CLS Infection Dynamics and Optimizing Disease Control

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NDSU NORTH DAKOTA STATE UNIVERSITY

Sugarbeet Growers' Seminars

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UNIVERSITY OF MINNESOTA EXTENSION

Cercospora leaf spot: A new introduction

- Rapid shift in disease incidence and severity in 2024 and 2025 compared to previous years

- Continuing adaptation of the pathogen to overcome CR+ trait

My goal:

- Provide data and evidence to support successful disease control
- Demonstrate that CLS management protects growers' investments in the crop

Environmental Context for 2024 and 2025

In 2025, Grand Forks area had 78% of normal rainfall

Year	Month	Rain (in.)	Departure from Normal (in.)	Average Temp. (°F)	Departure from Normal (°F)	Dew Point (°F)
2024	June	4.9	+1.0	65	-1	52
	July	1.8	-1.9	70	+1	62
	August	6.7	+3.8	68	-1	58
	September	0.3	-2.3	59	+7	54
2025	June	1.6	-2.3	65	-1	53
	July	5.4	+1.8	68	-1	61
	August	1.5	-1.5	67	-1	59
	September	1.7	-1.0	62	+3	54

Grand Forks NDAWN Station ndawn.ndsu.nodak.edu

Cercospora leaf spot (CLS)

- Caused by the fungus *Cercospora beticola*

Symptoms:

- Brown or tan spots, gray centers

  Smaller lesions than other diseases

Pseudostromata form in center of lesion

- Spore production

Photo: E. Branch

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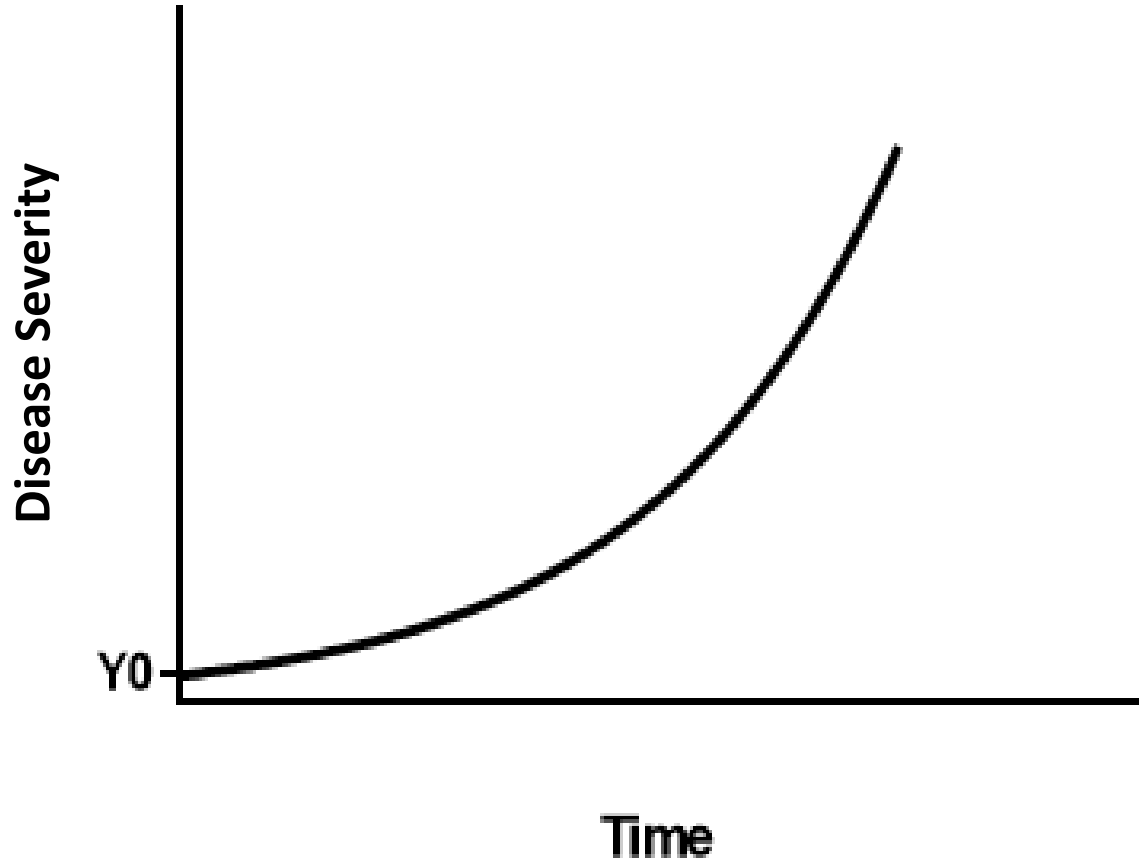
Photo: O. Neher

Cercospora biology affects management

Polycyclic disease cycle

- Each CLS lesion produces hundreds of spores
- If <u>just one</u> additional lesion forms, there is exponential growth



