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Increasing Faba Bean (*Vicia faba*) Seeding Rate Under Weedy and Weed Free Conditions

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Overview

- ▶ Research background
 - ▶ Faba beans (*Vicia faba*)
 - ▶ Weed control
 - ▶ Relevance
- ▶ Experiment
 - ▶ Design
- ▶ Results
 - ▶ Emergence
 - ▶ Biomass
 - ▶ Yield
- ▶ Conclusion



Research Background → Faba Beans



► Production

- SK regional yield trials began in 2006
- Over 60 000 acres in SK grown in 2015

► Consumption

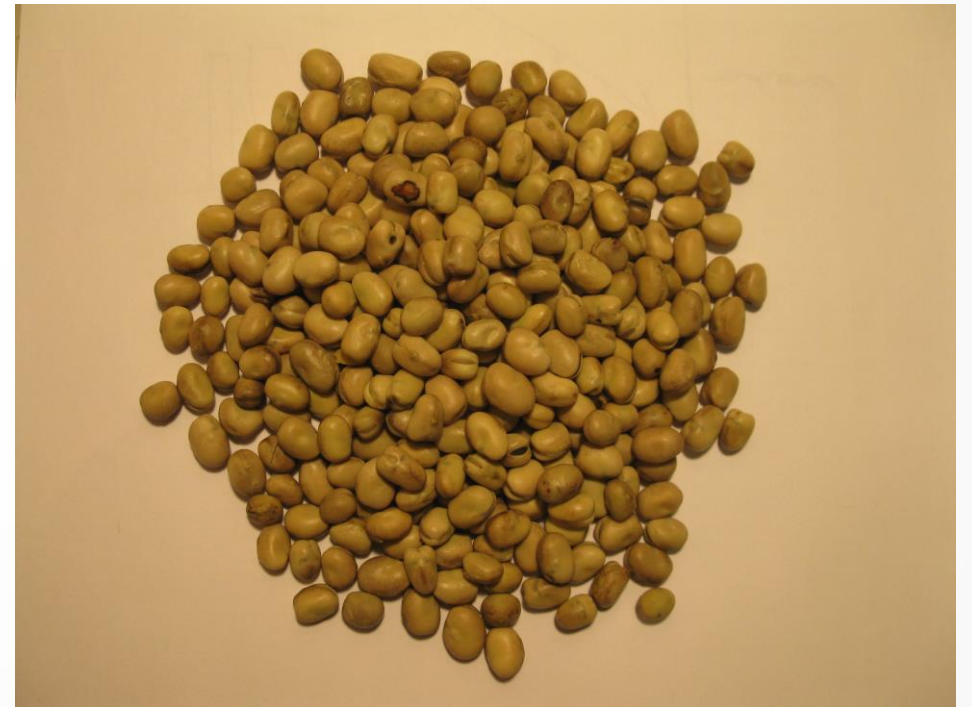
► High protein seed ~ 30%

► Human

► Tannin

► Feed

► Tannin Free



Research Background → Faba Beans

- ▶ Characteristics of *Vicia faba*
 - ▶ Legume → N-fixation
 - ▶ Over 200 kg/ha
 - ▶ Even with cooler temperatures
 - ▶ Continues fixation under higher N levels than other legumes
 - ▶ Even with application of 200kg/ha N faba bean still derived 60% of N from the atmosphere
 - ▶ More tolerant of wet conditions
 - ▶ Good P scavenger
 - ▶ High HI and WUE



Research Background → Weed Control

- Weeds = Major yield losses
 - Aprx. 50%
 - Depending on weed species and density
- Other negative impacts
 - total nitrogen fixation
 - general plant health

(Frenda et al. 2013; Strydhorst et al. 2008)



Research Background → Weed Control

- Chemical
- Tillage
- Cultural
 - Seeding rate
 - \uparrow SR \rightarrow \downarrow weeds
 - Effect more noticeable with higher weed pressure
 - Cultivar choice
 - Competitive growth characteristics

(Ball et al. 1997; Townley-Smith and Wright, 1994)



Research Background → Relevance

- ▶ Faba beans in sustainable farming systems
 - ▶ Biological N-fixation ↓ fossil fuel consumption
 - ▶ N input and diversification
- ▶ Organic = Weedy
 - ▶ Seeding rate and cultivar for benign weed management
 - ▶ Inc. SR under weedy conditions recommended for other pulses
 - ▶ Recommendation for faba beans ~ 45 plants/m²

(Baird et al. 2009; Ball et al. 1997; Townley-Smith and Wright, 1994)

