

Optimal Application Timing of Fungicide to Control Leaf Spots in Wheat

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Wheat production

- 27.7 million tonnes (mt) in 2014.
- 13.4 mt in Saskatchewan in 2014.
- Grown on 52,000 Canadian farms on 22.8 million acres (9.26 million hectares).
- Canada is the 7th largest producer in the world, exporting 17 mt worth approximately \$5.4 billion.



Leaf spot diseases

- Variety of leaf spot diseases, including species that make up the septoria leaf spot complex as well as spot blotch and tan spot.



Leaf spot diseases

- Infect the leaves of wheat plants.
- Appear to occur together in most areas.
- Diseases are often very difficult to distinguish.
- Result in yield losses up to 15%.



Optimal application

- Inconclusive, although several studies suggest early fungicide application improves yield.
- Leaf spot diseases at GS39, or the flag leaf stage.
- FHB at the beginning of anthesis, GS60.



Fungicide timing

- Is it required to spray at both flag leaf stage and at anthesis?
- Will spraying at anthesis alone provide adequate control of leaf diseases?



Hypothesis

- Control of leaf spot diseases will vary depending on timing of fungicide application.

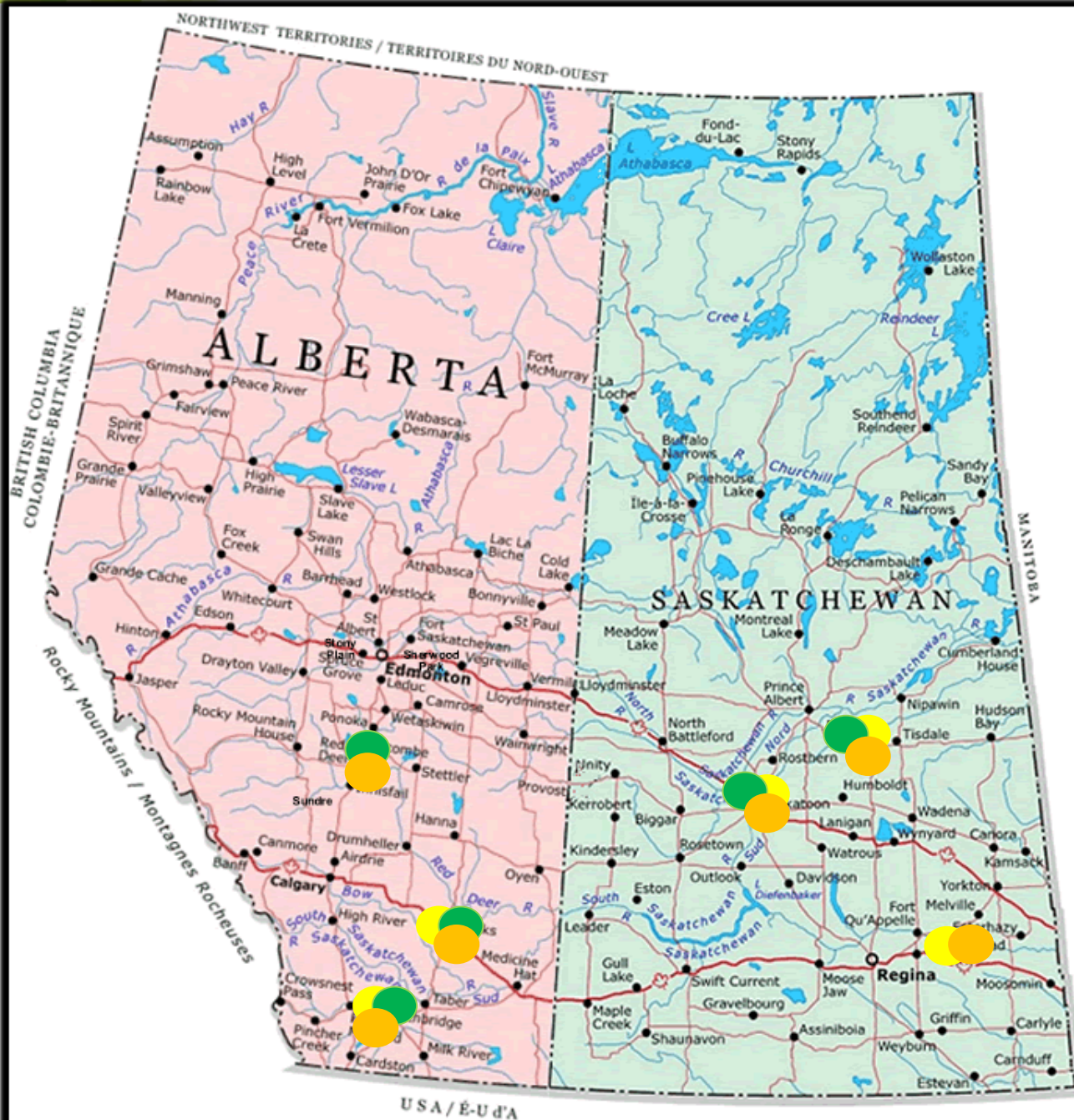
Objective

- Evaluate the efficacy of two fungicides and a bio-fungicide for controlling leaf spot disease severity at three application timings.