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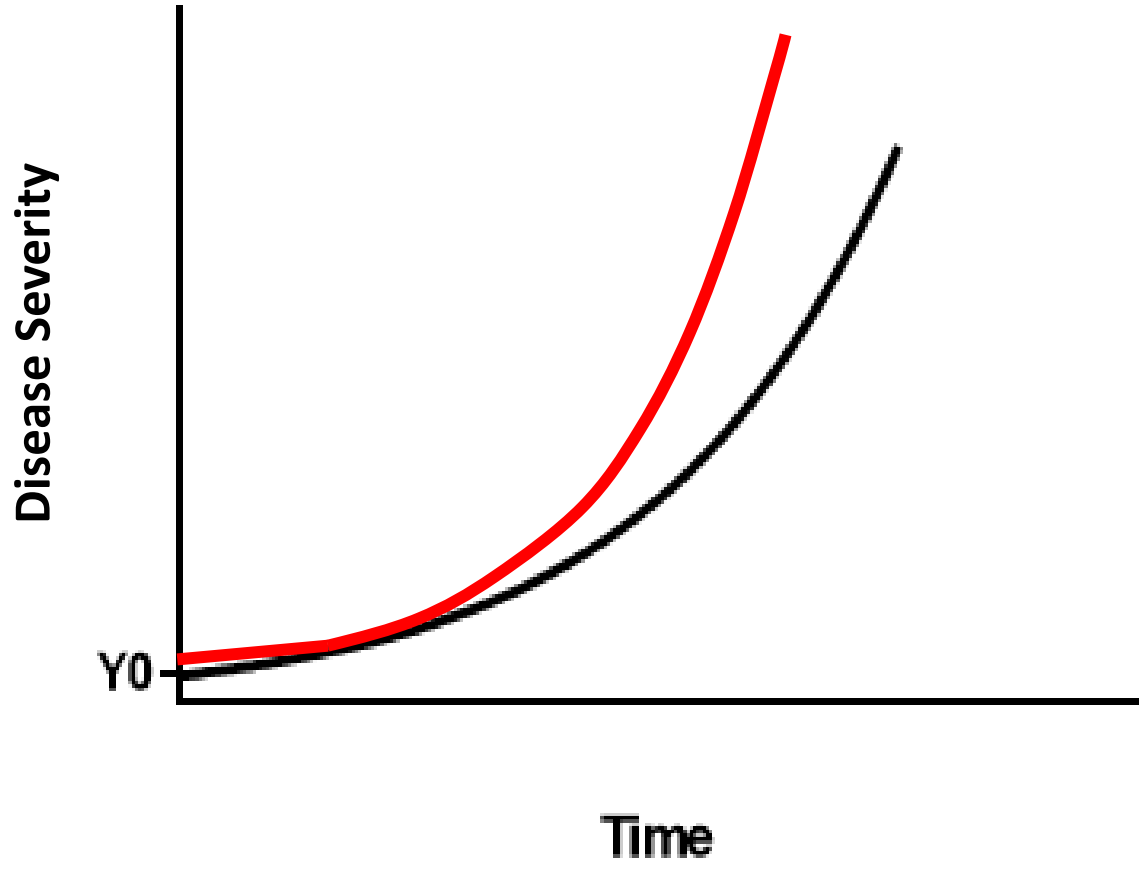


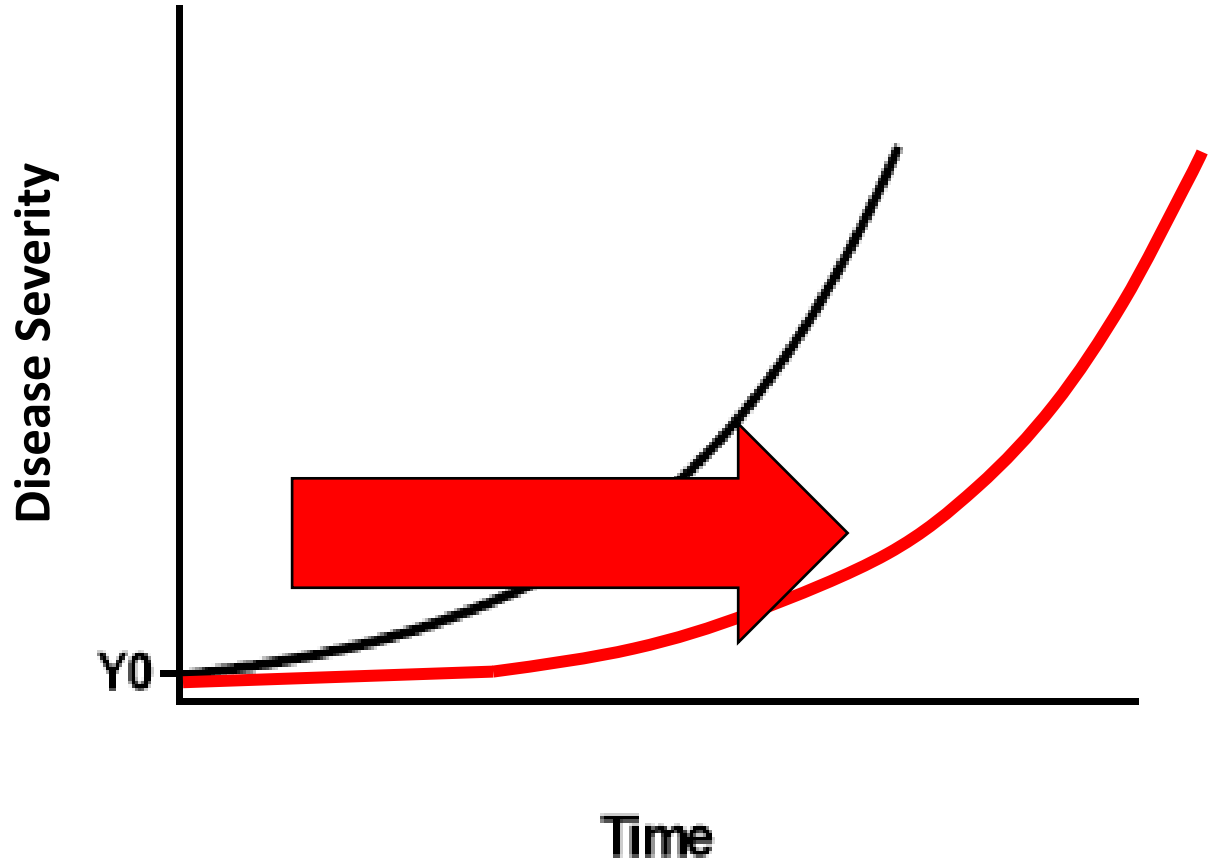
How can we delay spore production and infection?

Inoculum/residue management

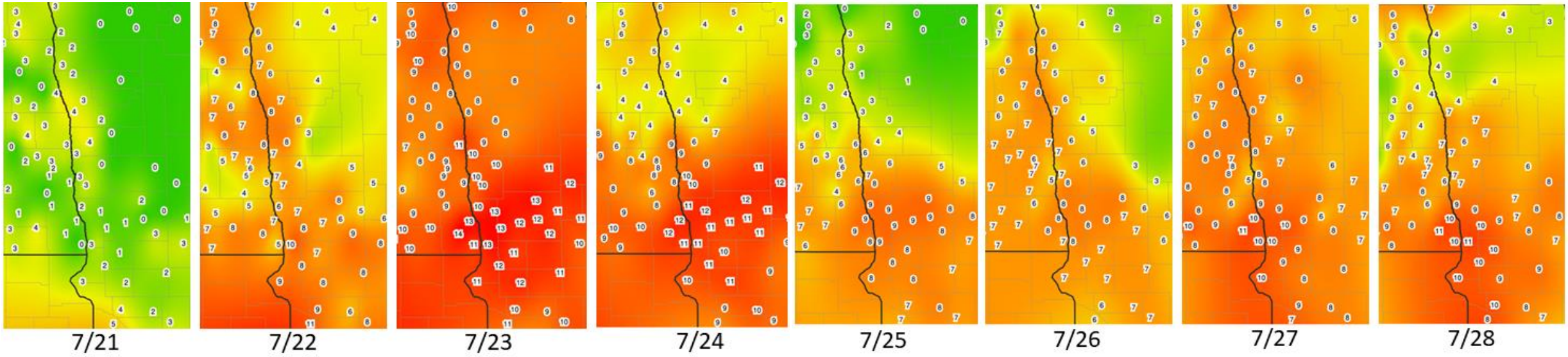
- Increase distance from last years' sugarbeet fields

Fungicides

- Apply for a preventative/ protective benefit
- Relatively little "curative" effect



Environment can shift rapidly – Be prepared!