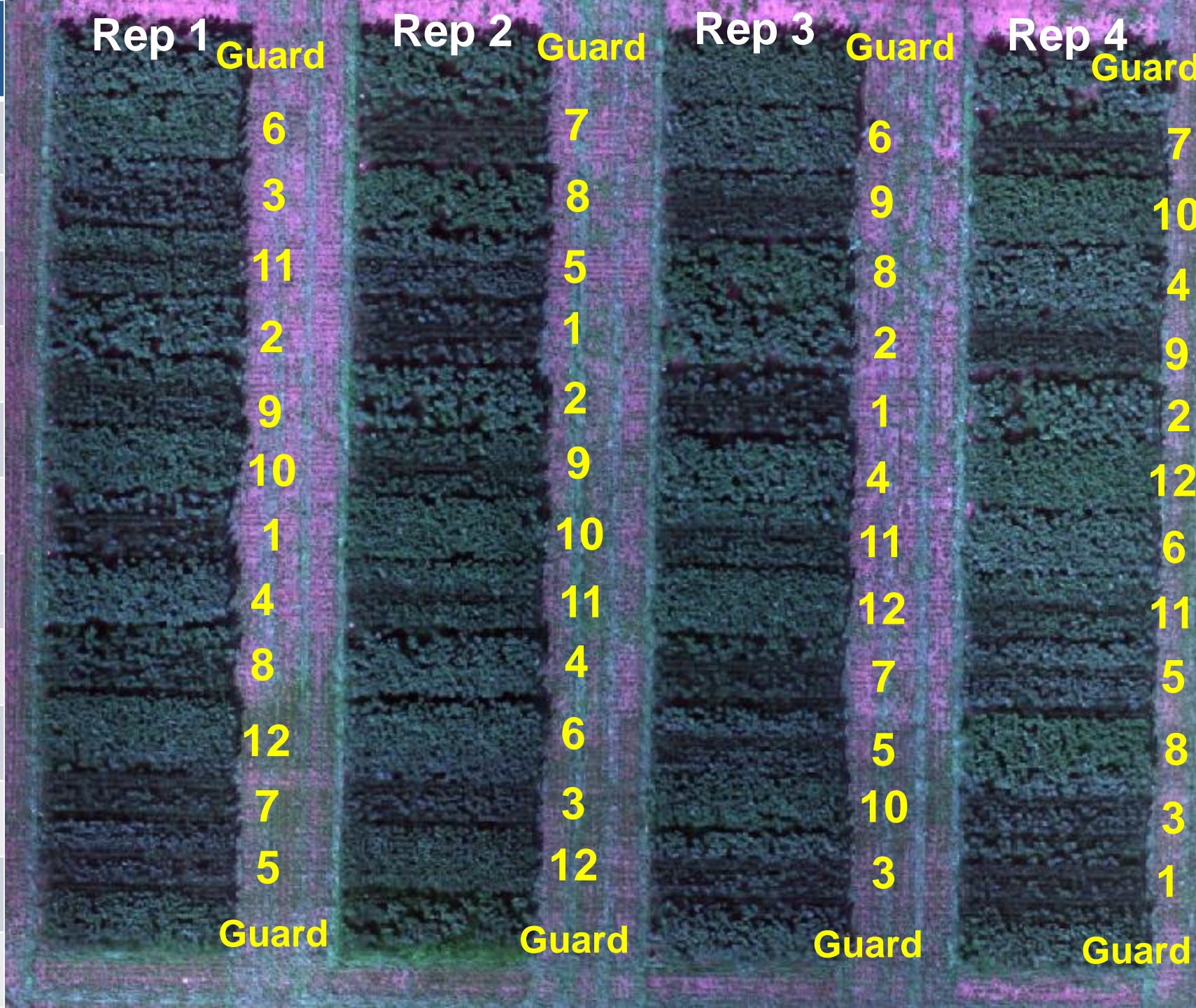


Research Objective

- ▶ Response of two faba bean varieties to increasing seeding rate under weedy and weed free conditions
- ▶ Experiment at the Kernen Research Farm
- ▶ Summer of 2016



Treatment	Variety	Weediness	Seed Rate
1	SNSS1	Weedy	20
2	SNSS1	Weed Free	20
3	SNSS1	Weedy	40
4	SNSS1	Weed Free	40
5	SNSS1	Weedy	60
6	SNSS1	Weed Free	60
7	Snowdrop	Weedy	20
8	Snowdrop	Weed Free	20
9	Snowdrop	Weedy	40
10	Snowdrop	Weed Free	40
11	Snowdrop	Weedy	60
12	Snowdrop	Weed Free	60



Varieties

Variety	Years Tested	Yield (% CDC Fatima)	Height (cm)	Maturity (days)	Seed Weight (g/1000)
Coloured Flower (normal tannin)					
CDC SSNS-1	10	91	109	105	335
White Flower (zero tannin)					
CDC Snowdrop	7	91	98	104	335

CDC SSNS-1

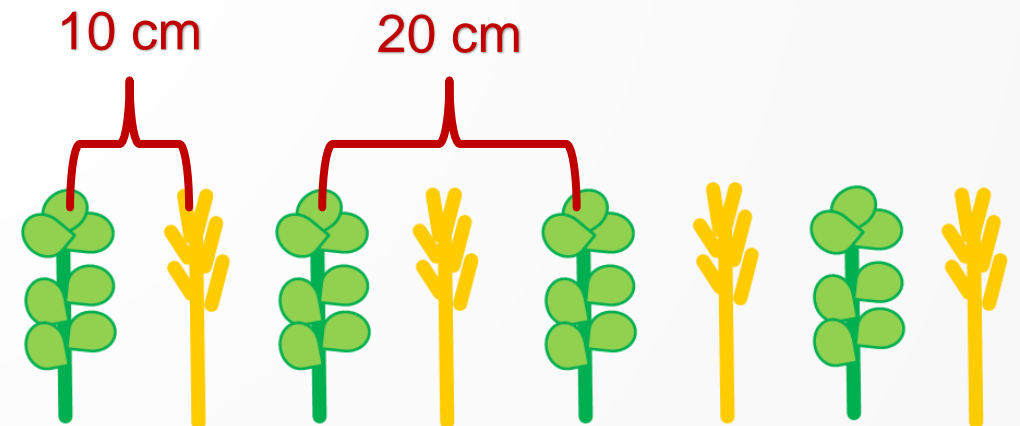


CDC Snowdrop



Weediness

- Weedy or Weed Free
- Constant seed rate
 - 200 viable seeds/m²
 - Plant counts showed about 150 plants/m² wheat in weedy plots
- Wheat (*Triticum aestivum*) used as a model weed
 - Clearfield® allowed spraying other weeds
 - Consistent weed pressure in weedy plots
 - Represent grassy weed competition



Seeding Rates



20



40



60

- ▶ Viable Seeds/m²
 - ▶ Based on germination tests
 - ▶ Ensure both varieties end up with same density

Experiment Methods

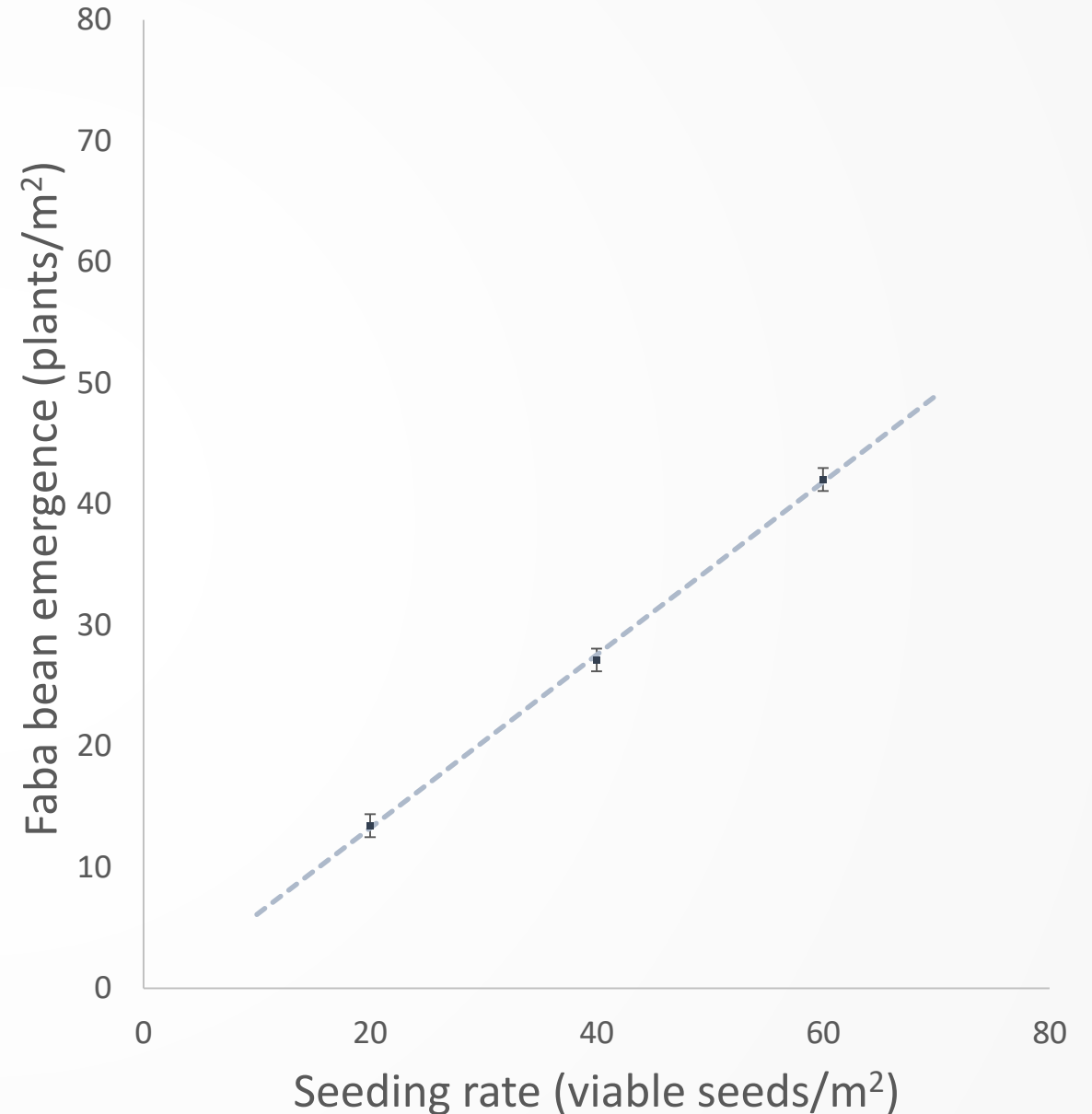
- Standard faba bean management
 - Sprayed June 1st
- Data collection
 - Plant density
 - Biomass
 - Yield
- Analysis - SAS