Experimental design

- Multiple site-years (2013-2015): 5 sites in 2013, 5 sites in 2014, and 6 sites in 2015 (16 site-years).
- 16 treatments each site-year: 3 timings x 5 fungicide treatments plus an unsprayed check.
- RCBD with 4 replications.
- cv. Carberry.





● 2013

● 2014

● 2015

Data collection

- Rated leaf spots on leaves at each application date.
- Rated % infection by FHB on heads.
- Collected yield, thousand kernel weight, test weight, and protein content.



Treatments

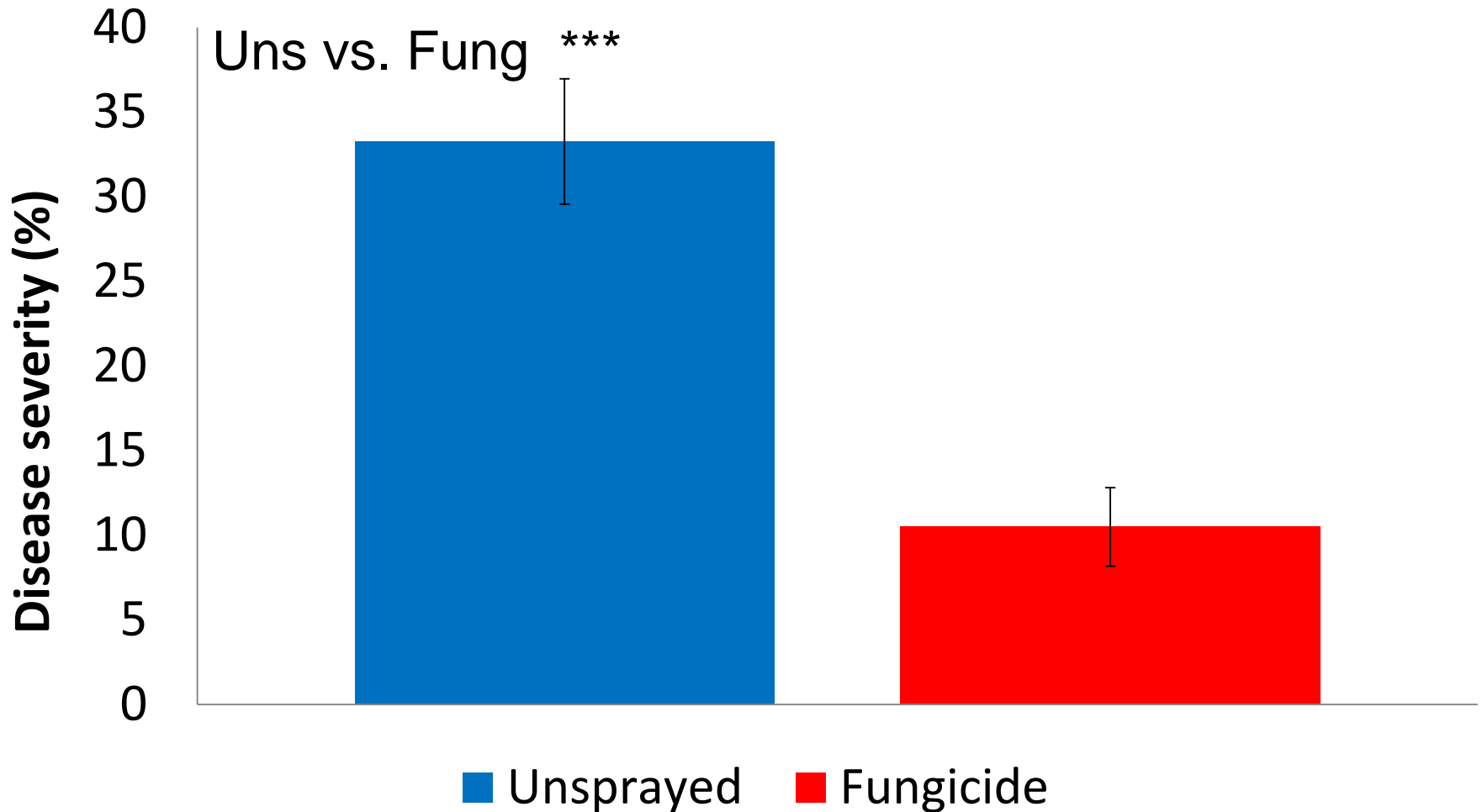
Fungicide	Timing
Prothioconazole+tebuconazole (Prosaro)	Flag, anthesis, both
Tebuconazole (Folicur)	Flag, anthesis, both
<i>Bacillus subtilis</i> (Serenade optimum)	Flag, anthesis, both
Prosaro+Serenade optimum	Flag, anthesis, both
Folicur+Serenade optimum	Flag, anthesis, both
Unsprayed Check	

