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Integrating the building blocks of agronomy into an IPM strategy for wheat stem sawfly.

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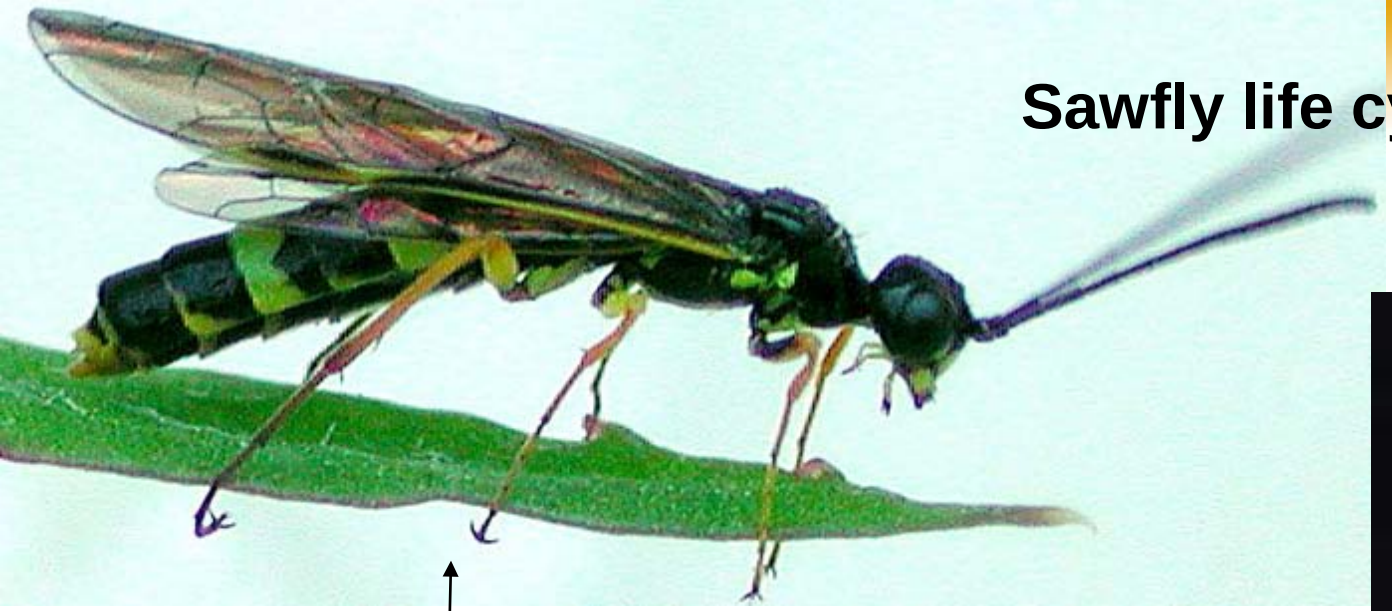
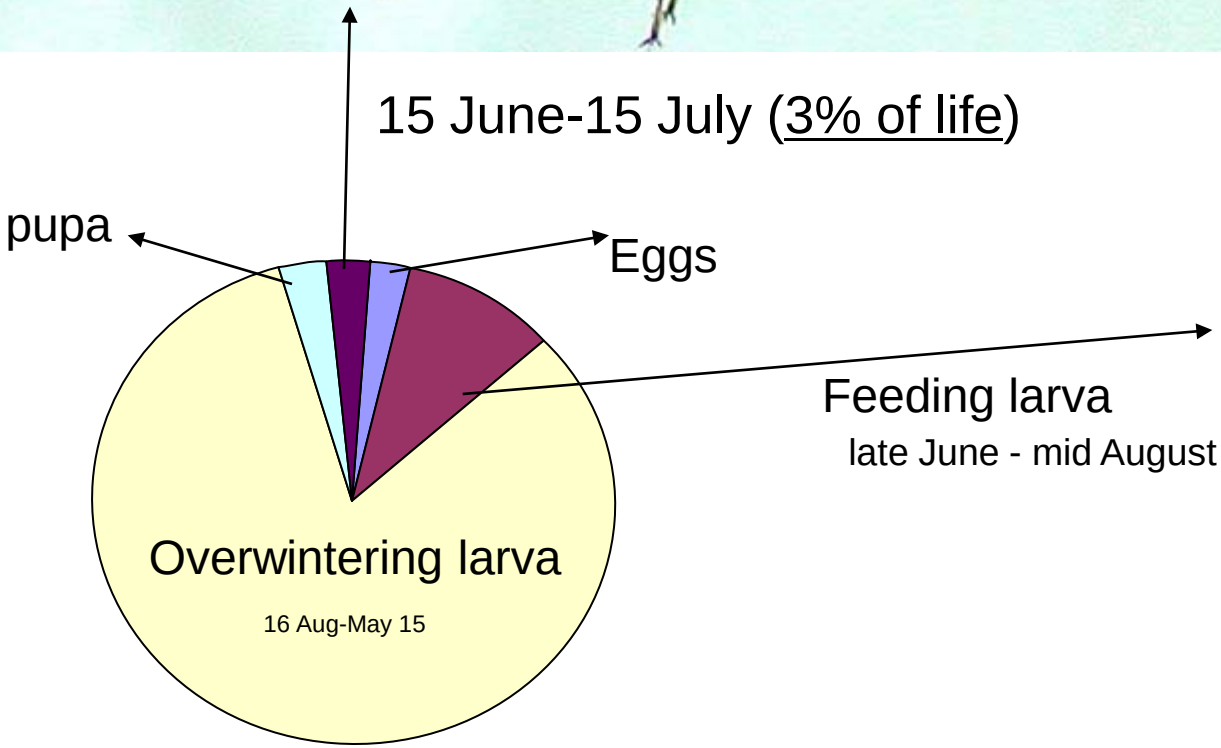
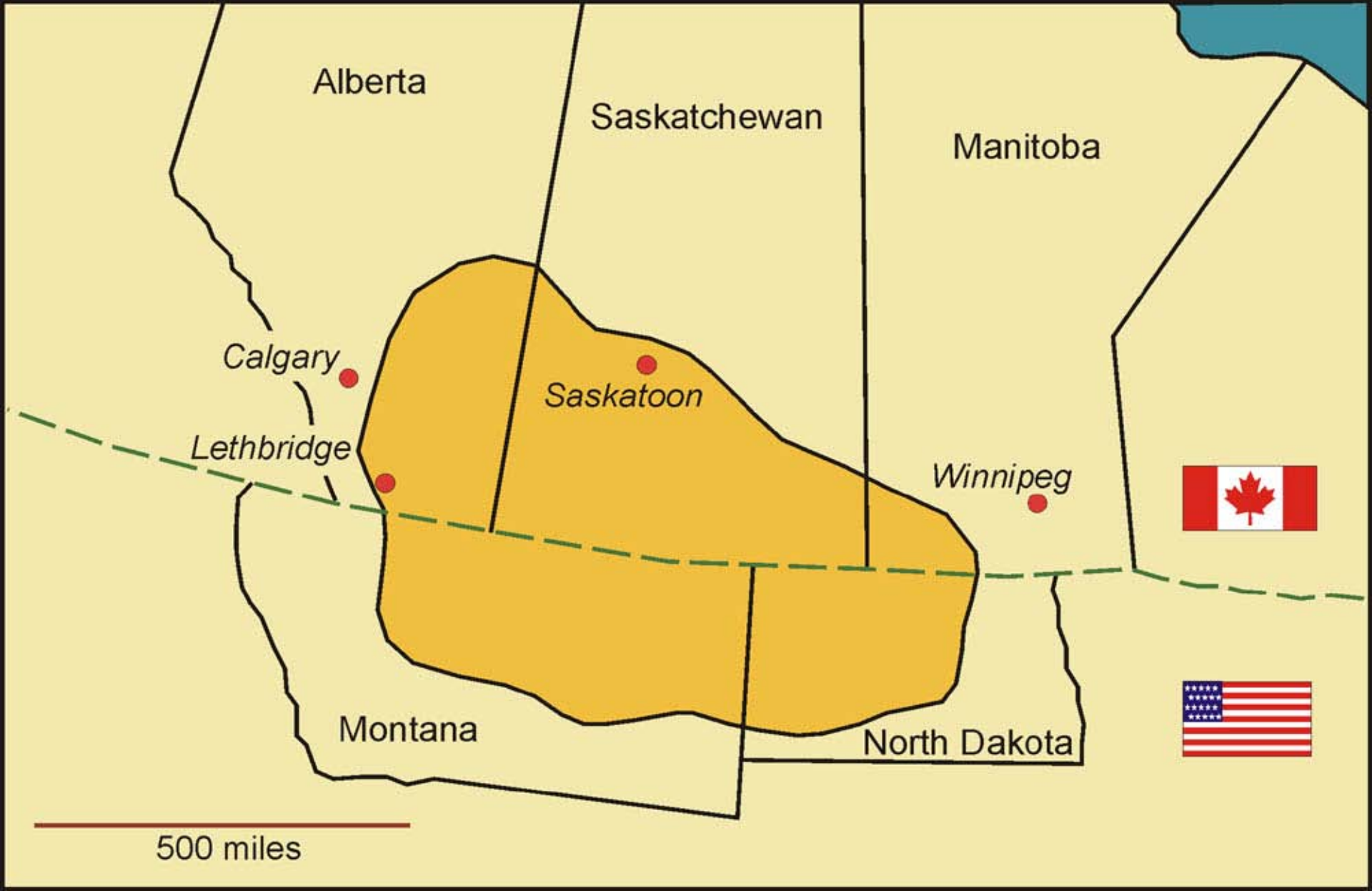
Canada