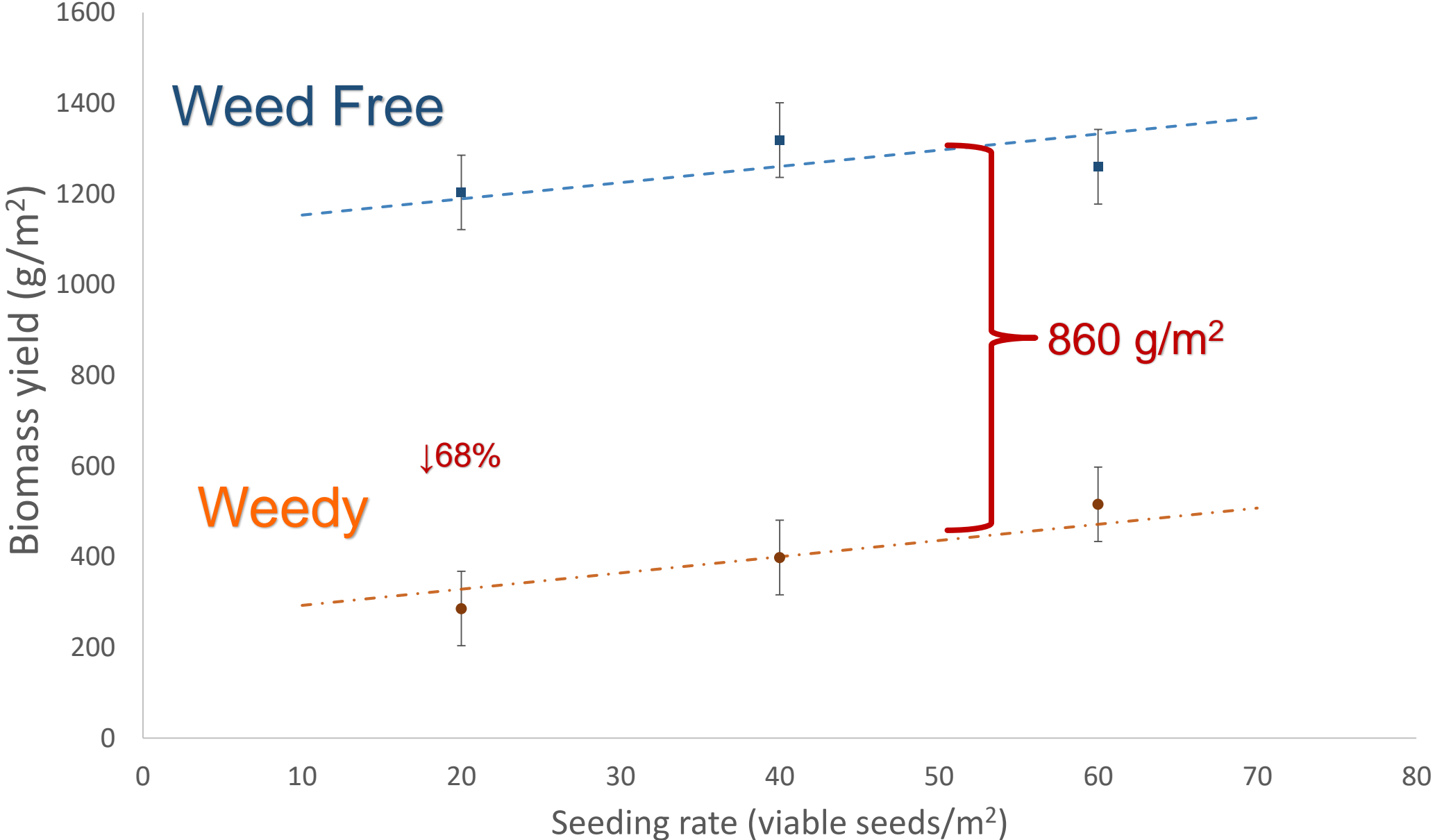
Emergence Results

- 71% Emergence
 - Consistent across treatments
- Less than target SR
 - Need to increase SR by 1.4 to increase plant density by $1/\text{m}^2$
 - Plant density for treatments was 13, 27 and 42