2-day total daily infection values (DIVs) in late July, 2025

Source: North Dakota Agricultural Weather Network (NDAWN)
https://ndawn.ndsu.nodak.edu

Field Trial Rationale

- Northern RRV traditionally has less CLS pressure than southern RRV and Southern MN regions

- How do we adjust fungicide programs to optimize in different environments?

8 trials conducted in 2025

NON-INOCULATED natural CLS infection

How early is too early to begin CLS fungicide programs?

Methods: Locations

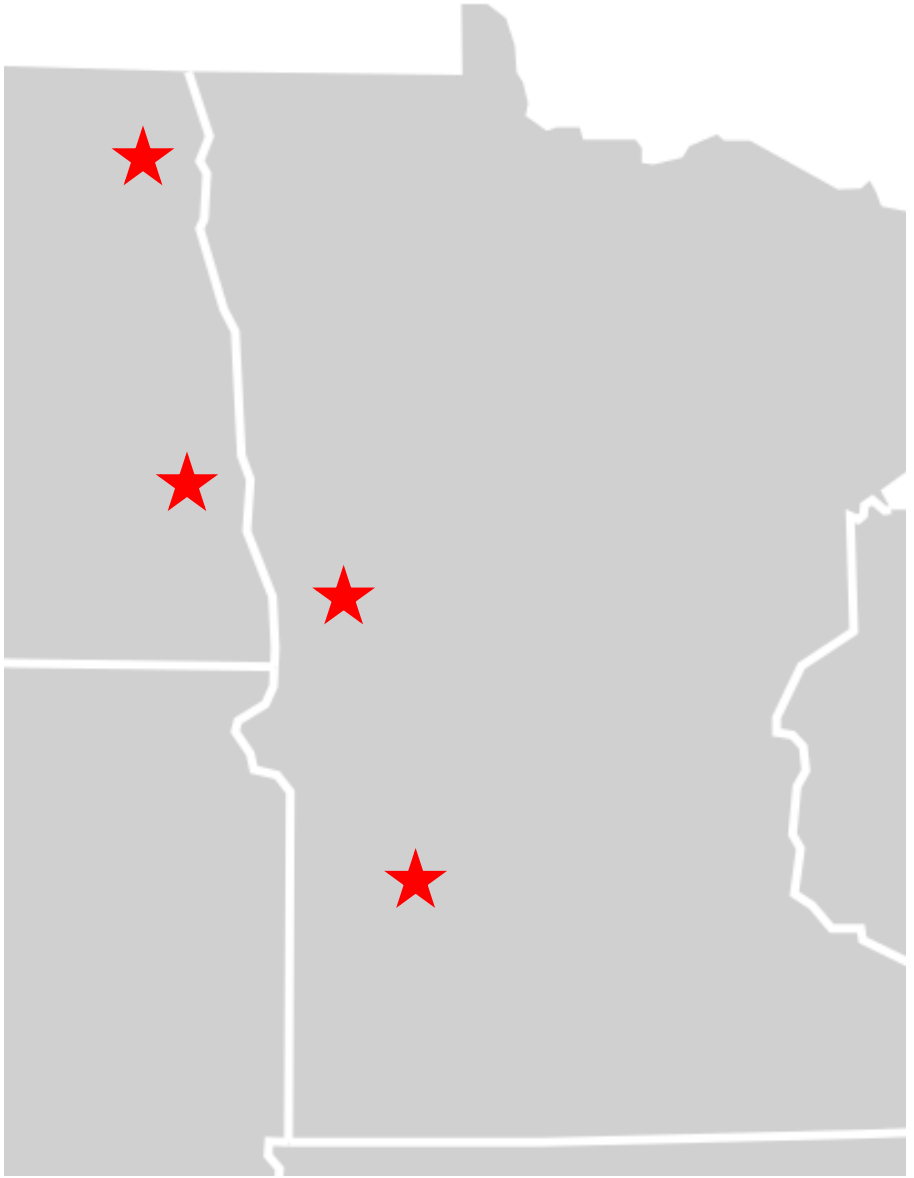
Renville, MN

Foxhome, MN

Prosper, ND

St. Thomas, ND

4 locations x 2 varieties = 8 trials total



Methods: Fungicide Treatments

All treatments received fungicides in the same sequence

- Only spray timing (program start date and intervals) differed between treatment

- 0 to 6 applications per treatment

- Treatment 2 at St. Thomas: placed QoI last (ACSC standard)

Methods: Fungicide Treatments

Application	Mode of action	Product @ Rate
1st	DMI (prothioconazole) + EBDC	Proline @ 5.7 fl oz/A + Koverall @ 2 lbs/A
2nd	Tin + Topsin	Super Tin @ 8 fl oz/A + Topsin 4.5L @ 20 fl oz/A
3rd	QoI (pyraclostrobin) + EBDC	Headline @ 12 fl oz/A + Koverall @ 2 lbs/A
4th	Tin + EBDC	Super Tin @ 8 fl oz/A + Koverall @ 2 lbs/A
5th	DMI (difenoconazole, propiconazole) + EBDC	Inspire XT @ 7 fl oz/A + Koverall @ 2 lbs/A
6th	Copper + EBDC	Badge SC @ 2 pt/A + Koverall @ 2 lbs/A

