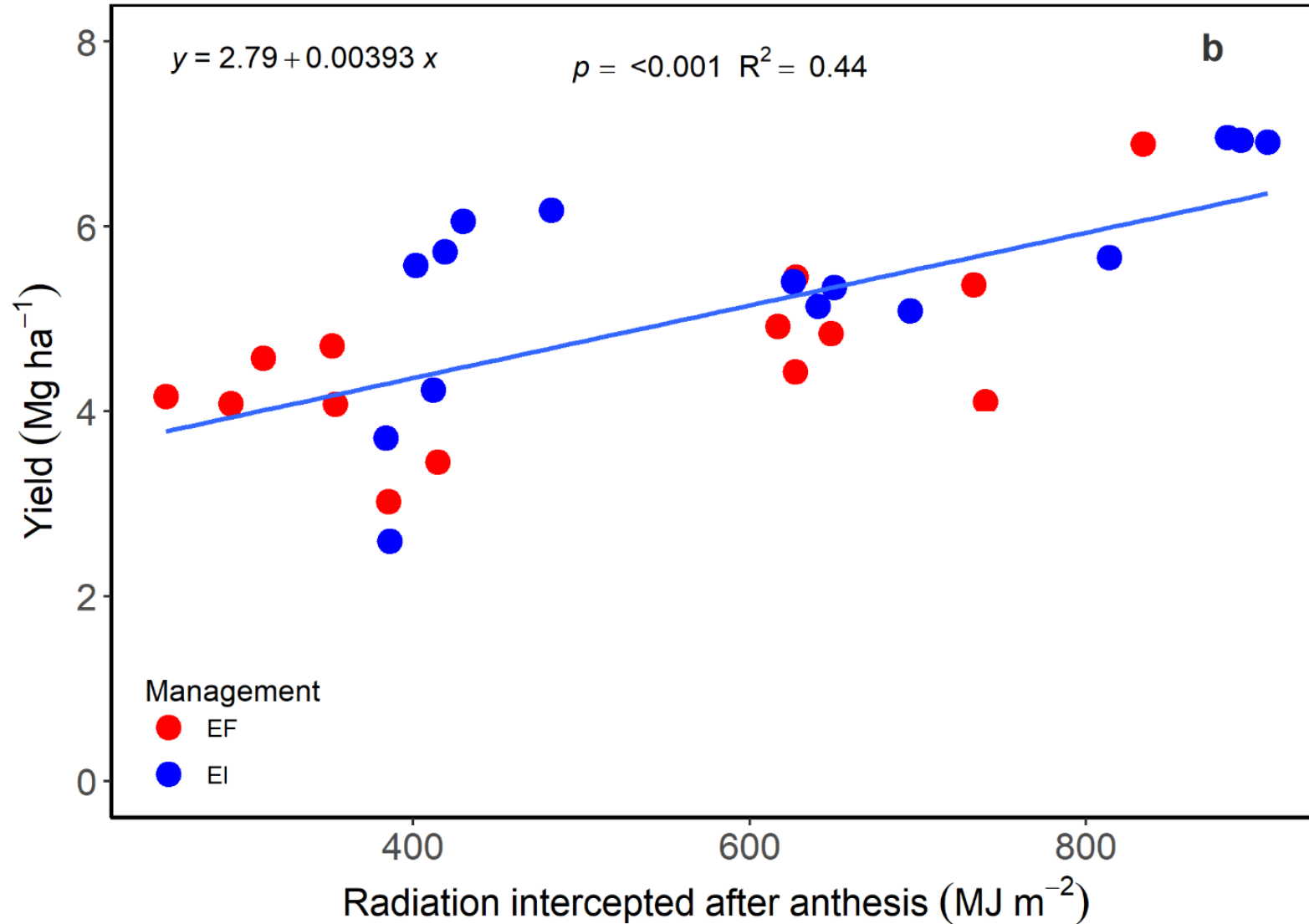




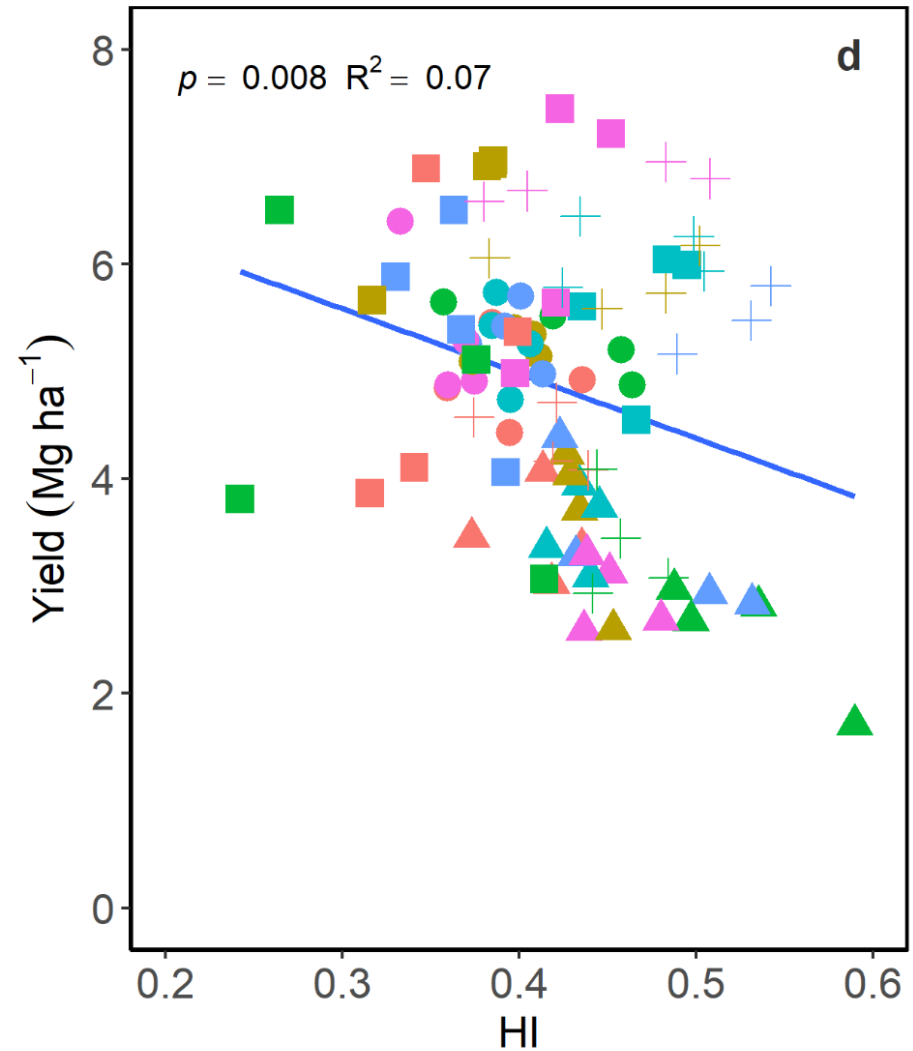