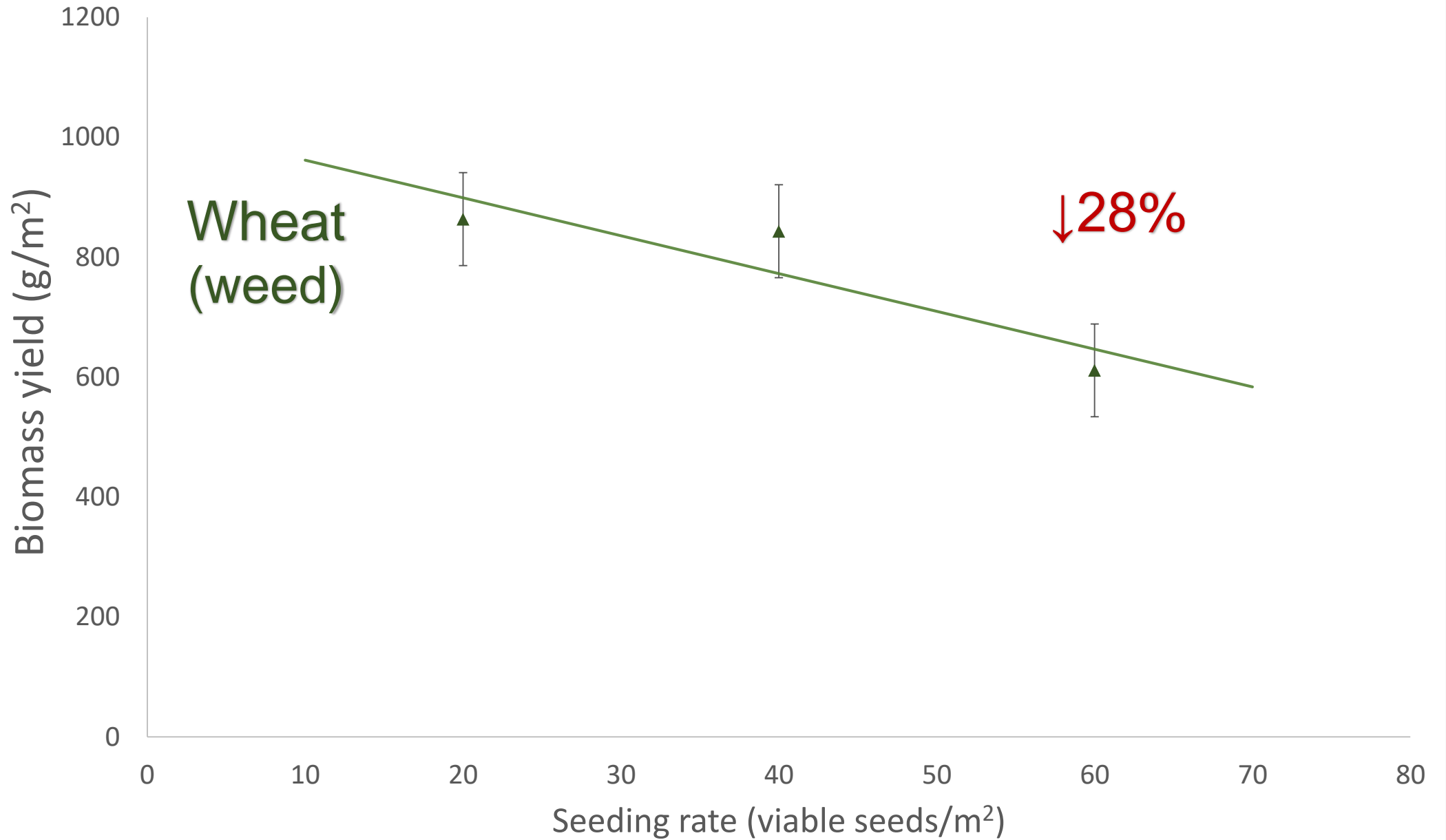
Faba Bean Emergence



Faba Bean Biomass Results



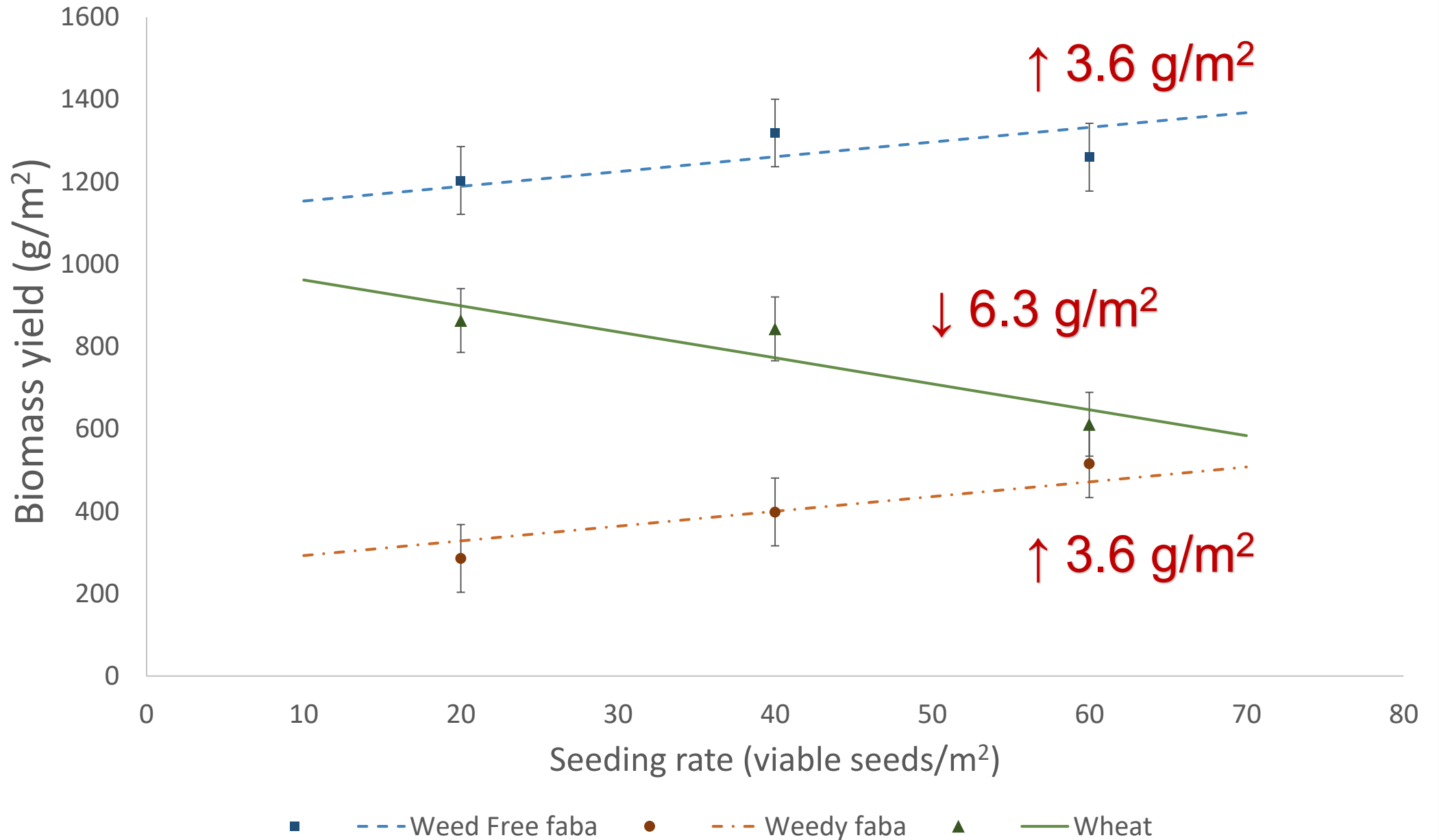
Wheat Biomass Results



Wheat
(weed)