Results

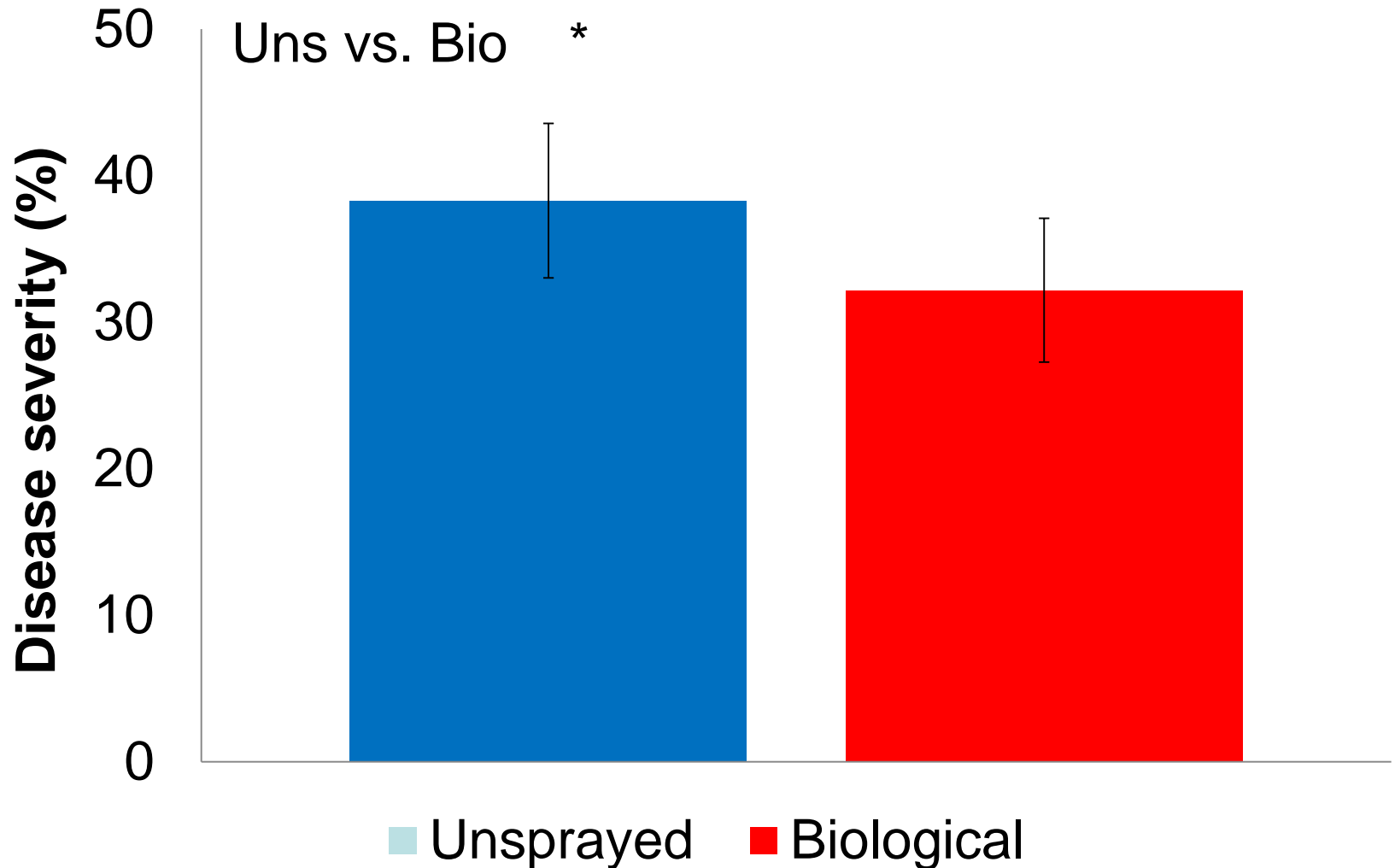
Contrast	Leaf disease (%)	Yield (kg/ha)	Fusarium head Blight (%)	Thousand Kernal Weight (g)	Protein (%)
Flag leaf vs anthesis	+	ns	ns	*	ns
Flag leaf vs both timings	***	*	ns	***	ns
Anthesis vs both timings	***	ns	ns	ns	+
Unsprayed vs biological	*	ns	ns	ns	ns
Unsprayed vs fungicide	***	**	ns	**	ns
Full-rate vs half-rate	ns	ns	ns	ns	ns
Prosaro® vs Folicur®	*	ns	ns	ns	ns

ns, $P > 0.10$, not significant; +, $0.05 < P < 0.10$, not significant, but tend to be significant; *, $P < 0.05$, significant; **, $P < 0.01$, strongly significant; ***, $P < 0.001$, very strongly significant