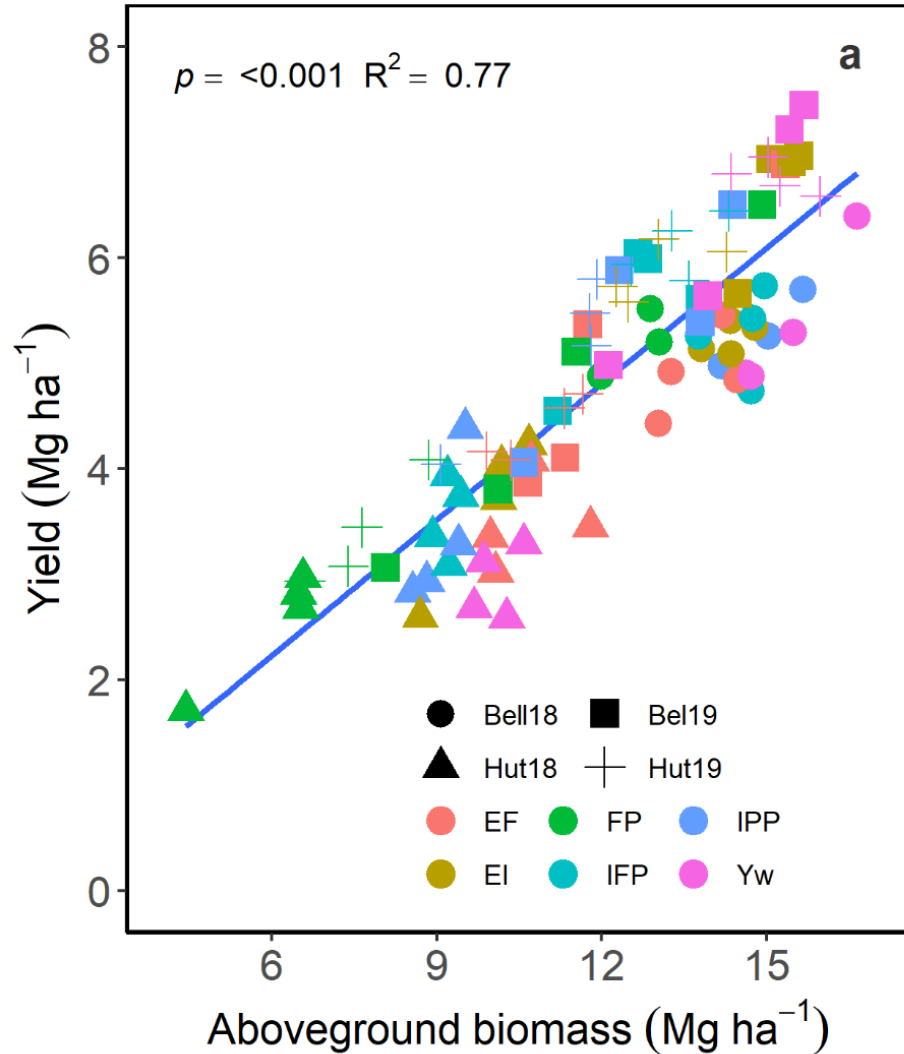