Methods: Application Timing

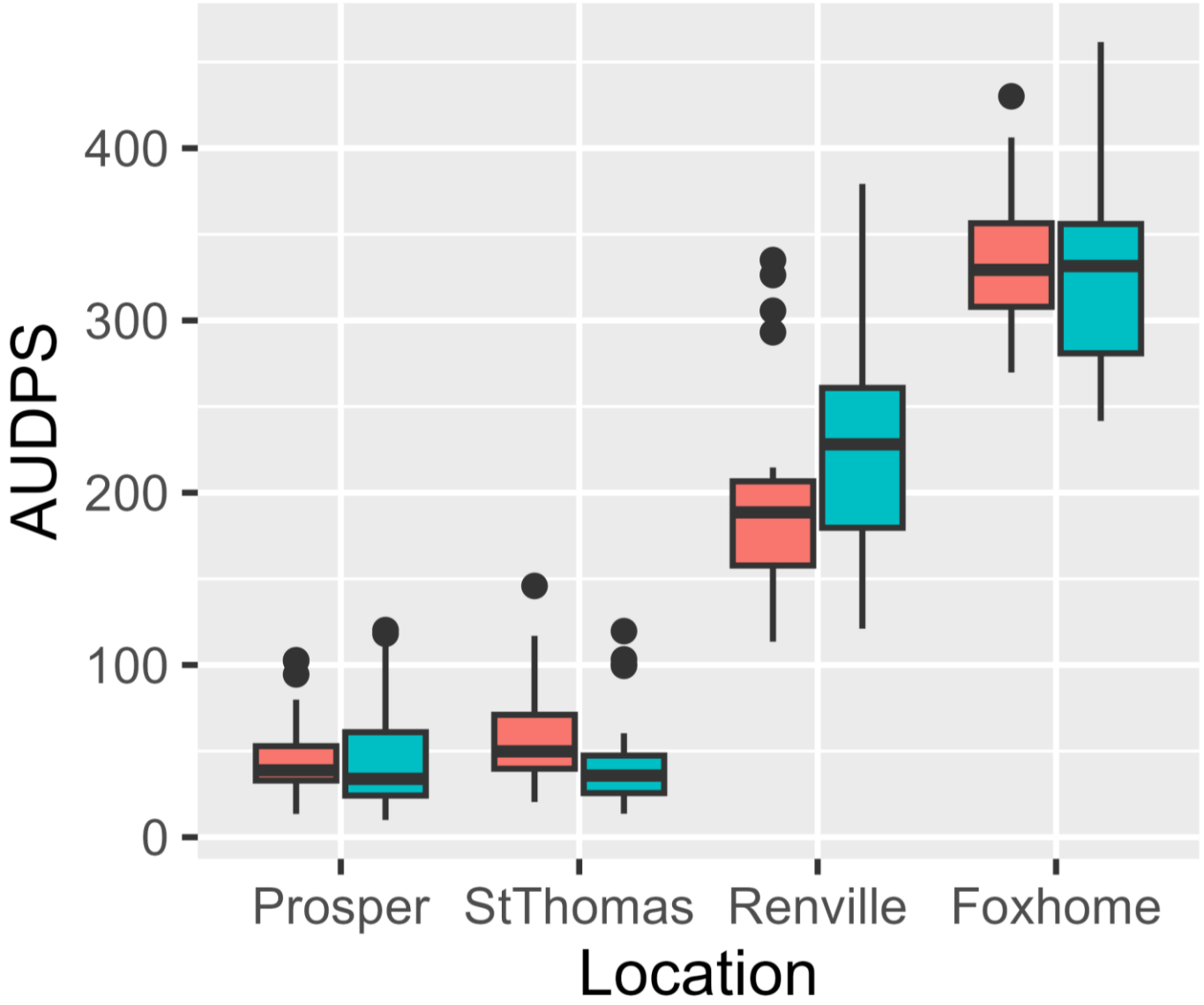
10-14 days = "**standard**"
10-14, then 21-28 days = "**extended**"

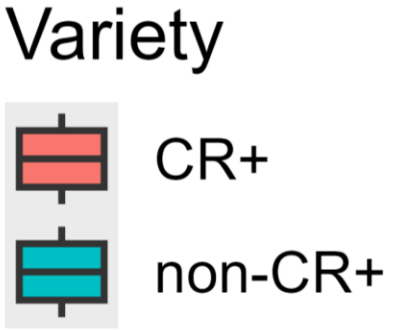
Treatment	Program start date	Interval	Number of applications	First application
1	Mid June	10-14 days	6	June 17-21
2	Late June	10-14 days	5	Pre-row closure
3	Late June	10-14, then 21-28 days	4	Pre-row closure
4	Early July	10-14, then 21-28 days	4	Row closure
5	Early July	3-spray	3	Row closure
6	-	-	0	-

CLS Infection Values (Season Total)

Location	Total Rainfall May 1st –Sep 30th	Cercospora Risk (DIVs)				
		June	July	Aug.	Sep.	Total
Willmar	25.8”	26	77	80	35	218
Foxhome	18.8	20	69	69	31	189
Prosper	13.0”	20	46	56	16	138
St. Thomas	10.1”	6	37	31	17	91
Grand Forks	12.1”	10	37	44	21	112