↓28%

Biomass Results



Weedy



20

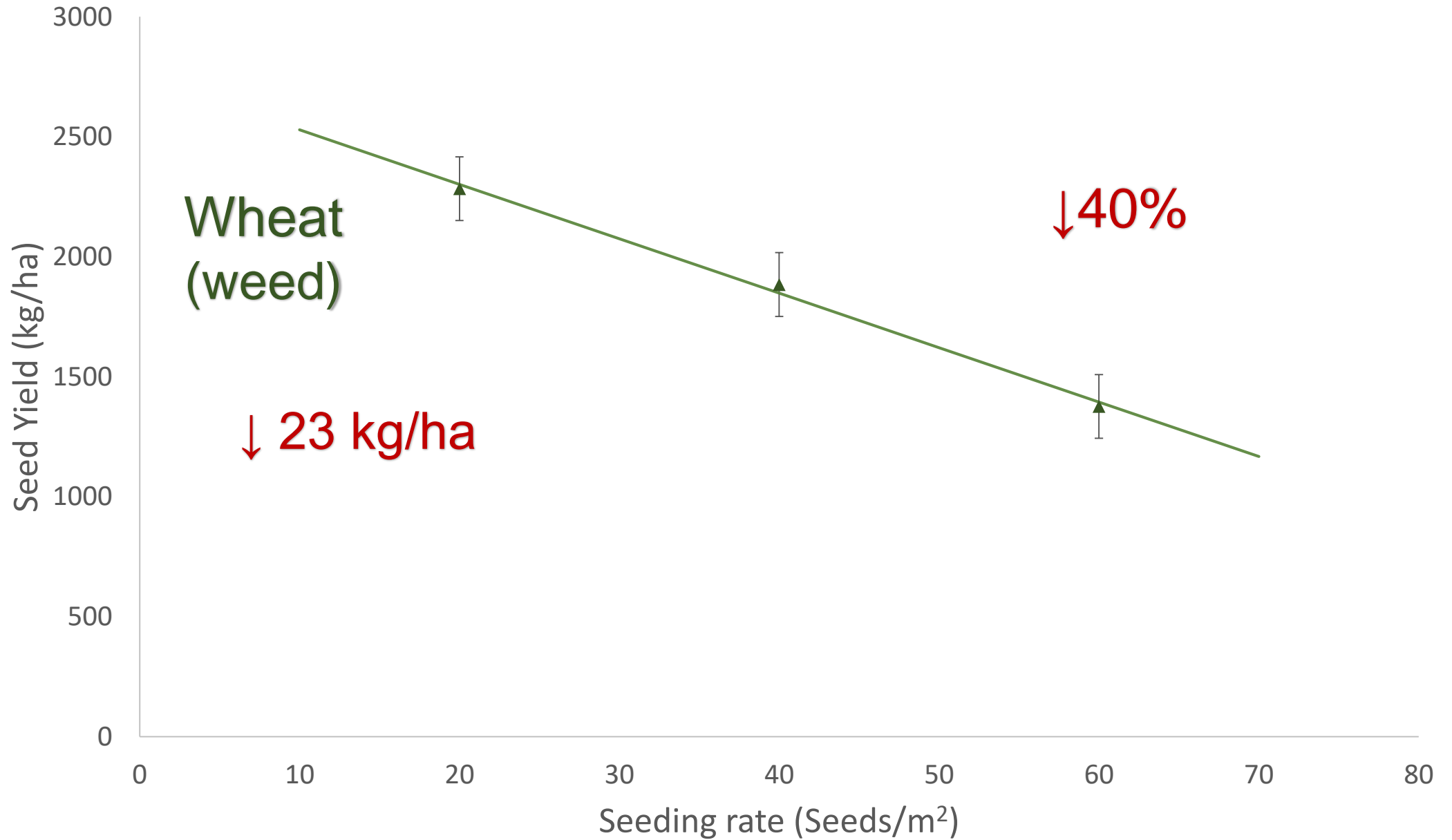
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60