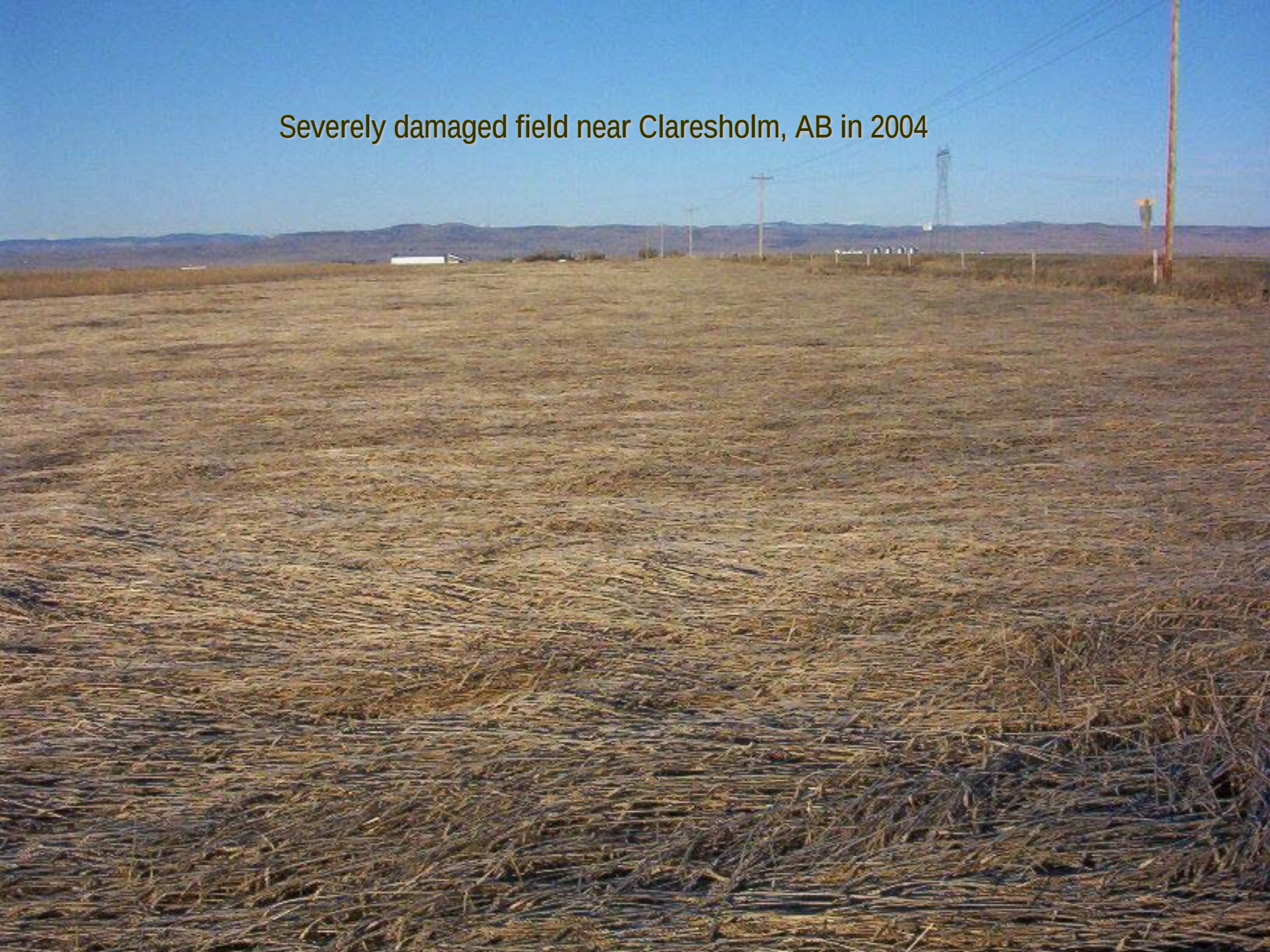
Sawfly life cycle





Insecticide Efficacy??


Alberta
Saskatchewan
Manitoba
Calgary
Saskatoon
Lethbridge
Winnipeg
Montana
North Dakota
500 miles


Severely damaged field near Claresholm, AB in 2004

PhD Program Objectives

Objective 1: Determine the impact of re-cropping infested stubble on the population dynamics of the wheat stem sawfly and it's natural enemies.

Objective 2: Determine the influence of seeding rate on pith expression in the culm of solid-stemmed wheat cultivars.

Objective 3: Develop and assess harvest management strategies to enhance natural enemy populations of the wheat stem sawfly.

Objective 4: Determine the influence of mid-row banded nitrogen and post-emergent micronutrient applications on crop canopy architecture and pith expression in the culm of solid-stemmed wheat.

Expt. 1. Effect of Re-cropping Infested Wheat Stubble on WSSF Survivorship

Split-Plot Design

– Main Plot: Crop Residue Management on spring wheat stubble infested with sawfly

- Control – no harrowing
- Heavy tine harrow - 20˚ angle (low disturbance setting)
- Heavy tine harrow - 5˚ angle (high disturbance setting)
- Phoenix rotary harrow - 25˚ angle (low disturbance setting)
- Phoenix rotary harrow - 45˚ angle (high disturbance seeting)

– Sub Plot: Direct Seeding System

- ConservaPak 23 cm row spacing with knife opener
- ConservaPak 23 cm row spacing with 11“ sweep
- ConservaPak 30 cm row spacing with knife opener
- JD Disc opener with Flexi-coil seed distribution
- Chemical fallow-no seeding

Timing of treatment: Winter wheat (stacked behind spring wheat) vs. Spring wheat (‘AC Barrie’). Total of 25 plots x 3 replicates grown in spring and winter wheat system.