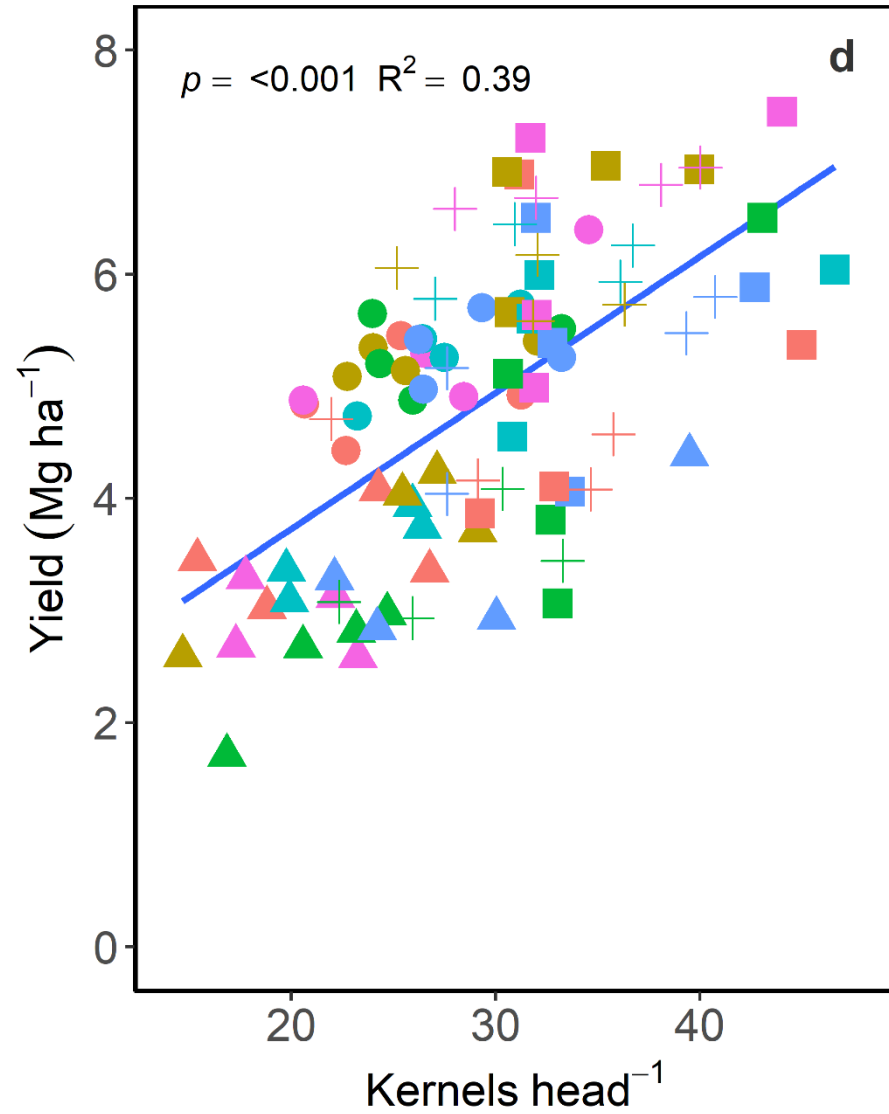
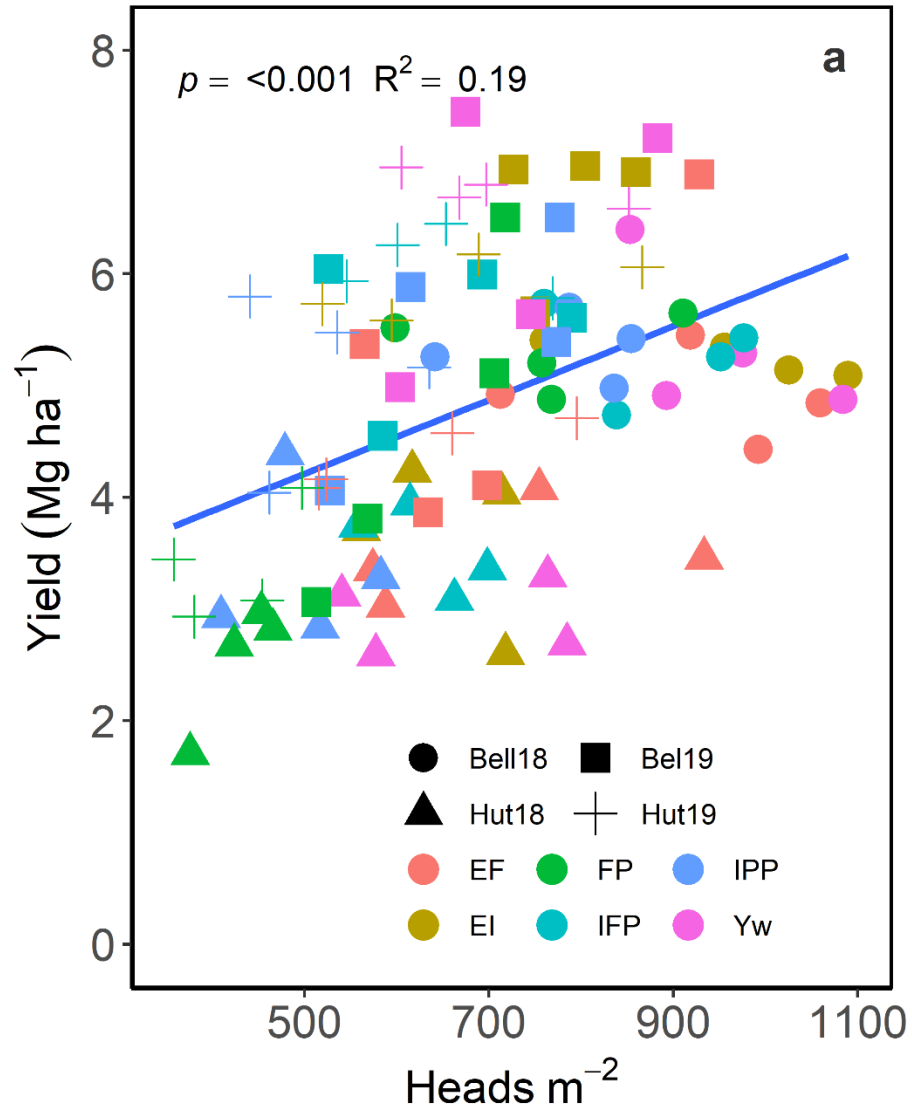