Unsprayed vs fungicide – leaf disease

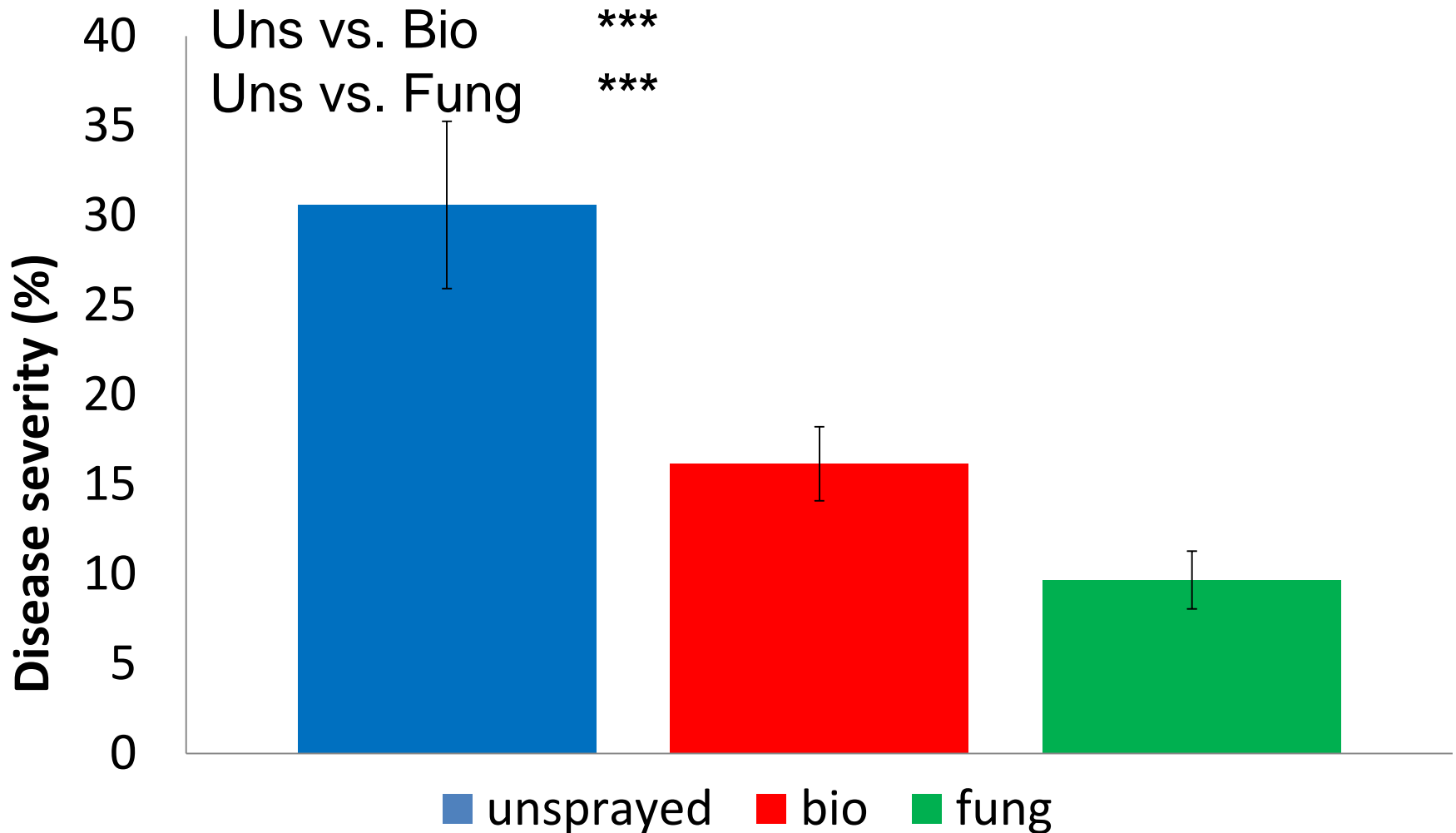


Unsprayed vs biological – leaf disease

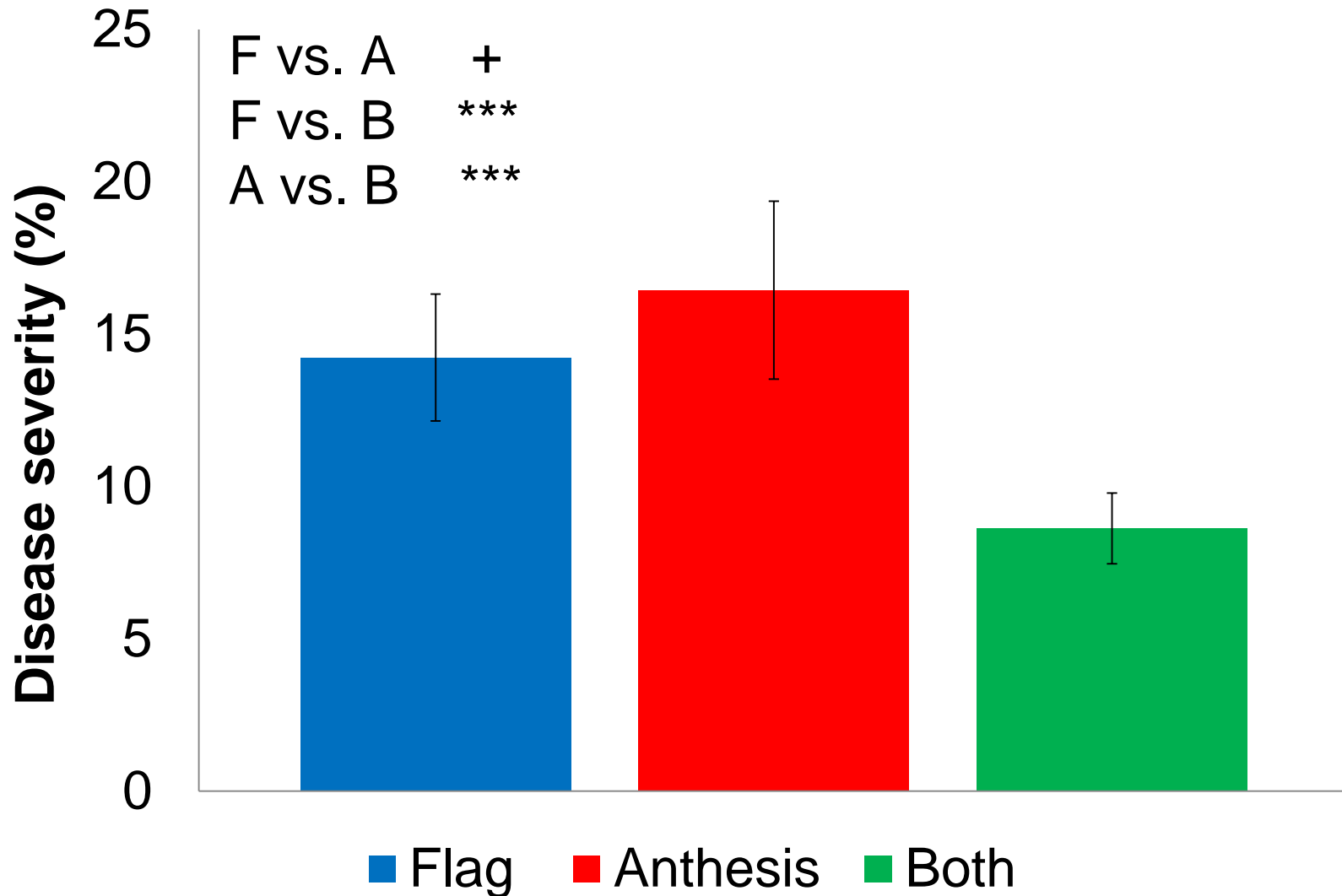


Unsprayed vs biological vs control

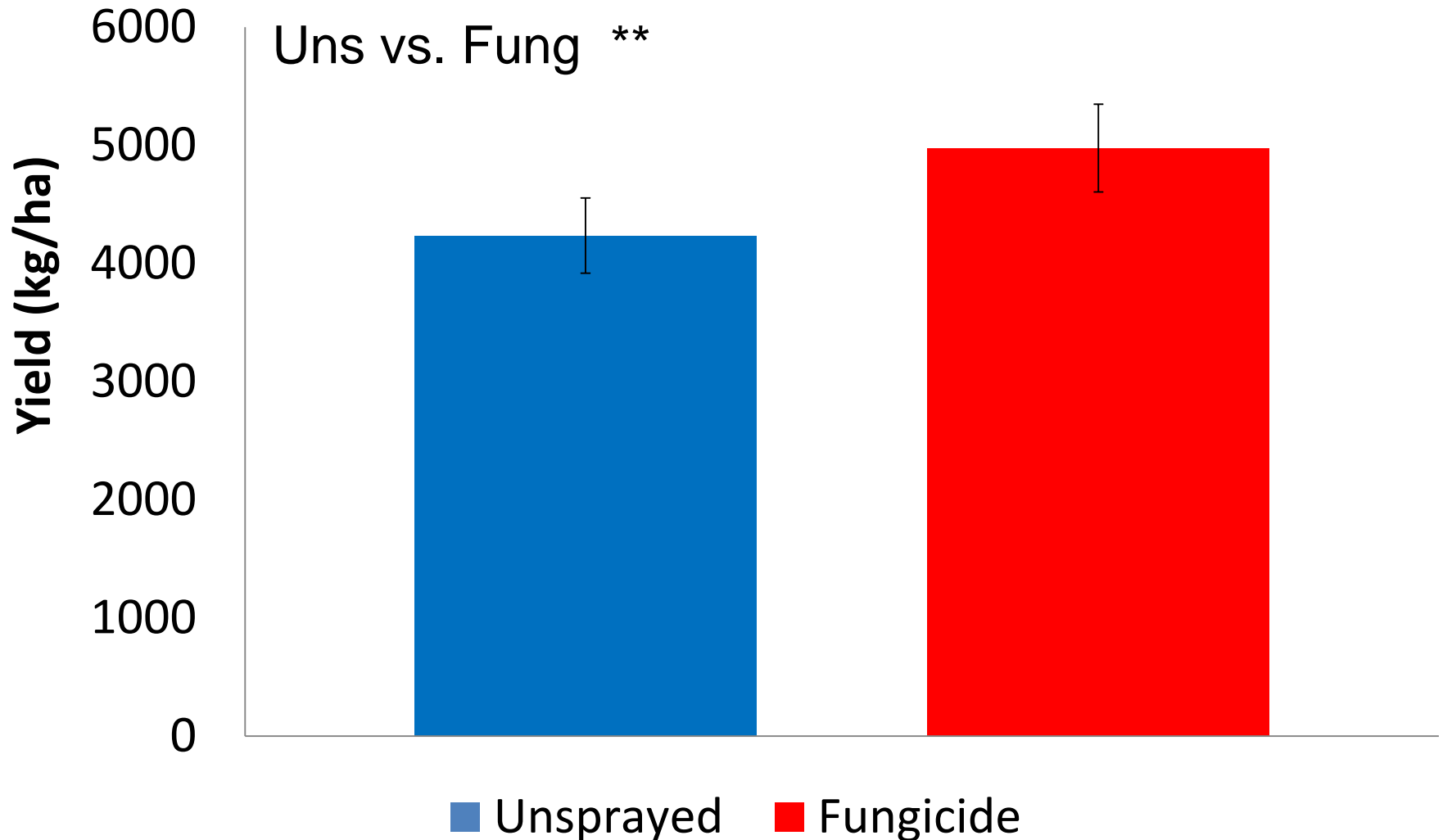