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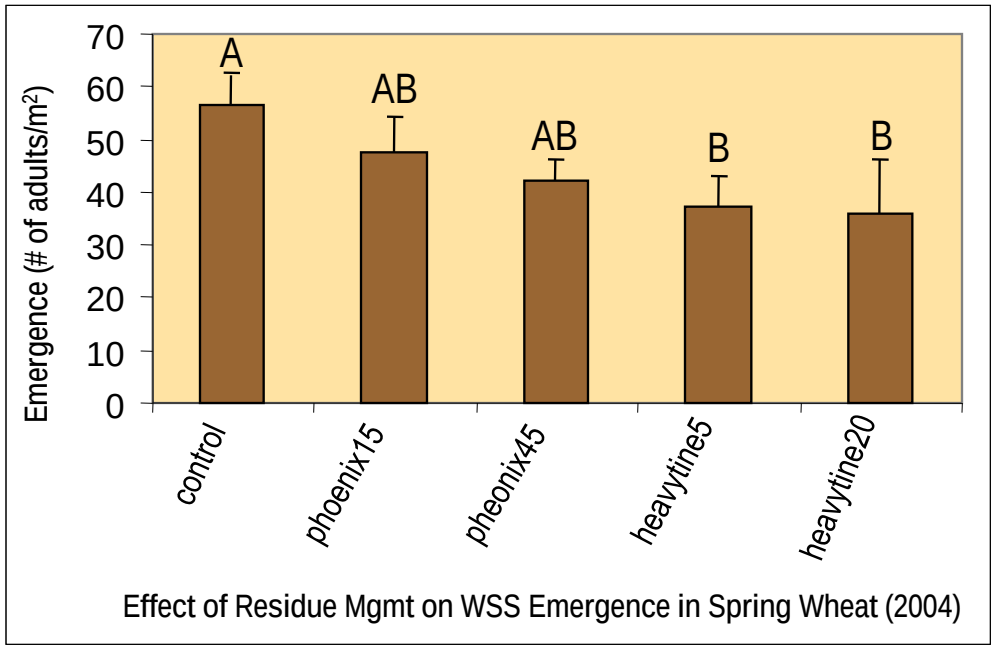
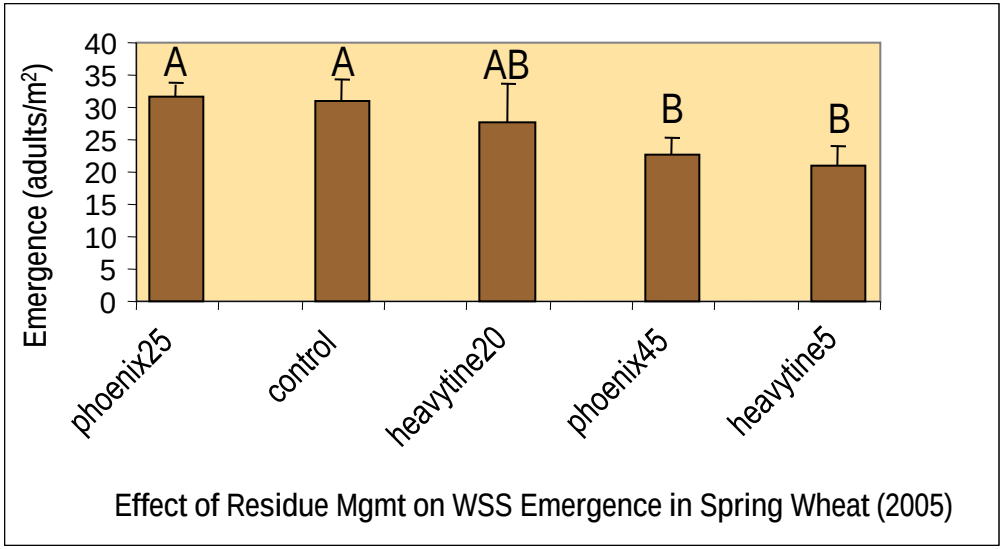
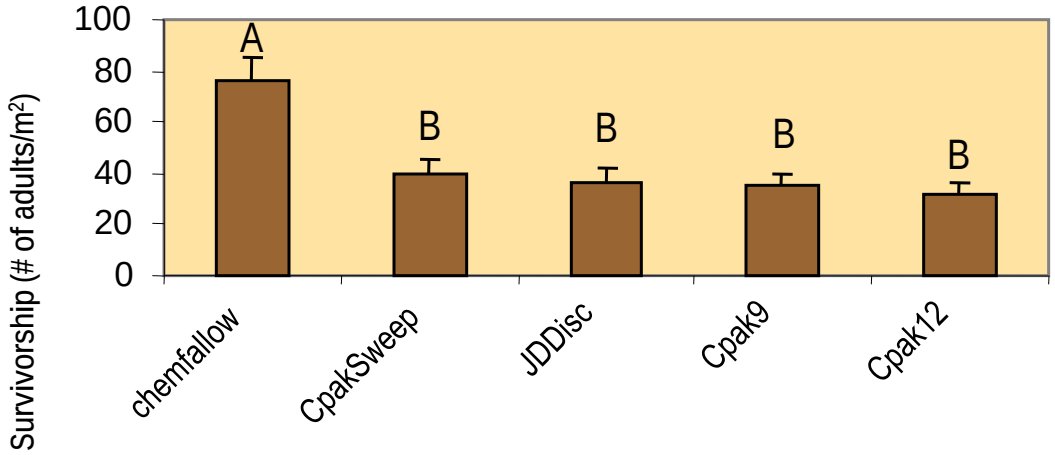
PHOENIX