FUNGICIDE: YIELD x GREEN CANOPY



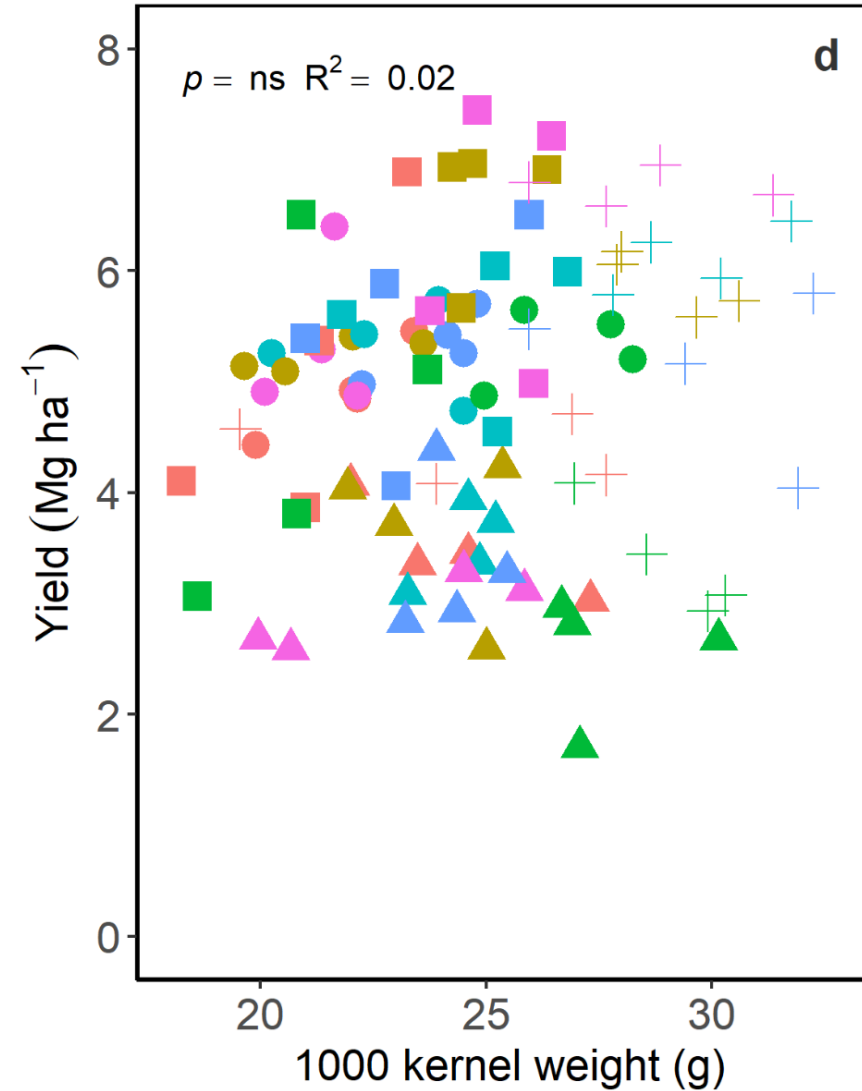