Overall CLS Severity, All Treatments

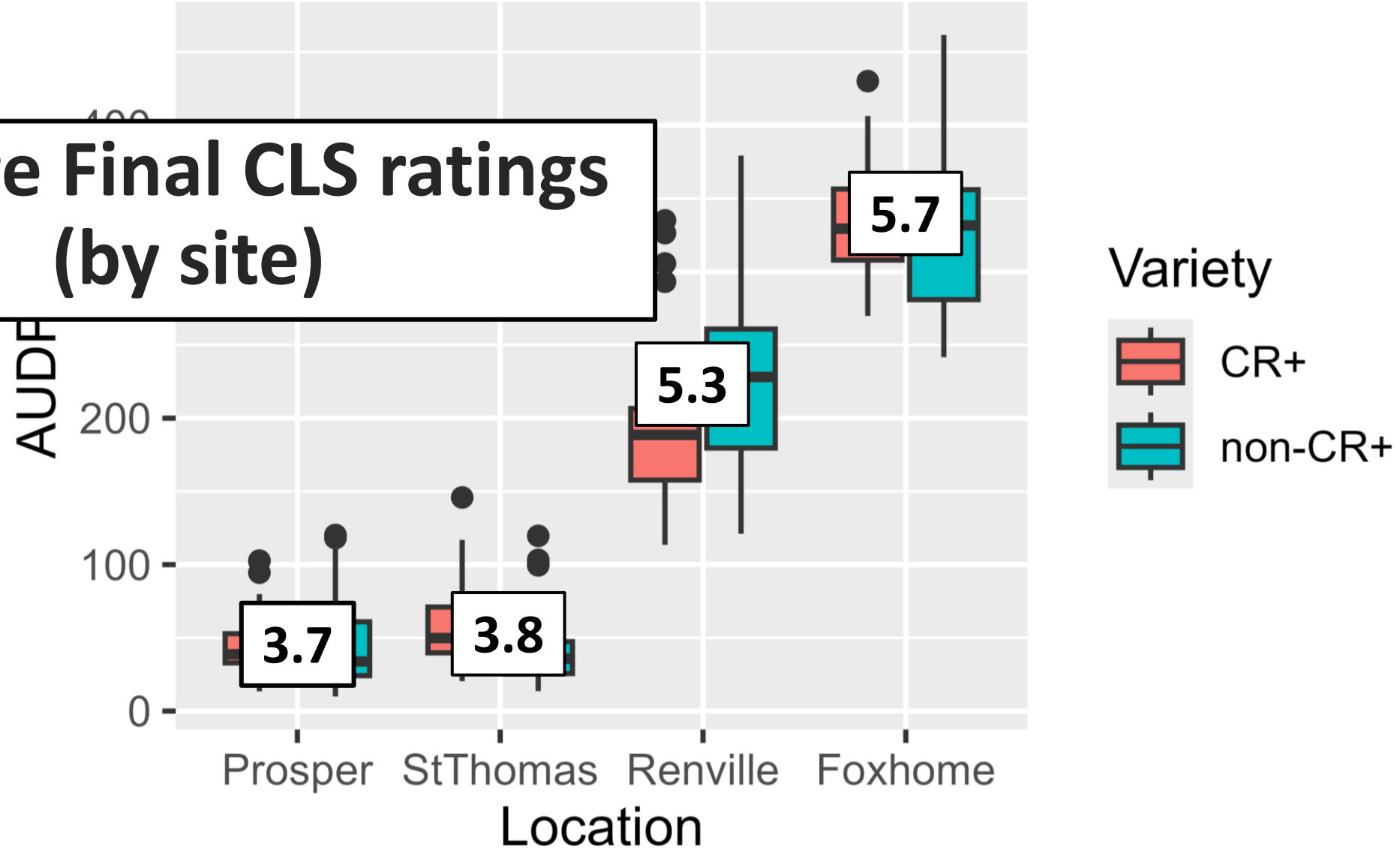




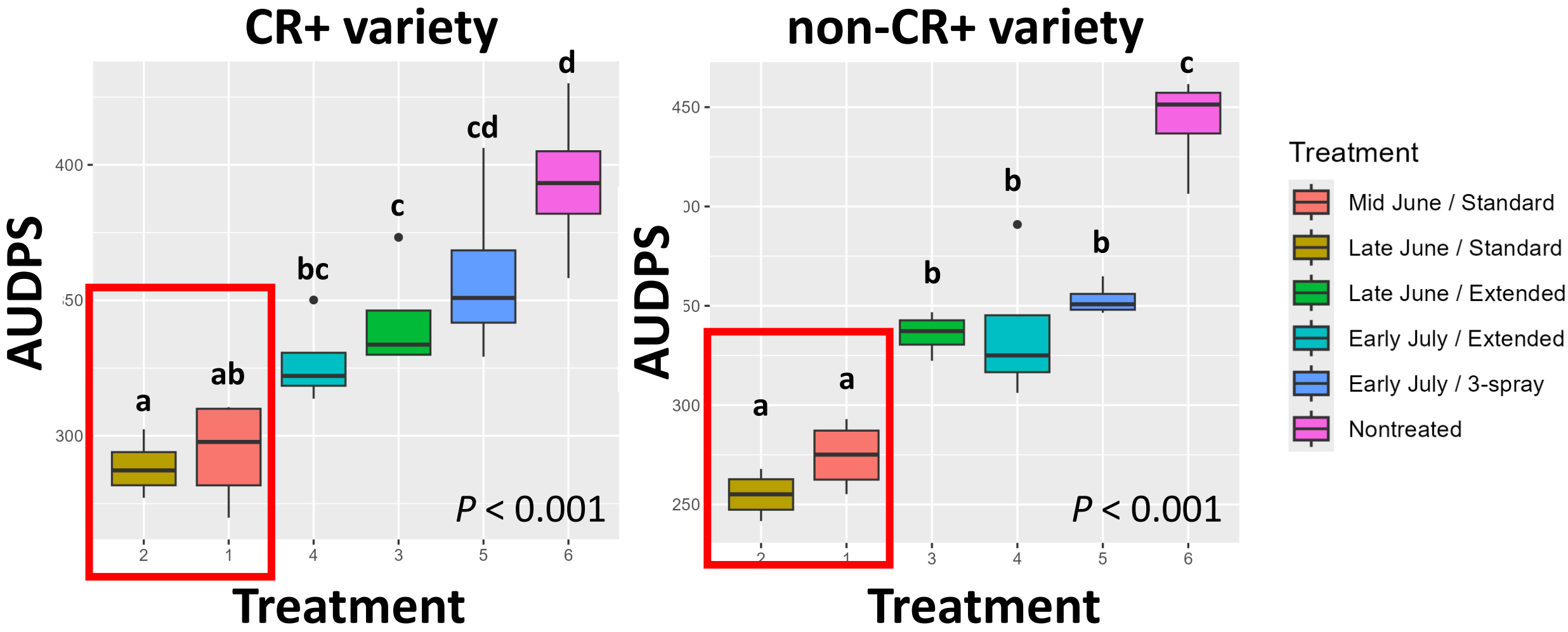
AUDPS = Area Under Disease Progress Stairs