Results: Residue Management

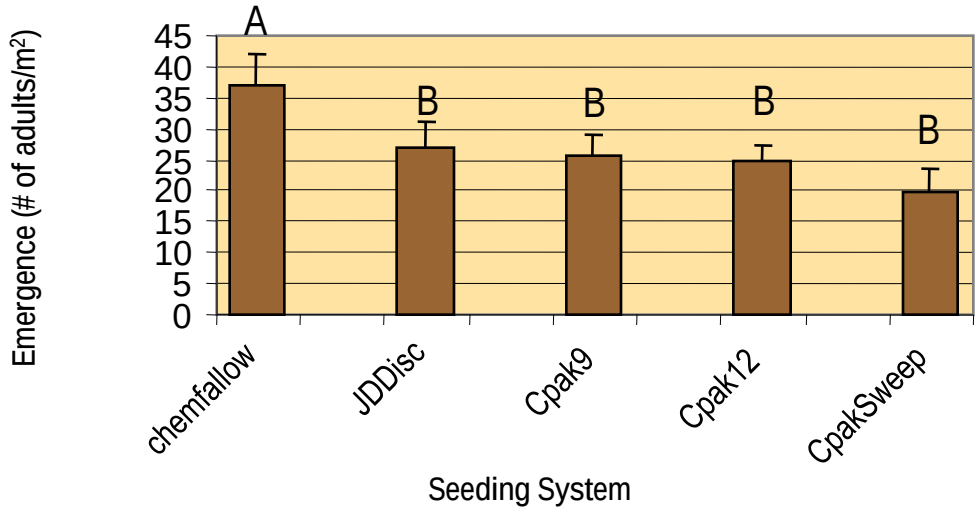




Results: Re-cropping vs. Fallow

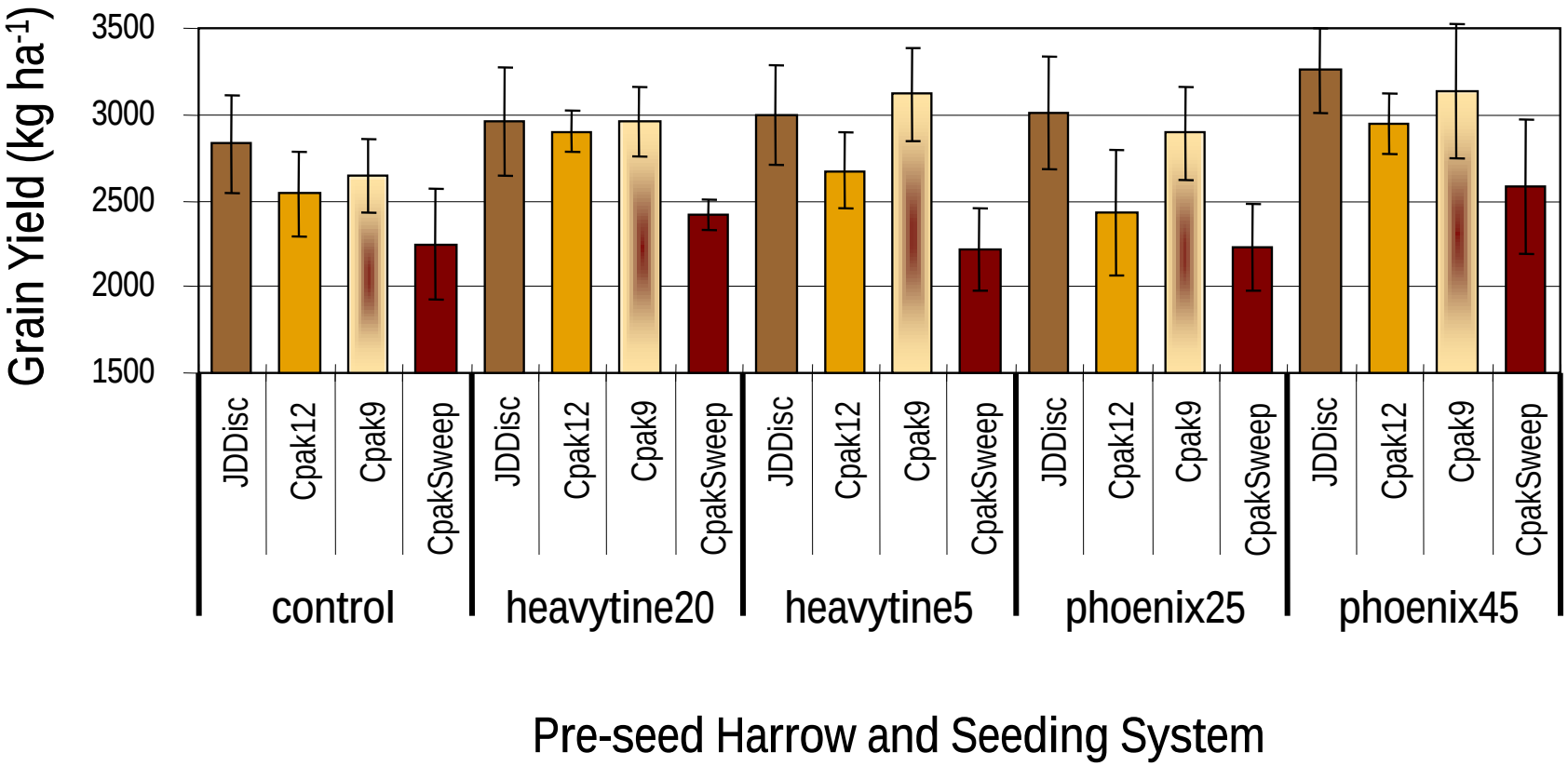


Effect of Seeding System on WSS Emergence in Spring Wheat. Lethbridge, AB(2004)