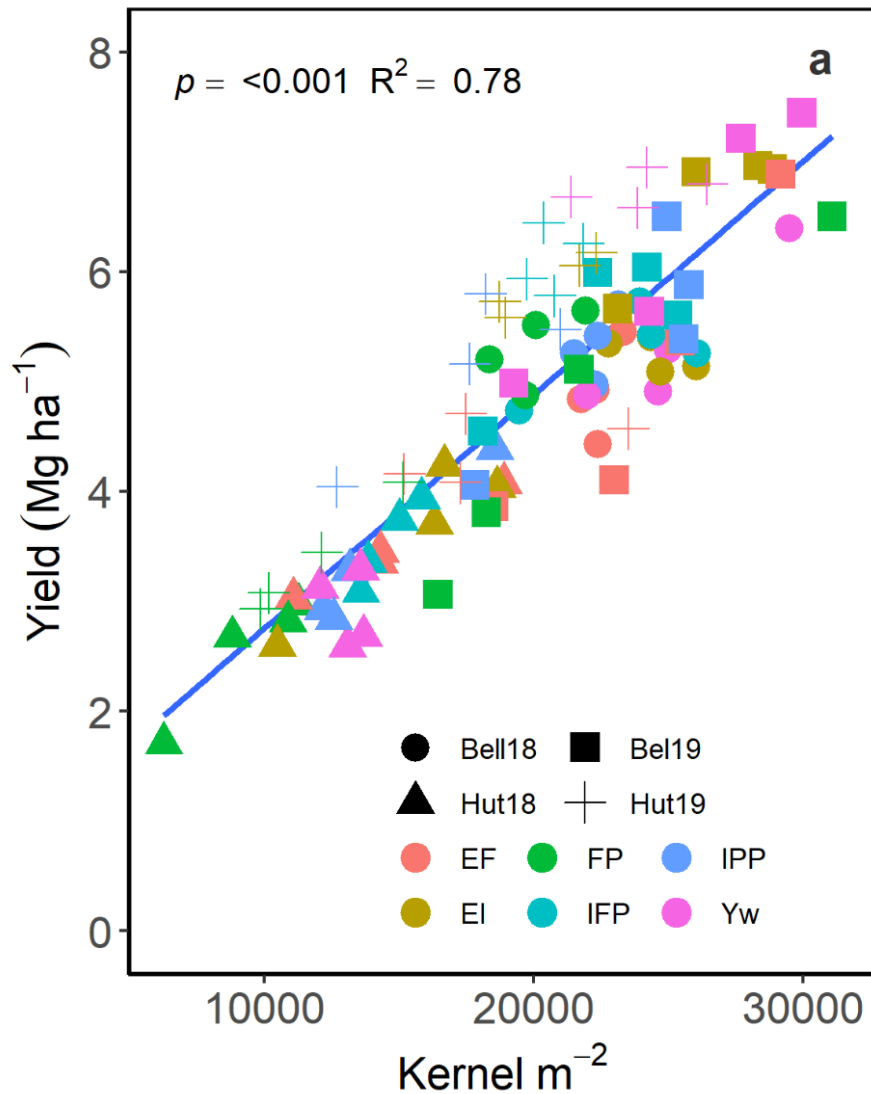
BIOMASS OR HARVEST INDEX?