Overall CLS Severity, All Treatments

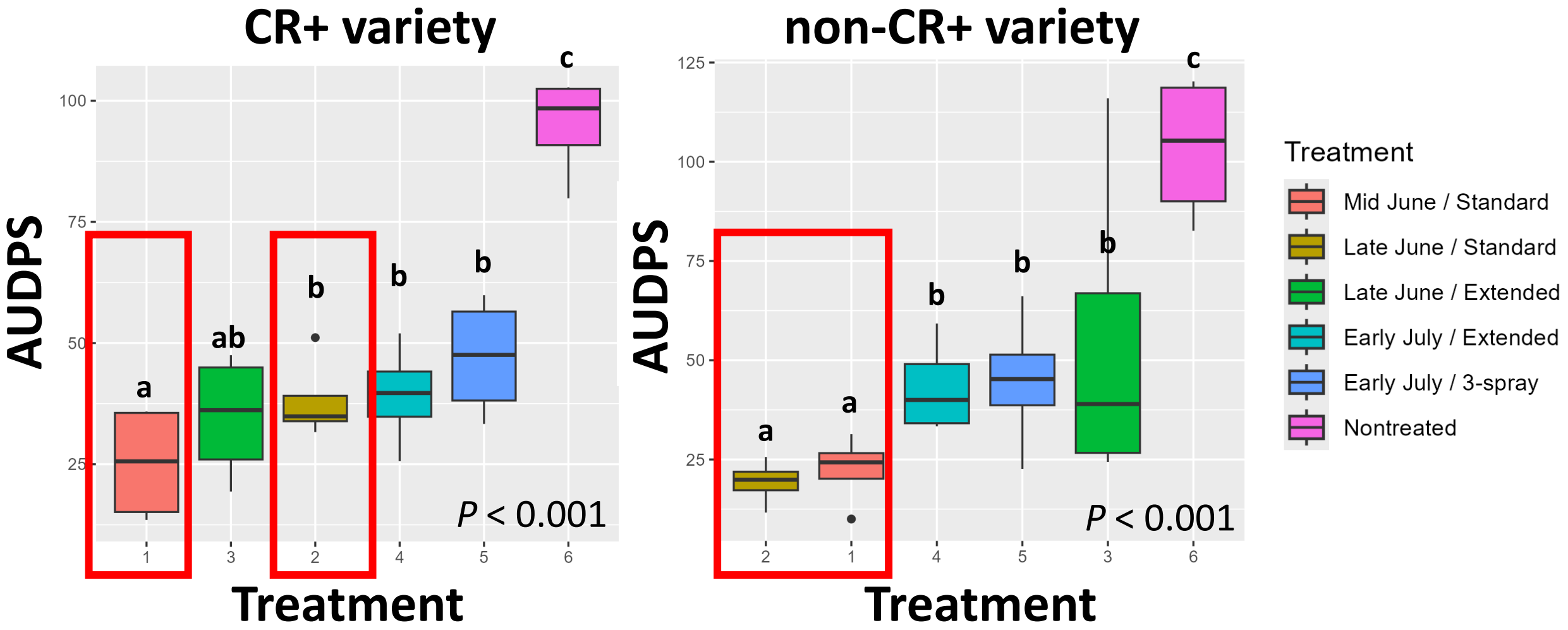
Average Final CLS ratings (by site)