Effect of Seeding System on WSS Emergence in Spring Wheat (2005)

Effect of Pre-seed Harrow and Seeding System on Yield of Spring Wheat in Coalhurst, Alberta (2004-2005)



Expt. 2. Integration of Technologies to Manage Wheat Stem Sawfly in Durum and Hard Red Spring Wheat

– Split-Plot Design

– Main Plot: Cultivar

- AC Lillian (solid-stemmed treatment)
- CDC Go (hollow-stemmed treatment)
- 1:1 blend of CDC Go: ‘AC Lillian’ (blend)
- ‘AC Avonlea ’ (hollow-stemmed durum)

– Sub Plot: Seeding Rate

- 150 seeds m-2
- 250 seeds m-2
- 350 seeds m-2
- 450 seeds m-2

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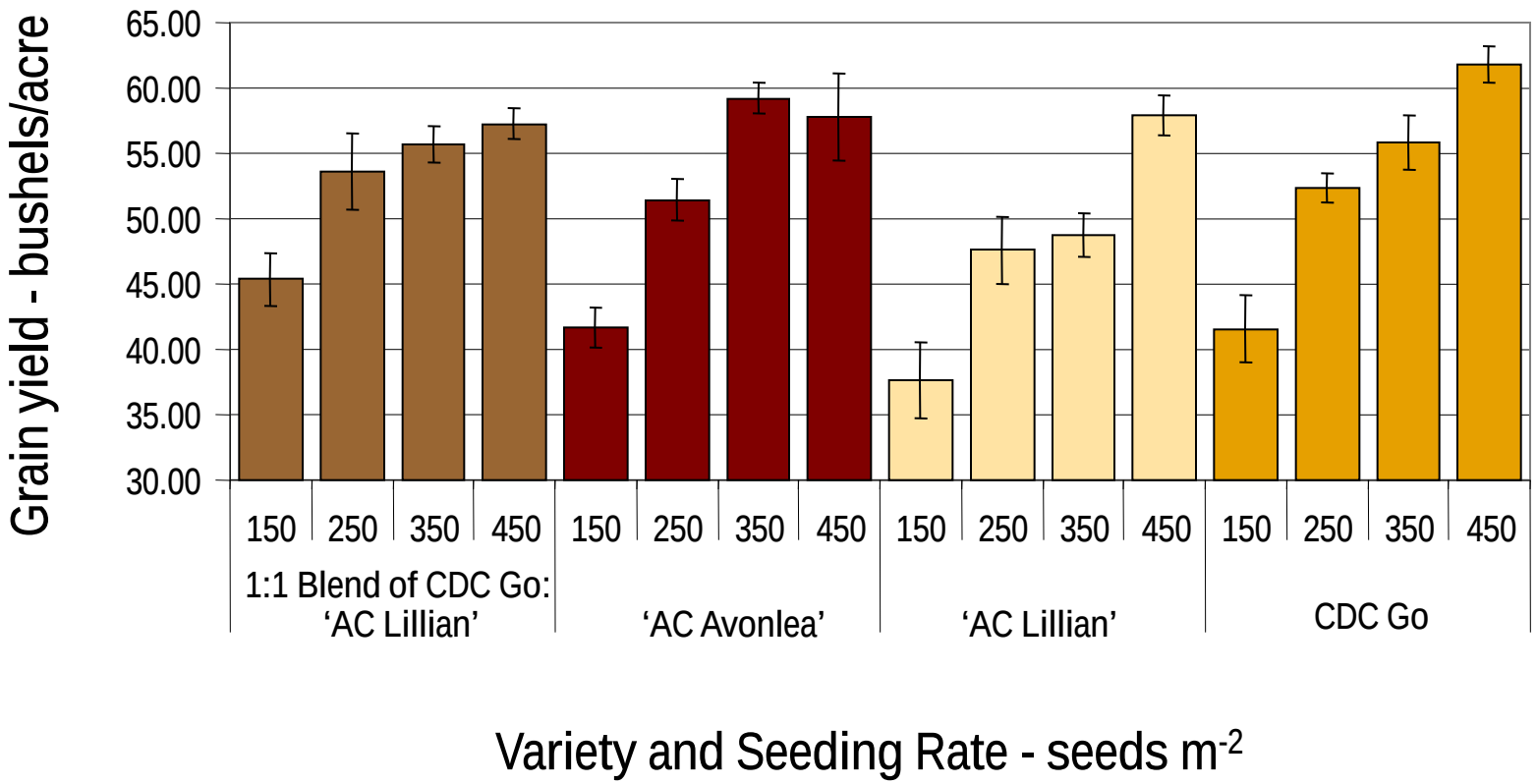
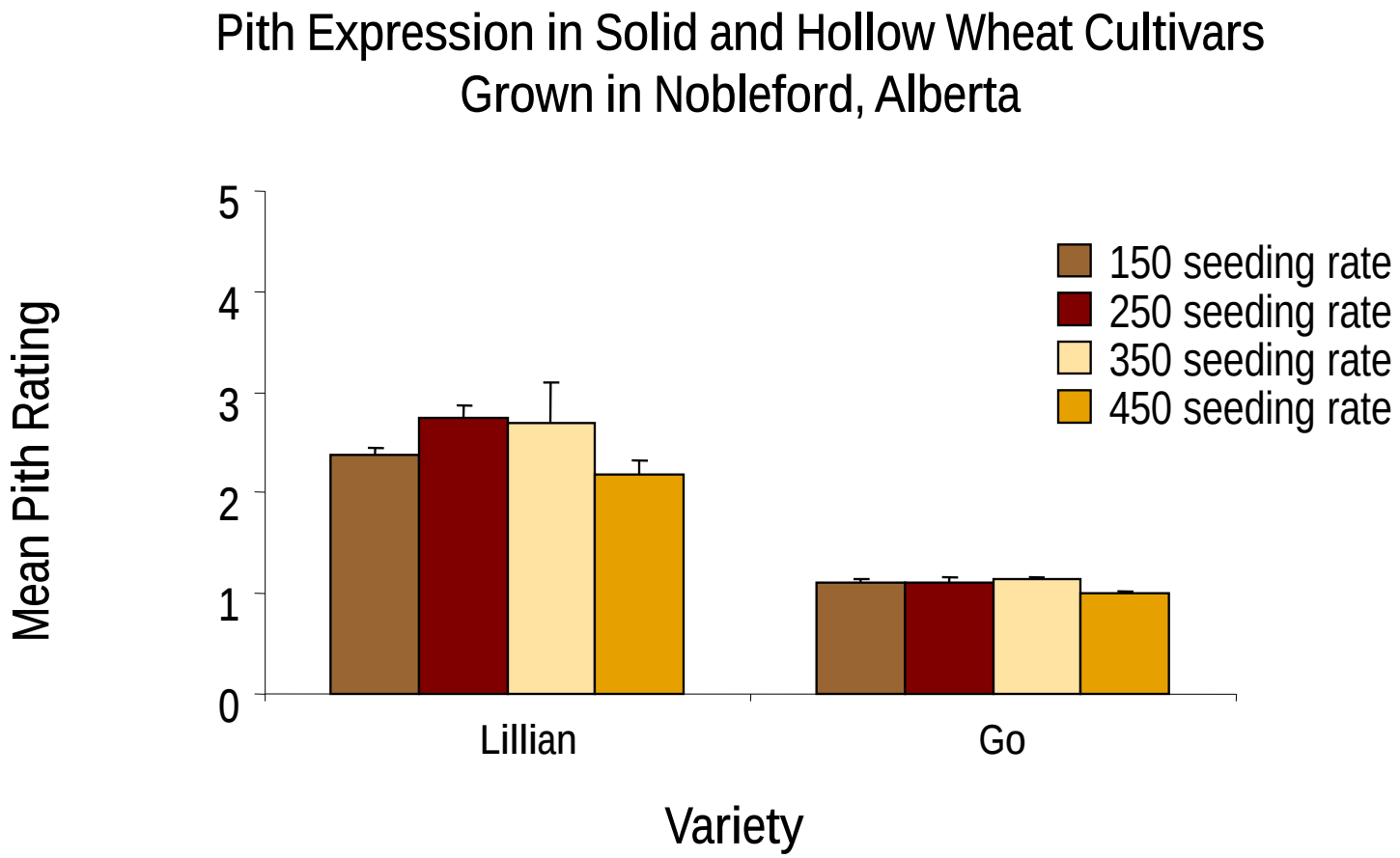
CP 12