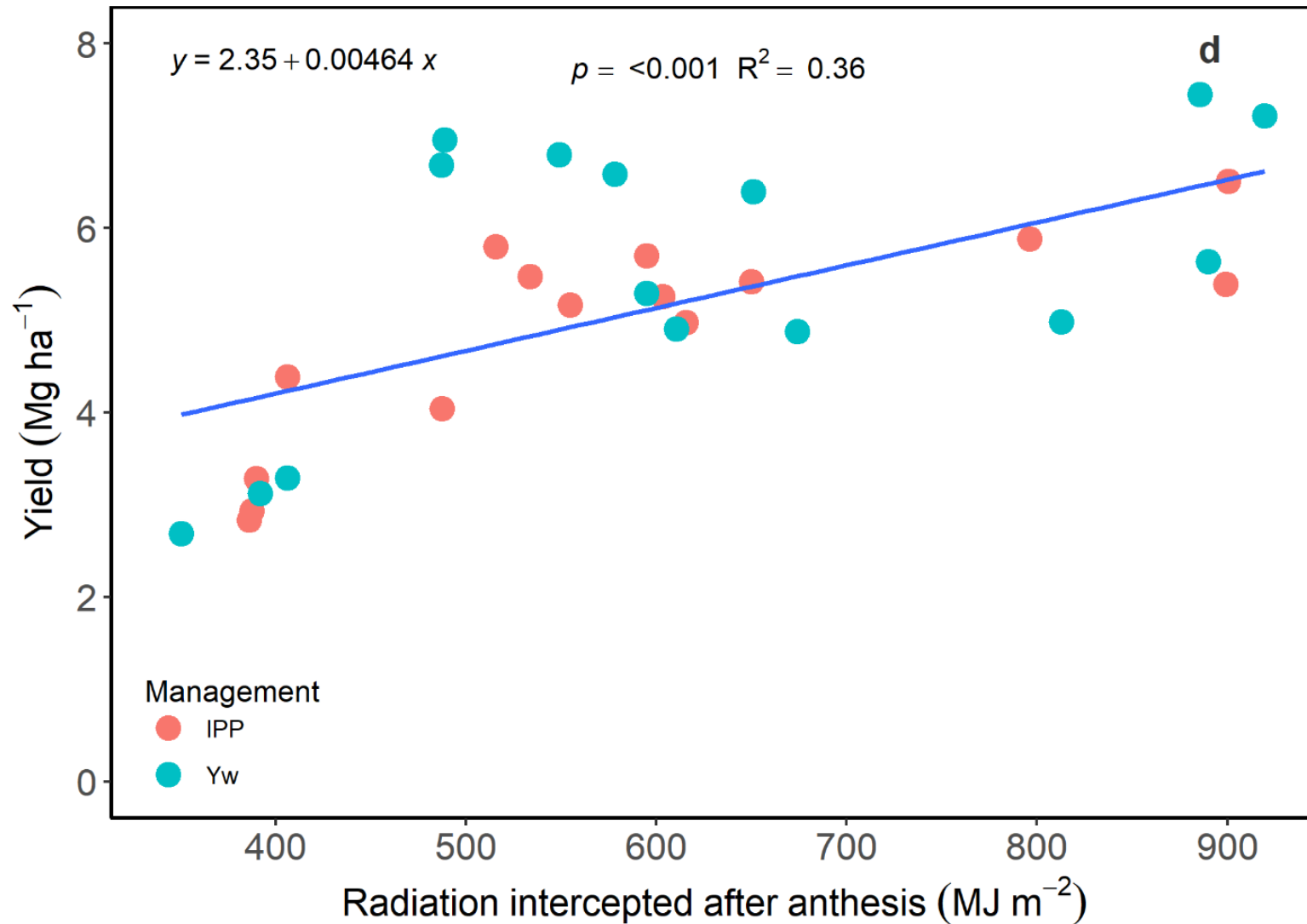
HEAD NUMBER OR HEAD SIZE?