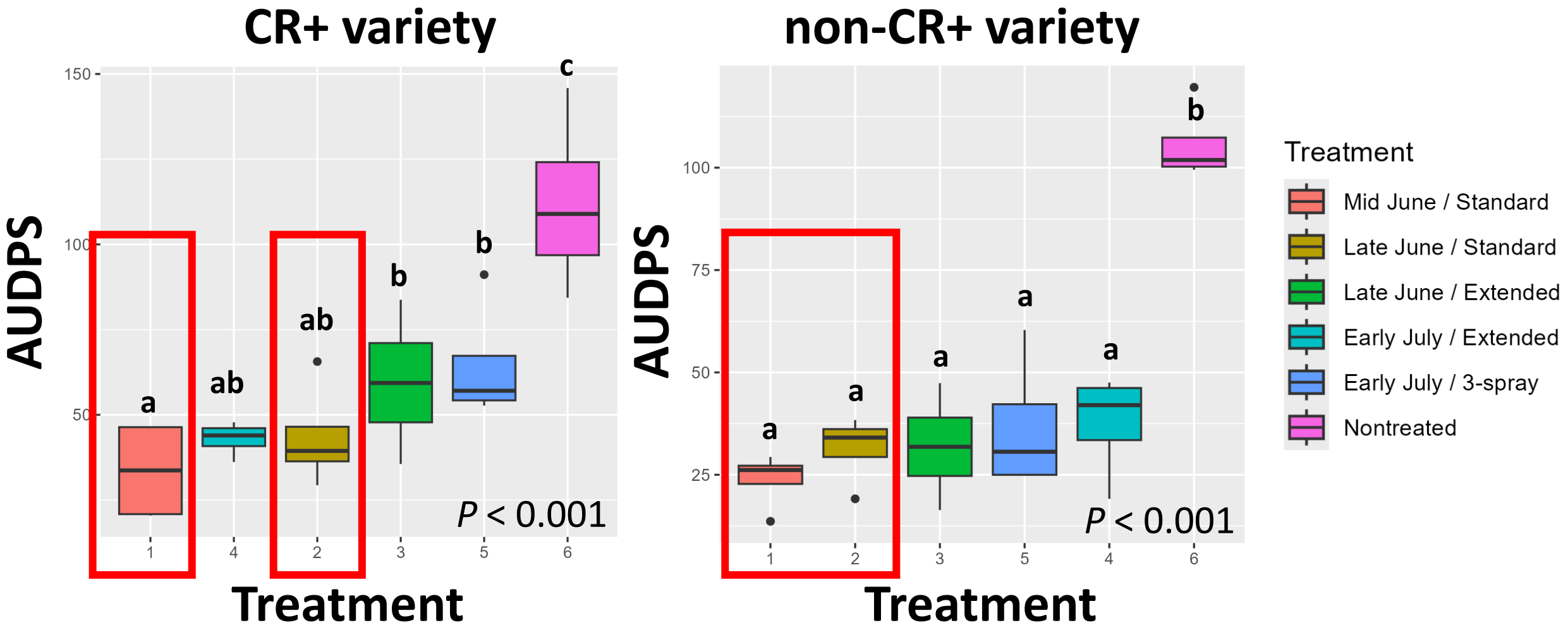
CLS Severity, Foxhome



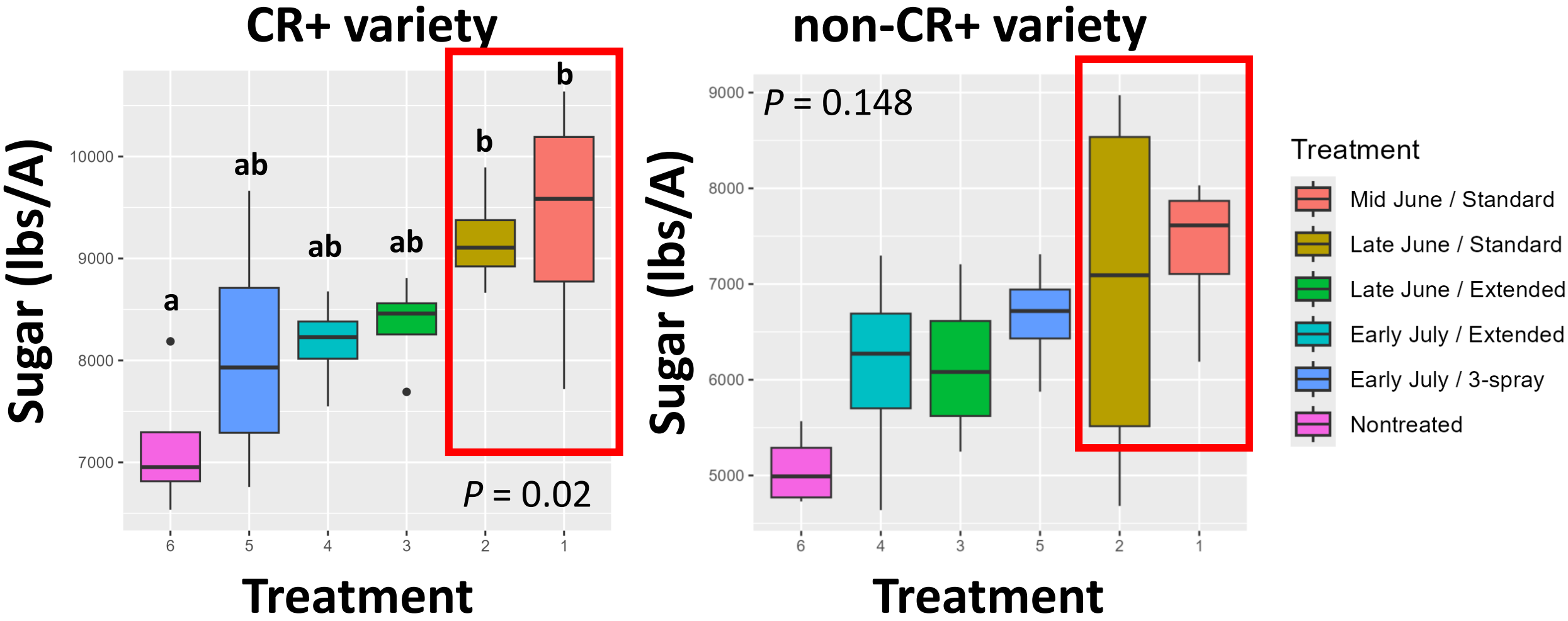
CLS Severity, Prosper



CLS Severity, St. Thomas



Recoverable Sugar, Foxhome



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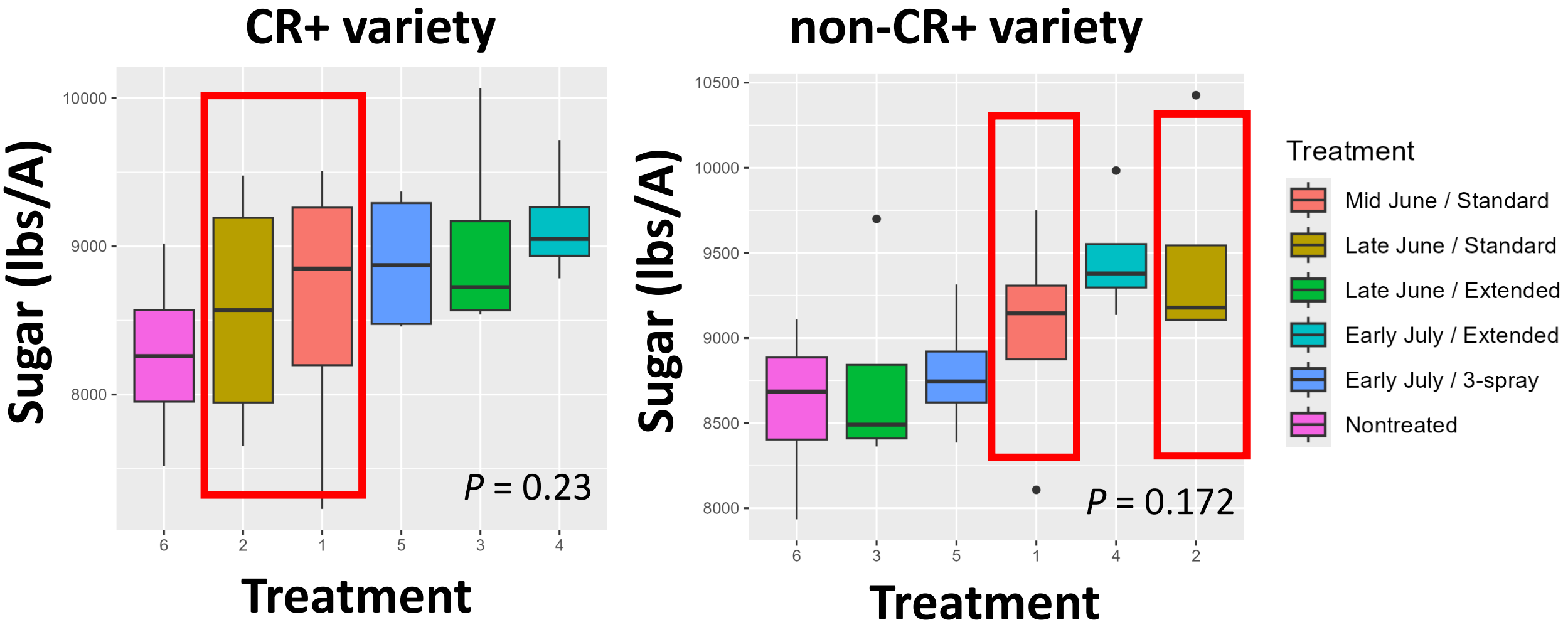