2013 Lethbridge



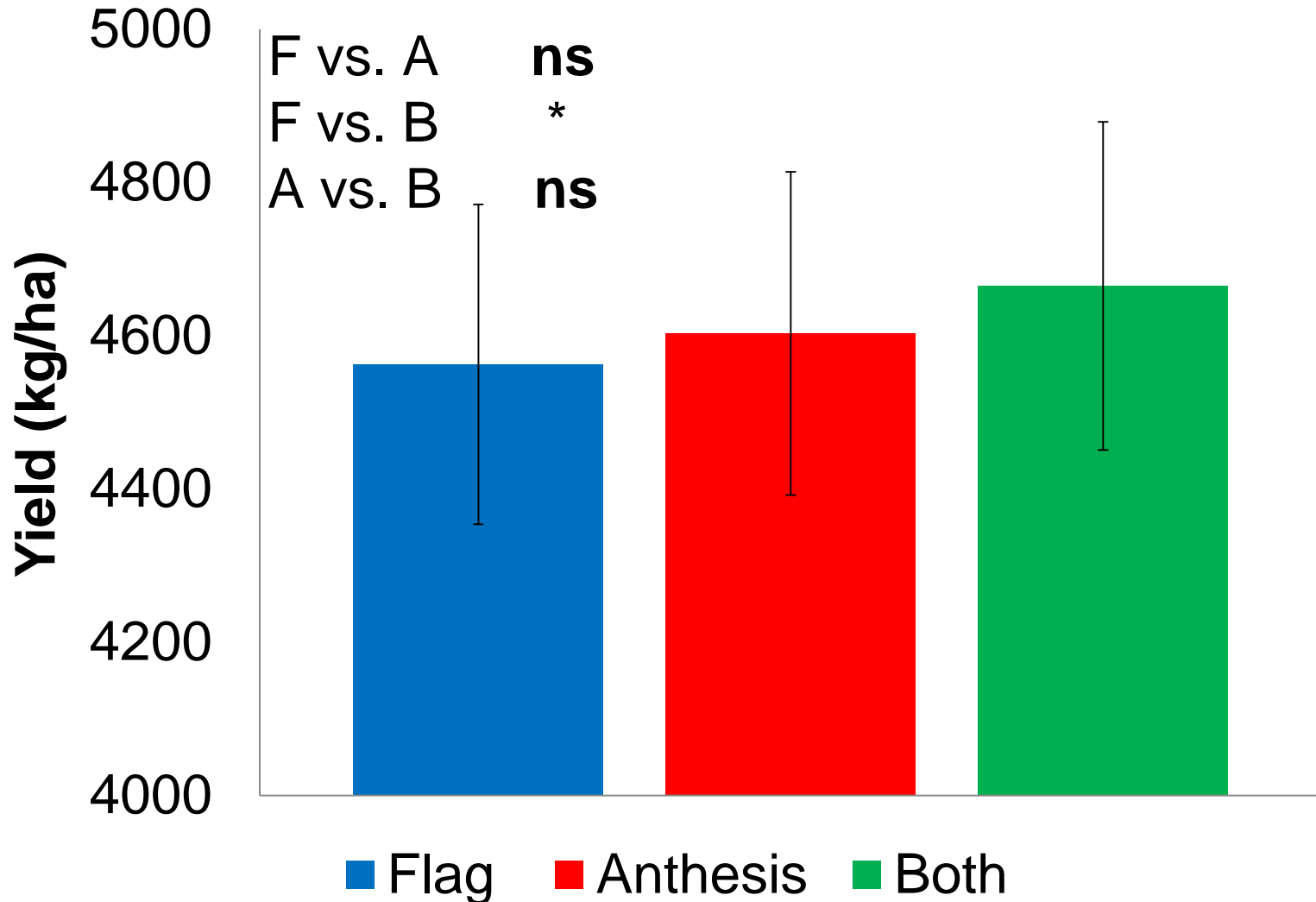
Application timing – leaf disease



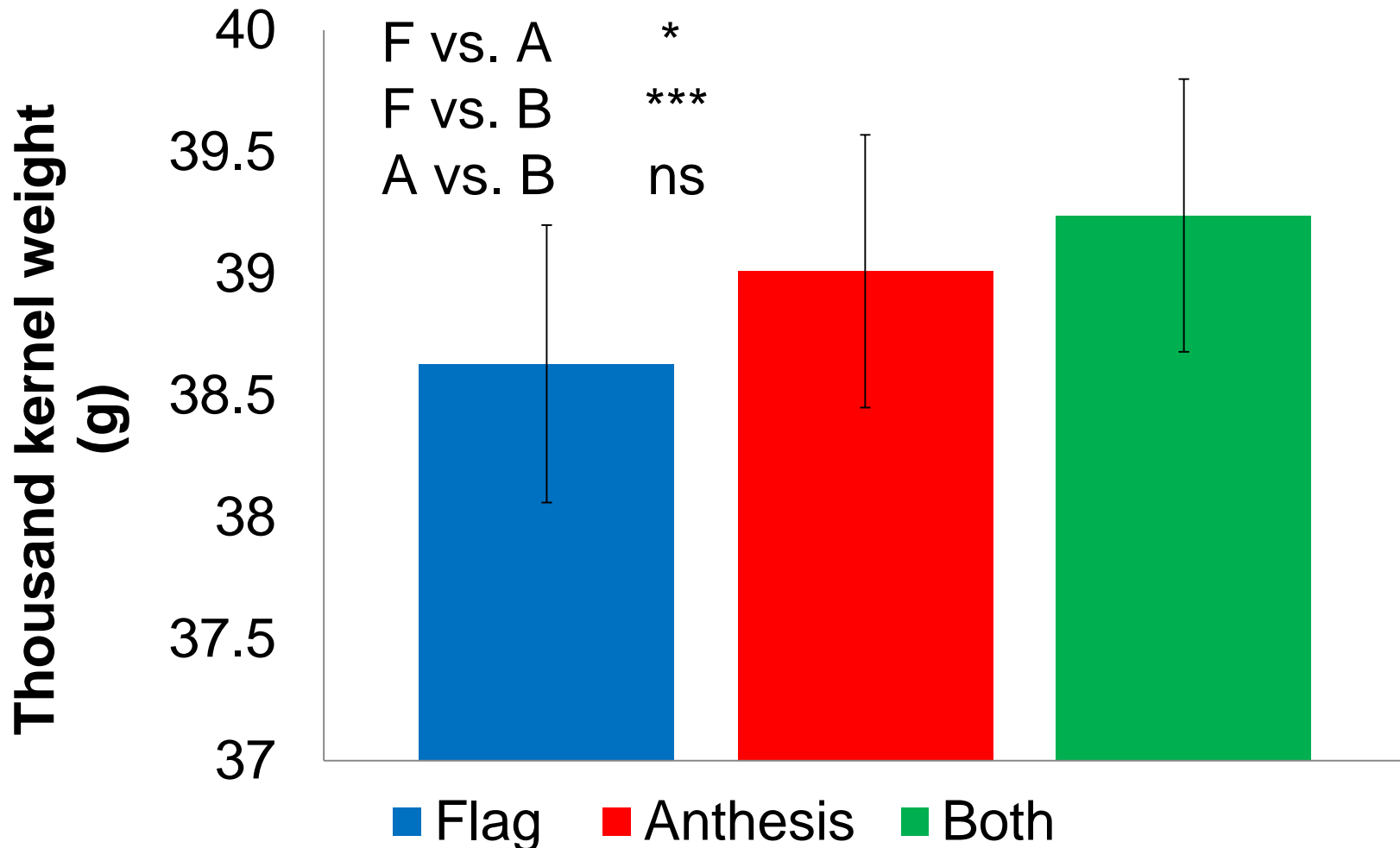
Unsprayed vs fungicide - yield



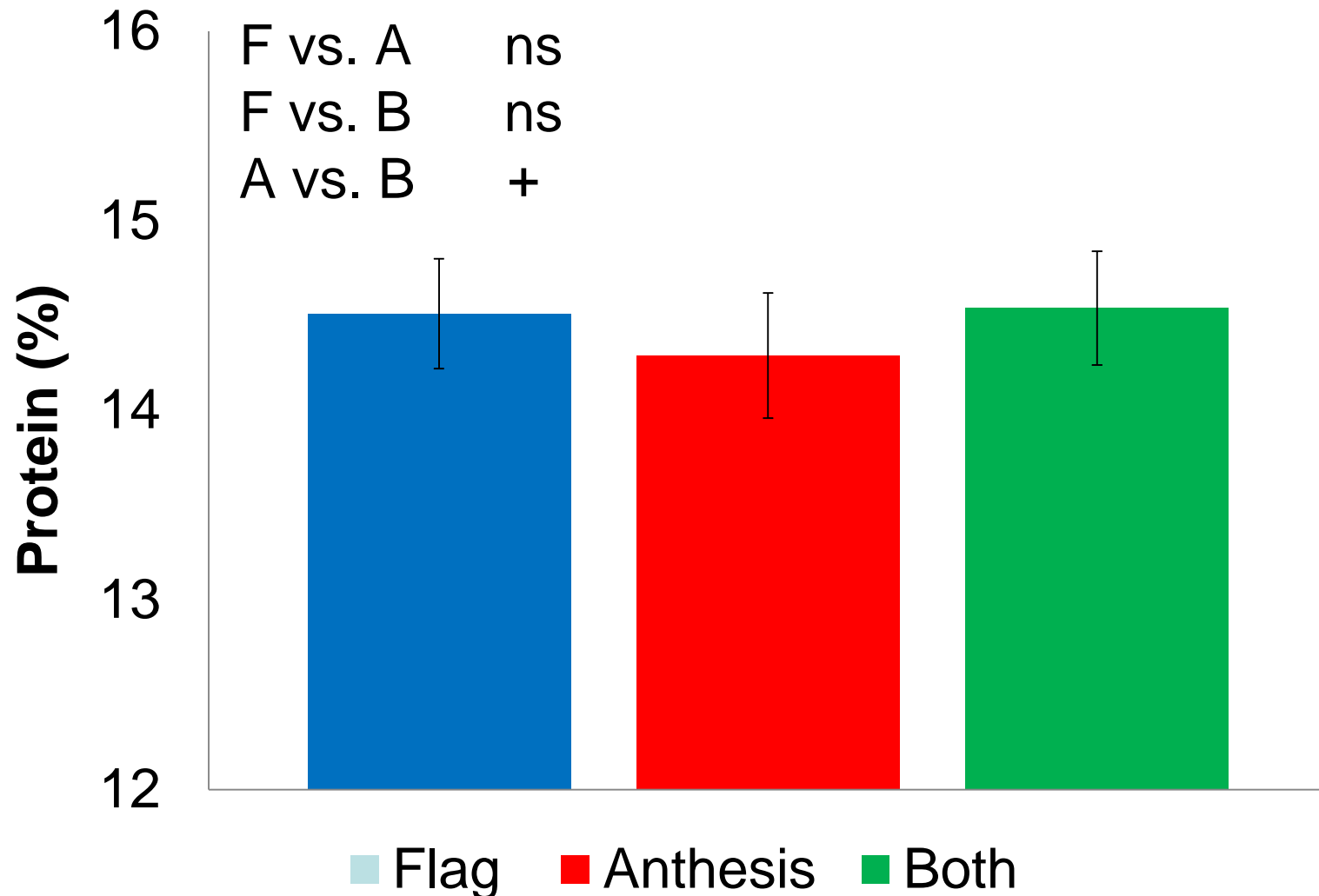
Application timing - yield



Application timing – thousand kernel weight (TKW)



Application timing - protein



Conclusion

- No significant difference in leaf disease when spraying at flag leaf stage compared to anthesis.
- Significant difference in leaf disease when spraying at both timings compared to either flag leaf stage or anthesis.
- Yield was increased when sprayed at both timings compared to sprayed at flag leaf stage.
- Biological fungicide reduced leaf disease compared to the unsprayed check, but the data was strongly influenced by one location.

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Questions?

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