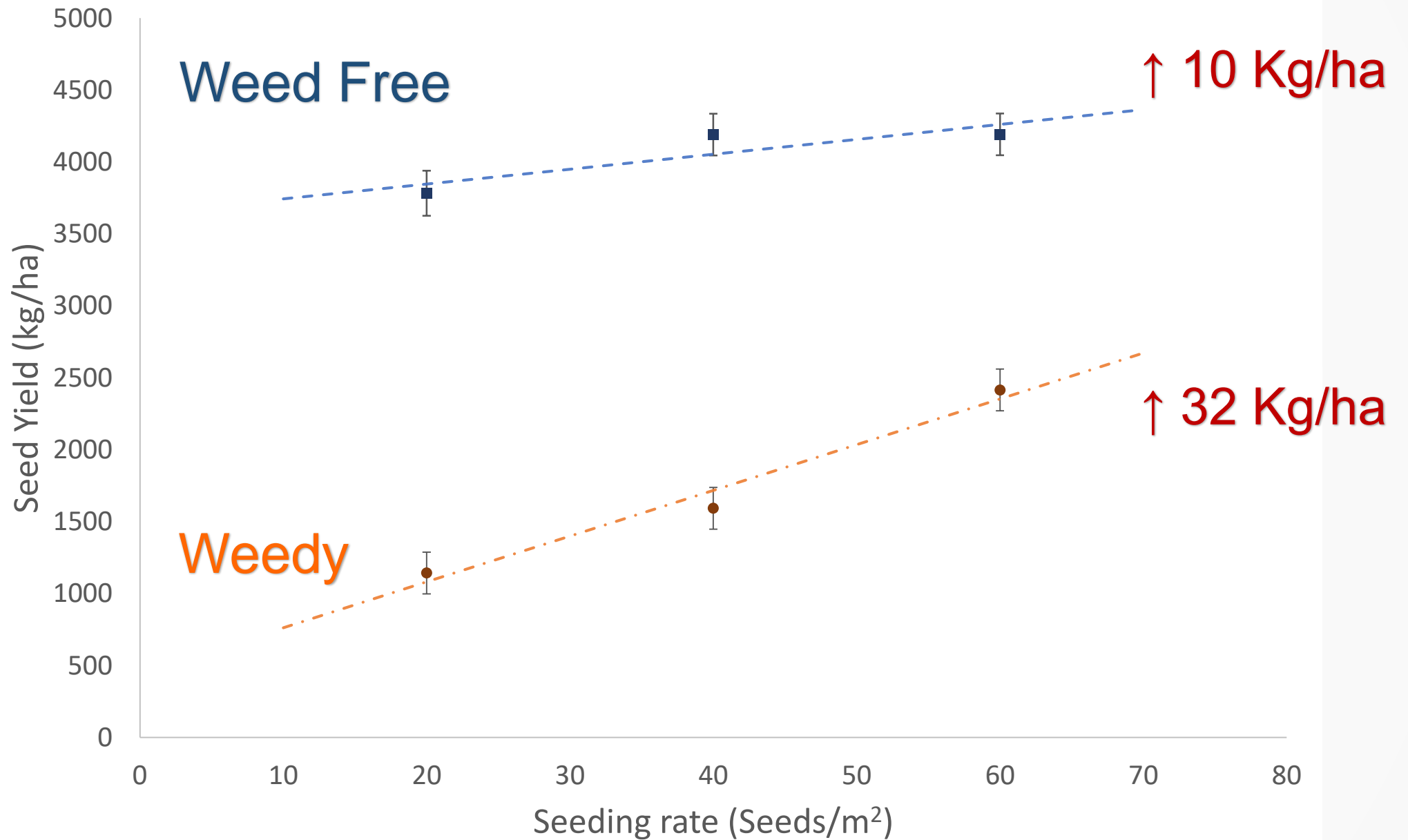
Weed Free



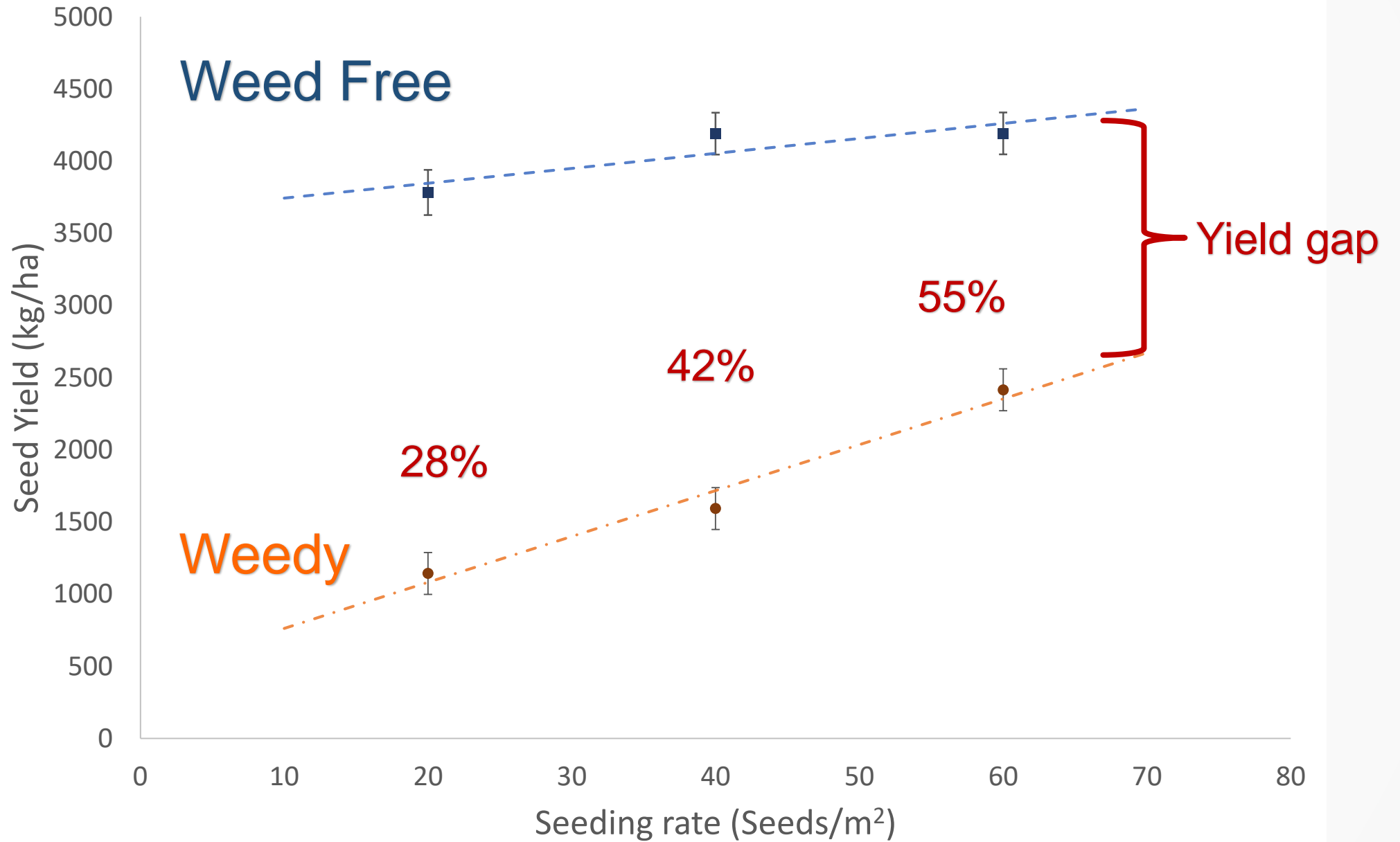
Wheat Yield Results



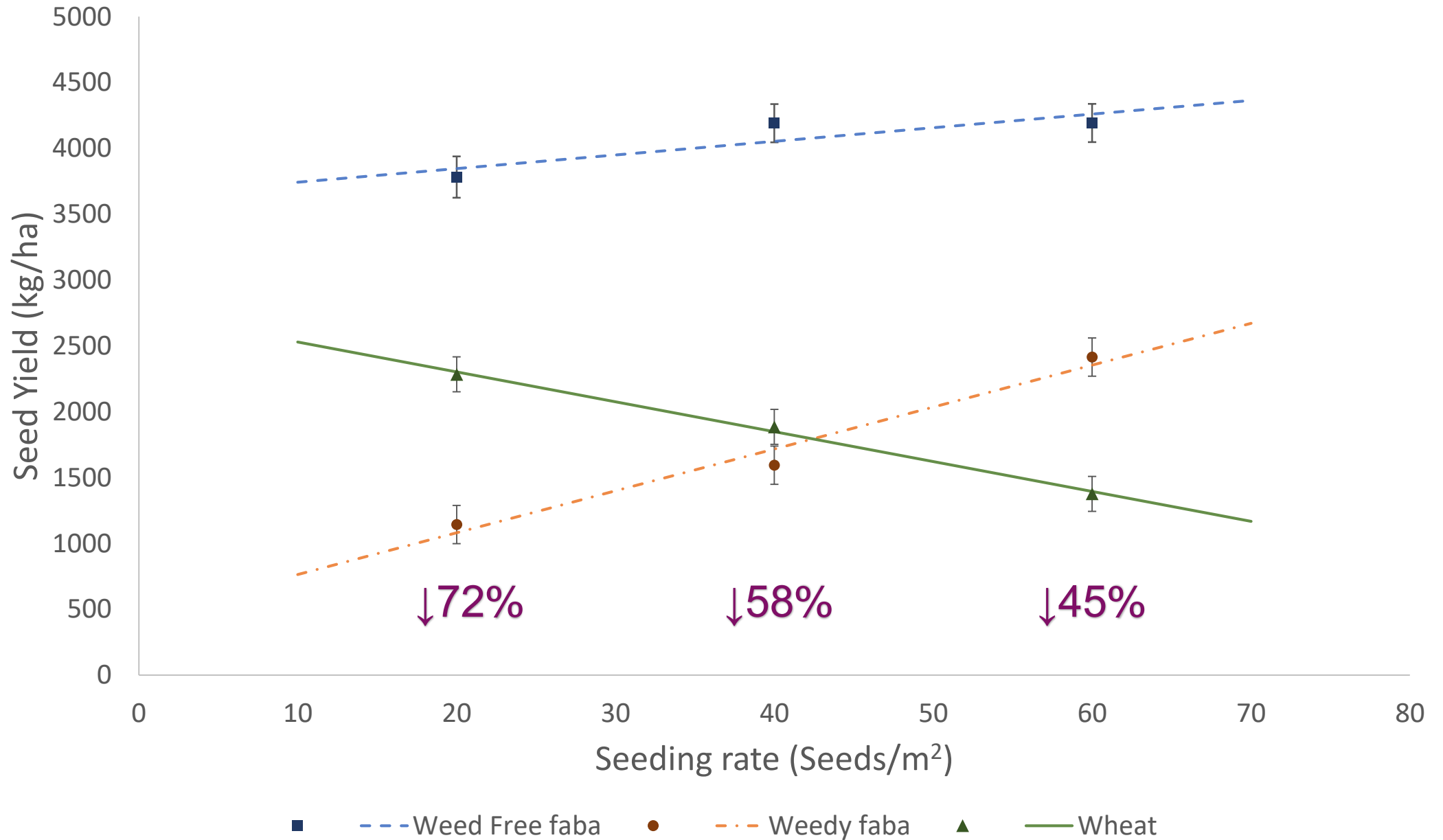