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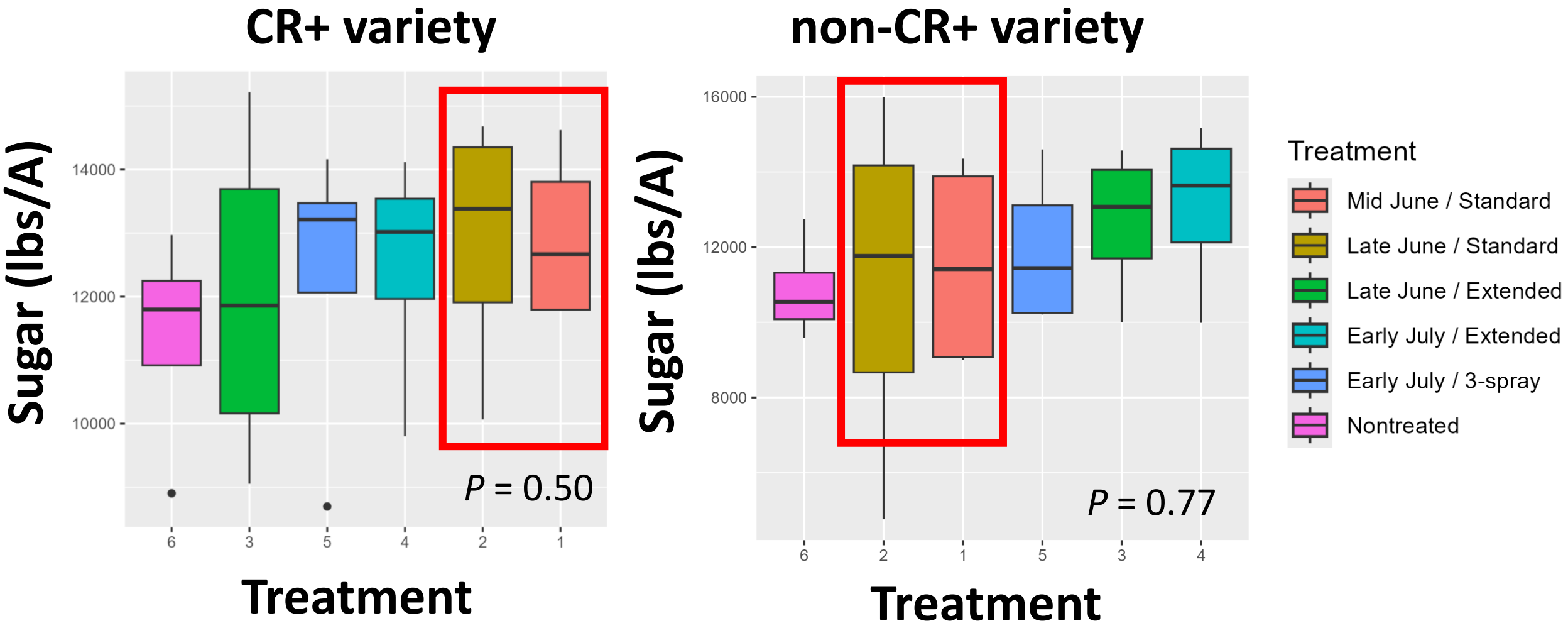


St. Thomas Trial Yield, RSA, Return

Low Disease Pressure! **Entire site (CR+ and non-CR combined)**

Program start date	Number of Applications	Disease Severity (AUDPS)	Yield (tons/A)	RSA (lbs)	Gain over nontreated ($/acre)
Mid June	6	29 a	38.9	12,238	$216
Late June	5	37 ab	37.9	11,974	$182
Late June	4	46 b	39.3	12,339	$245
Early July	4	40 b	40.6	12,797	$310
Early July	3	50 b	39.0	12,121	$178
Nontreated	0	108 c	36.3	11,110	-
P =		< 0.01	NS	NS	

Foxhome Trial Yield, RSA, Return

High Disease Pressure! **Entire site (CR+ and non-CR combined)**

Program start date	Number of Applications	Disease Severity (AUDPS)	Yield (tons/A)	RSA (lbs)	Gain over nontreated ($/acre)
Mid June	6	284 a	33.0 a	8,371 a	$383
Late June	5	271 a	31.7 ab	8,075 ab	$362
Late June	4	342 b	29.5 ab	7,254 abc	$219
Early July	4	327 b	29.5 ab	7,145 bc	$184
Early July	3	359 b	30.2 ab	7,363 ab	$218
Nontreated	0	393 c	26.7 b	6,113 c	-
P =		< 0.01	< 0.01	< 0.01	

Similar results to 2024 Fungicide Program Trials

Fungicide program start date / interval trials also demonstrated benefit of early/on-time application

Two years in a row! Clear evidence for benefit of a **proactive / preventative** fungicide program

Region-wide data confirms value of proactive fungicides

No better way to achieve 5%-6% increase in yield

From ACSC data, for the whole RRV (weighted by acreage)

Year	Number of fungicide applications	% of average $/acre
2024	0-3	97.9
	4-6	102.6
2025	0-3	96.9
	4-6	102.2

Key Message

Trial data supports beginning fungicide programs in **late June/early July**

- Best disease control
- Highest RSA

Fungicide programs are an investment to protect the crop

- Even in low CLS environments, each application paid for itself

Key Message

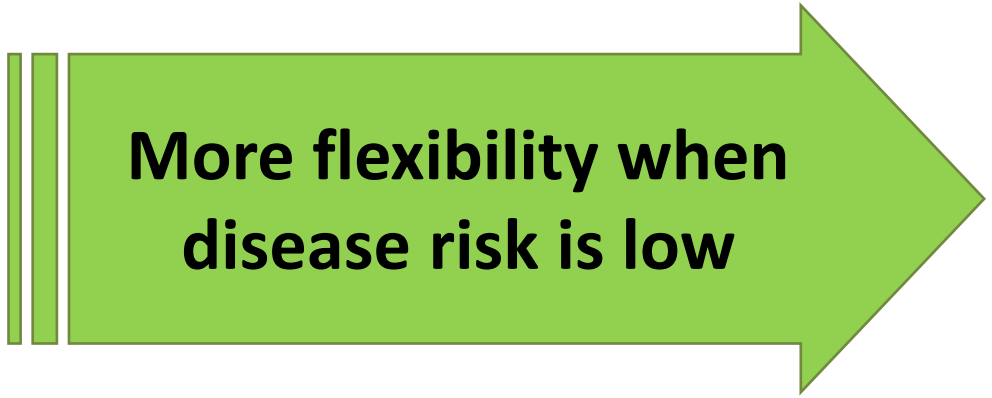
In low disease pressure environments:

(like St. Thomas in 2025)

- Even the 3-spray program reduced disease severity compared to nontreated plots

Mid- or Late June applications resulted in numerically improved CLS control and recoverable sugar

No way to predict the environment, so proactive approach to CLS management is best



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Prior to or just at row closure

Late June = June 22-30

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More flexibility when disease risk is low

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More flexibility when disease risk is low

Fungicides must be proactive!

Summary/Conclusion

Unexpected results: no benefit in disease control when fungicide applications began in **mid-June compared to late June**

- Mid-June start was worse in Foxhome, but not significant

Late June fungicide applications improve CLS control

The “perfect program” is probably a combination of **late June start + standard intervals**

- Before July 4th

Late June = June 22-30

Acknowledgements

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Cooperating Growers

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