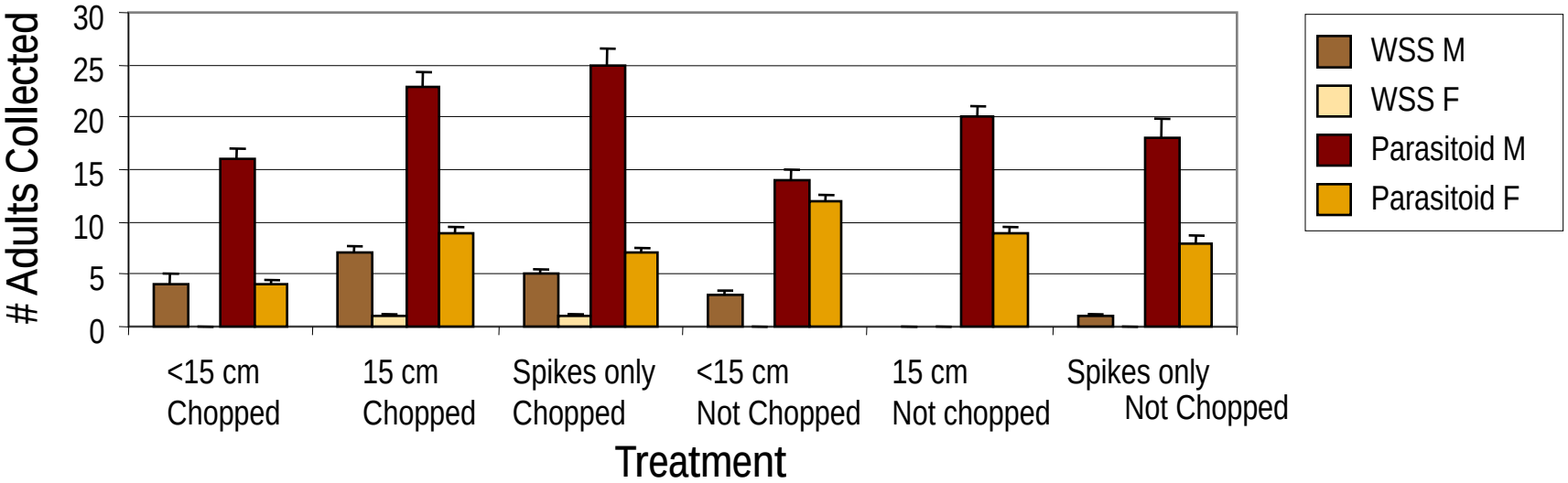
Influence of Seeding Rate on Yield of CWRS and CWAD Planted on Wheat Stubble in Coalhurst, Alberta (2006)