Faba Bean Yield Results



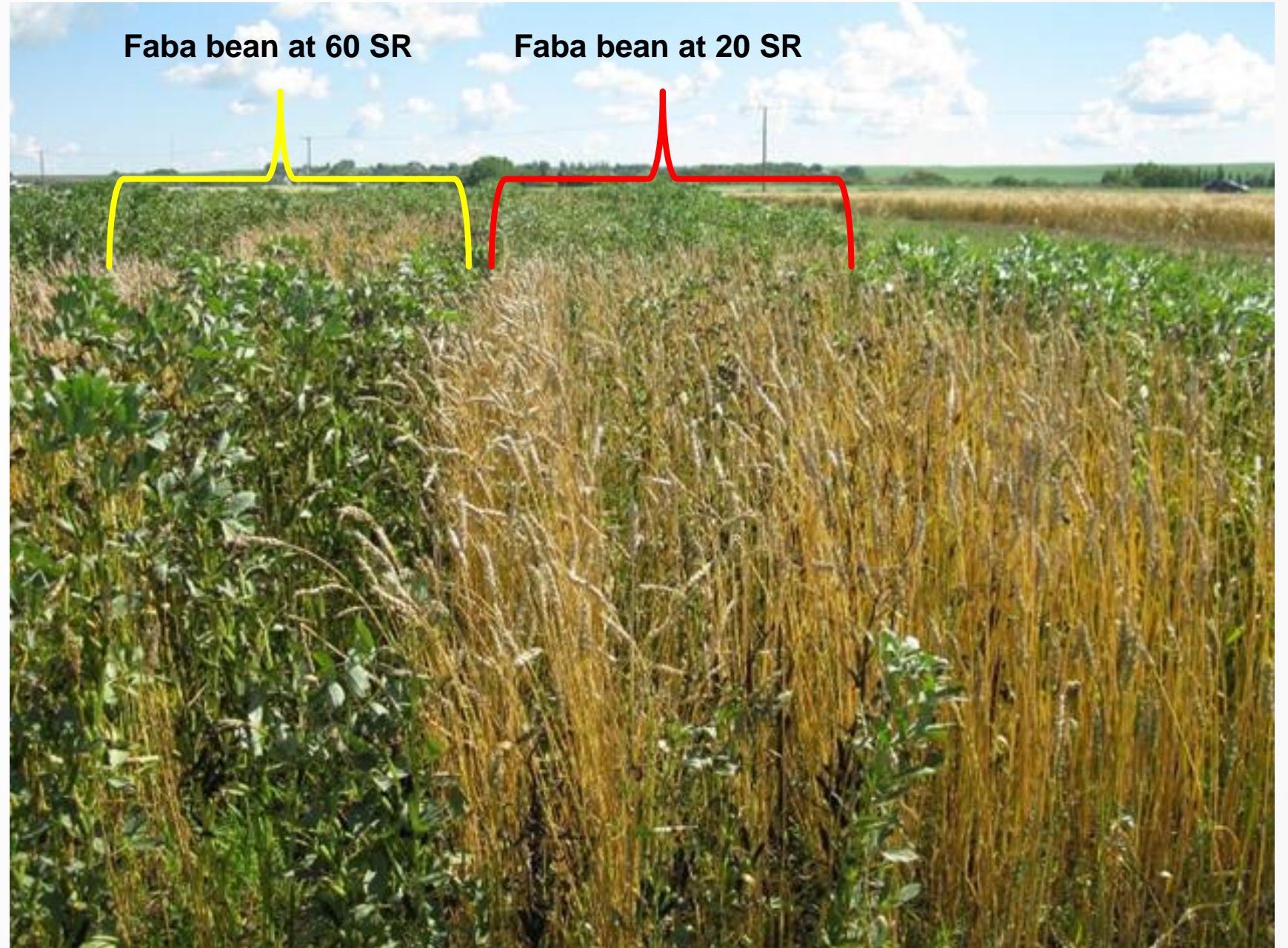
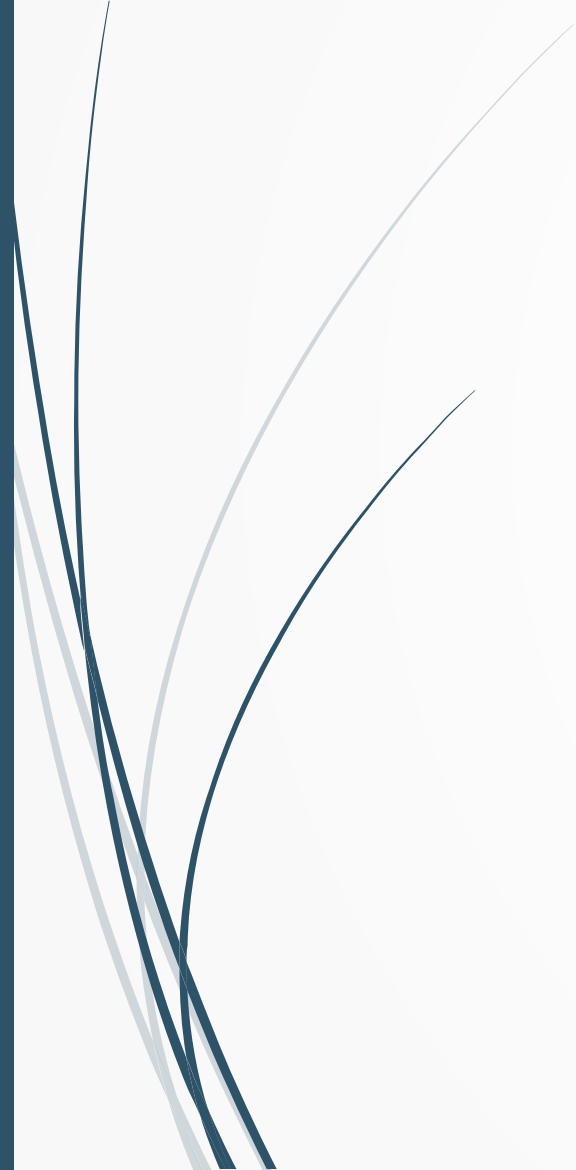
Faba Bean Yield Results