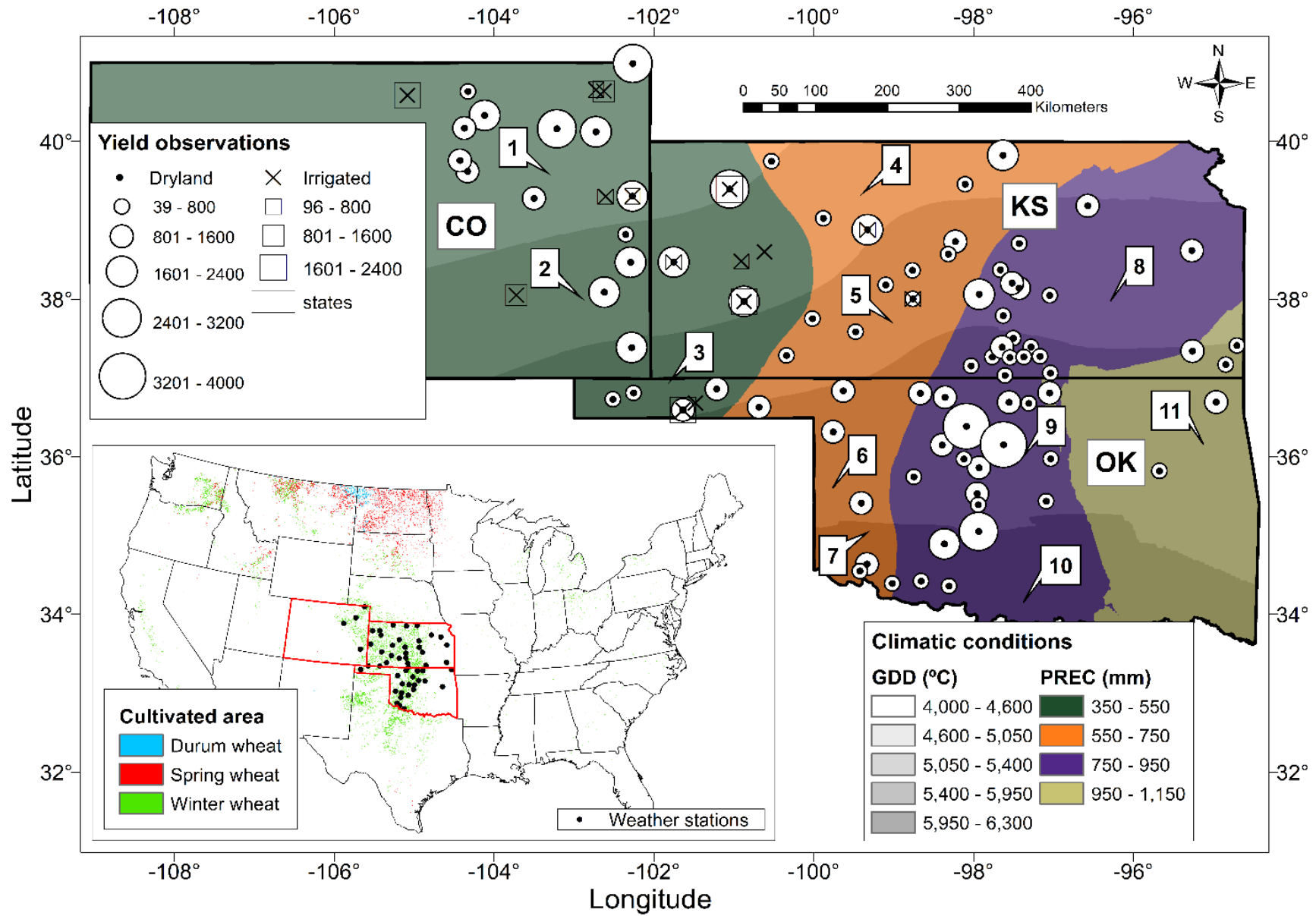
KERNEL NUMBER OR KERNEL WEIGHT?