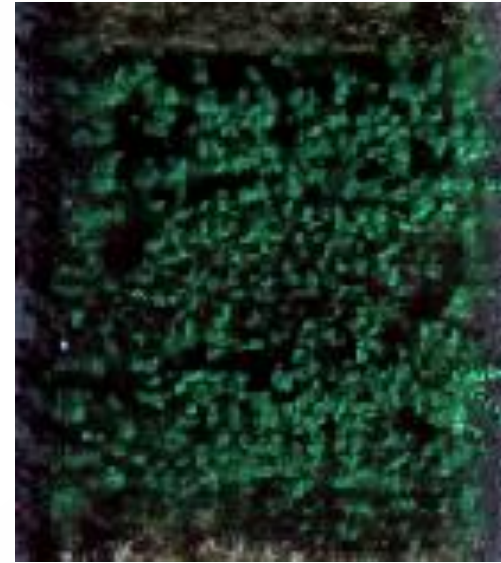
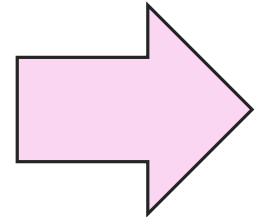
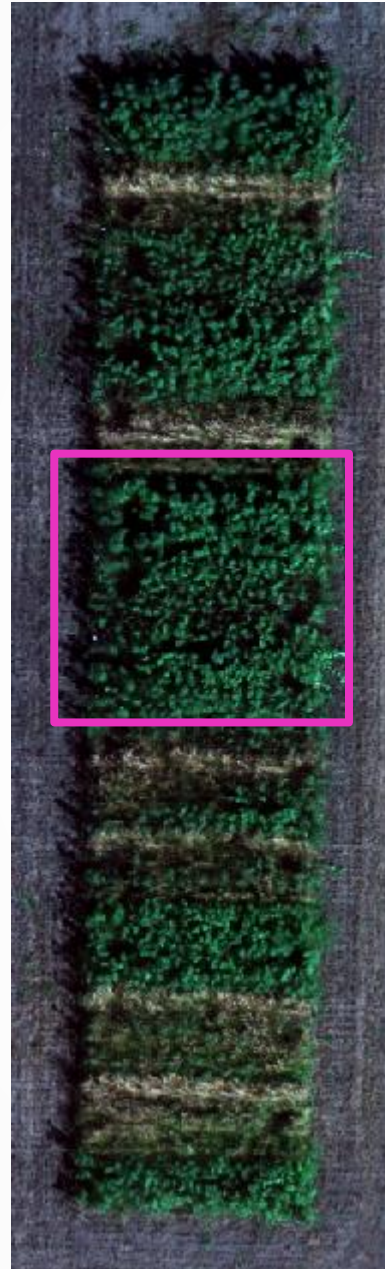
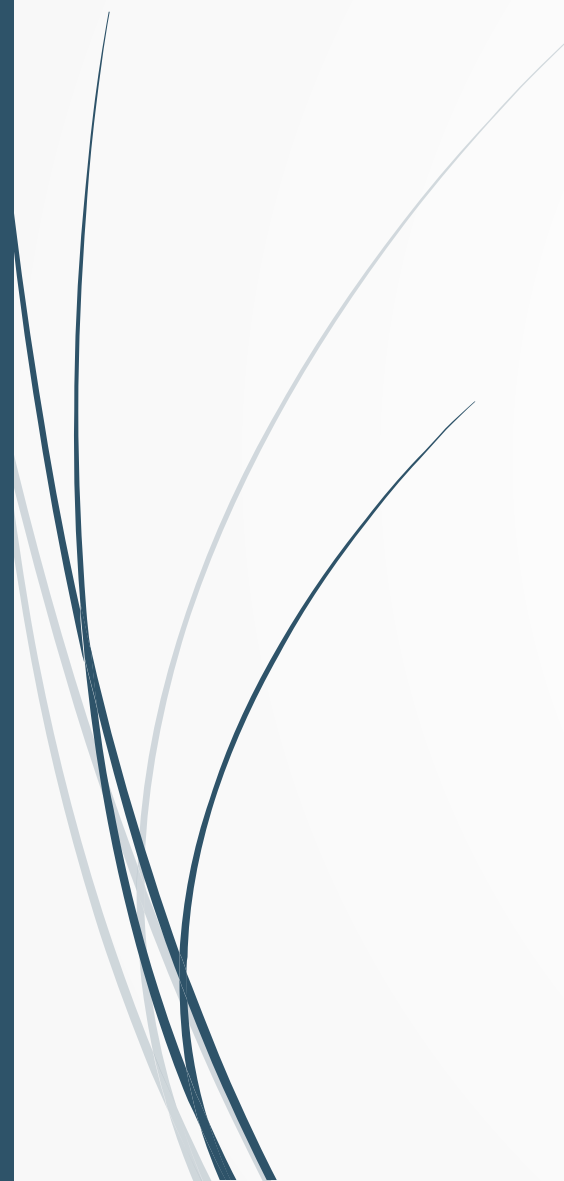
Yield Results



Weedy



Weed Free



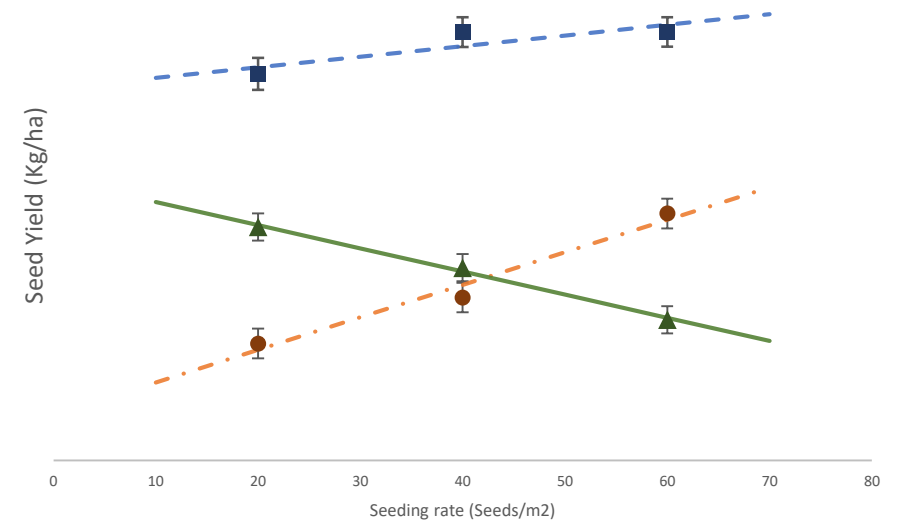
} 20 SR

} 60 SR

} 60 SR

Conclusions

- Variety
 - No significant effect on biomass or yield
- Increasing Seeding Rate
 - Weed decrease
 - Biomass by 28%
 - Seed by 40%
 - Yield and biomass increase
- SR and Weediness interaction
 - 3x benefit of ↑ SR when weedy
- Weediness
 - Ave. 58% faba bean yield decrease
- Further research with higher seeding rates needed to determine optimum SR



References

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Questions?