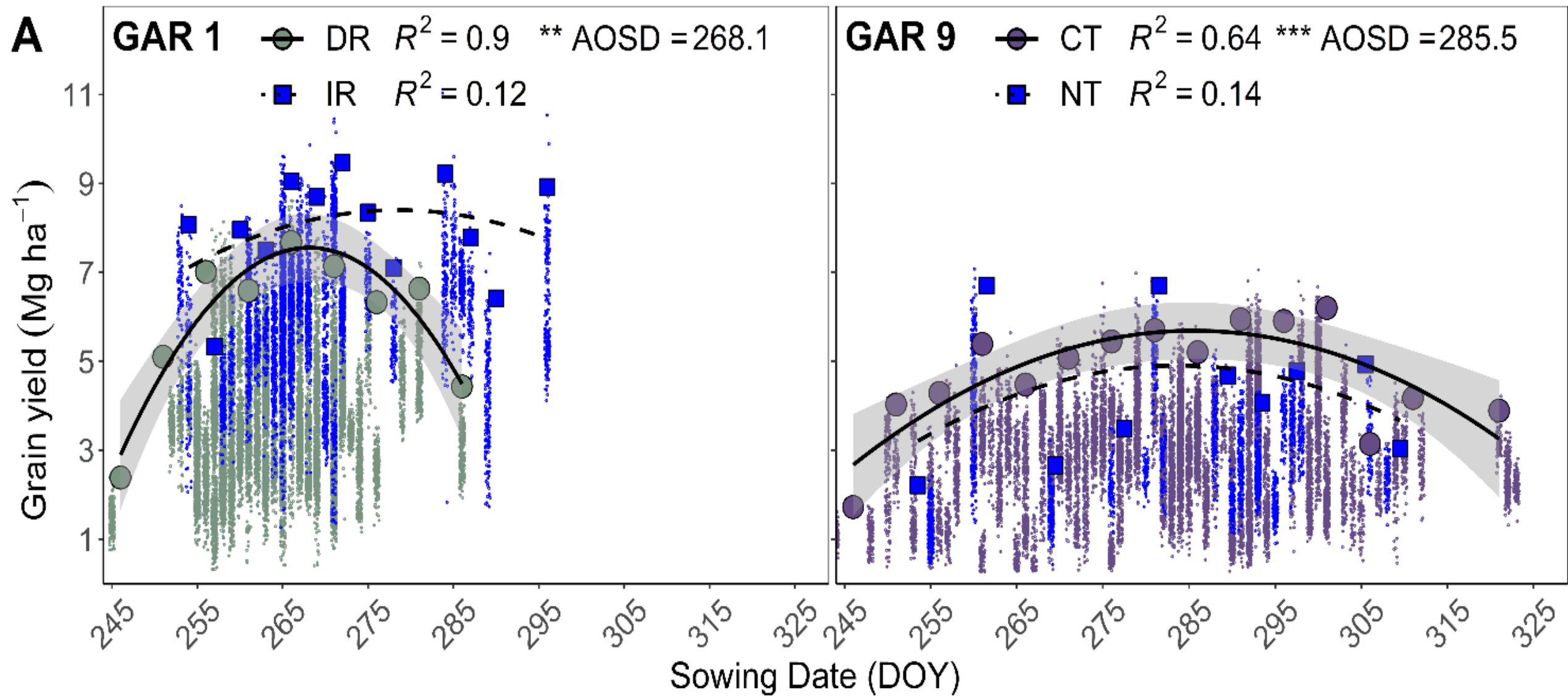


REDUCED SEED RATE: YIELD x GREEN CANOPY



LONG-TERM VARIETY TRIALS



A

B