Can Seeding Rate Influence Pith Expression or Stem Solidness ??



Influence of Cutter Bar Height and Straw Chopper on *C. cinctus* and *B. cephi* emergence patterns. Coalhurst, AB. 2007.



Expt. 3. Influence of Seeding Rate and N Management on Pith Expression in Spring Wheat

Main Plot:

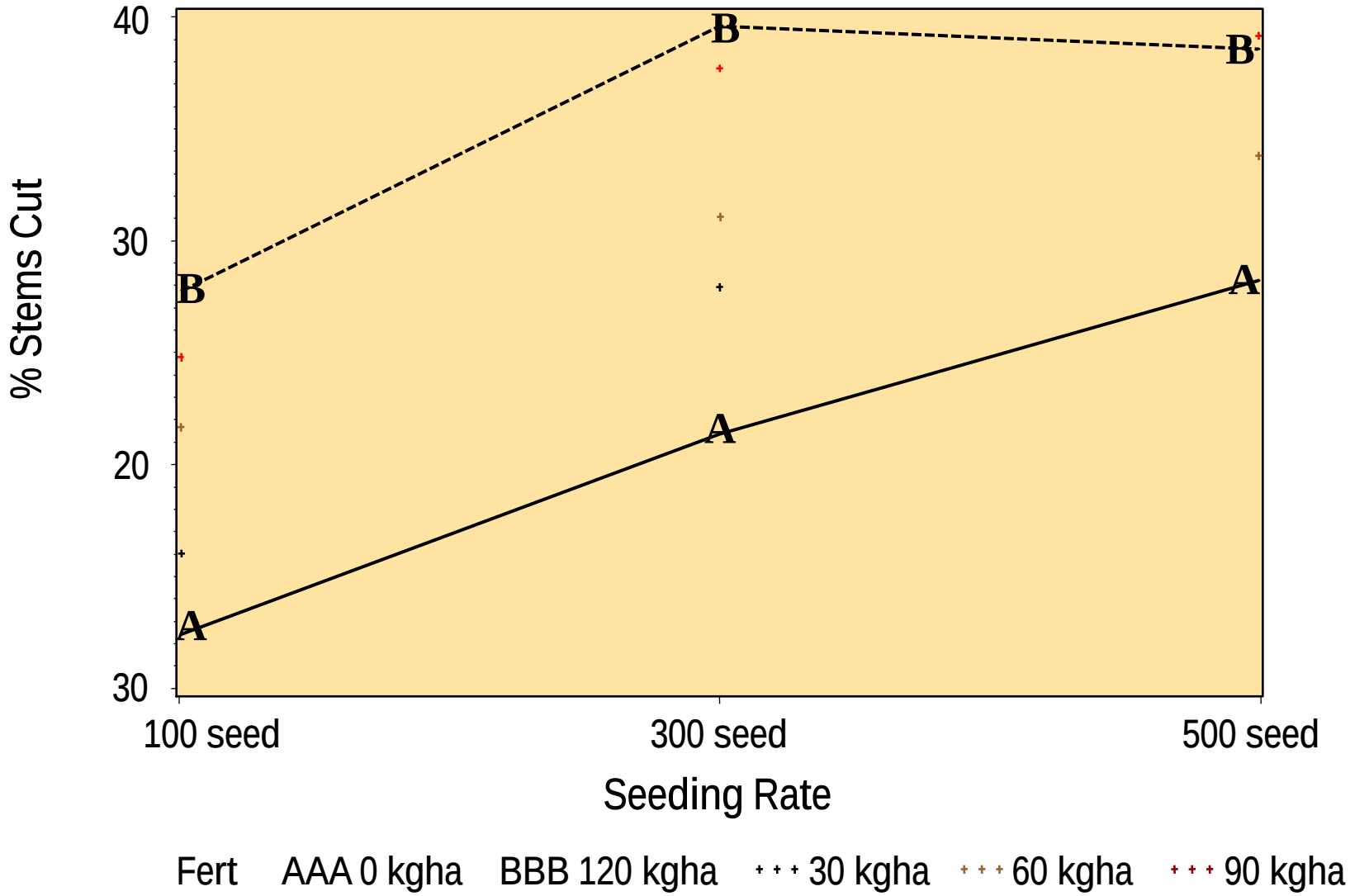
1) 0 N
2) 30 kg/ha mid-row banded N
3) 60 kg/ha mid-row banded N
4) 90 kg/ha mid-row banded N
5) 120 kg/ha mid-row banded N
6) 'Yield Max' (2 – 5x rate apps) + 90 kg/ha mid-row banded N

Sub Plot:

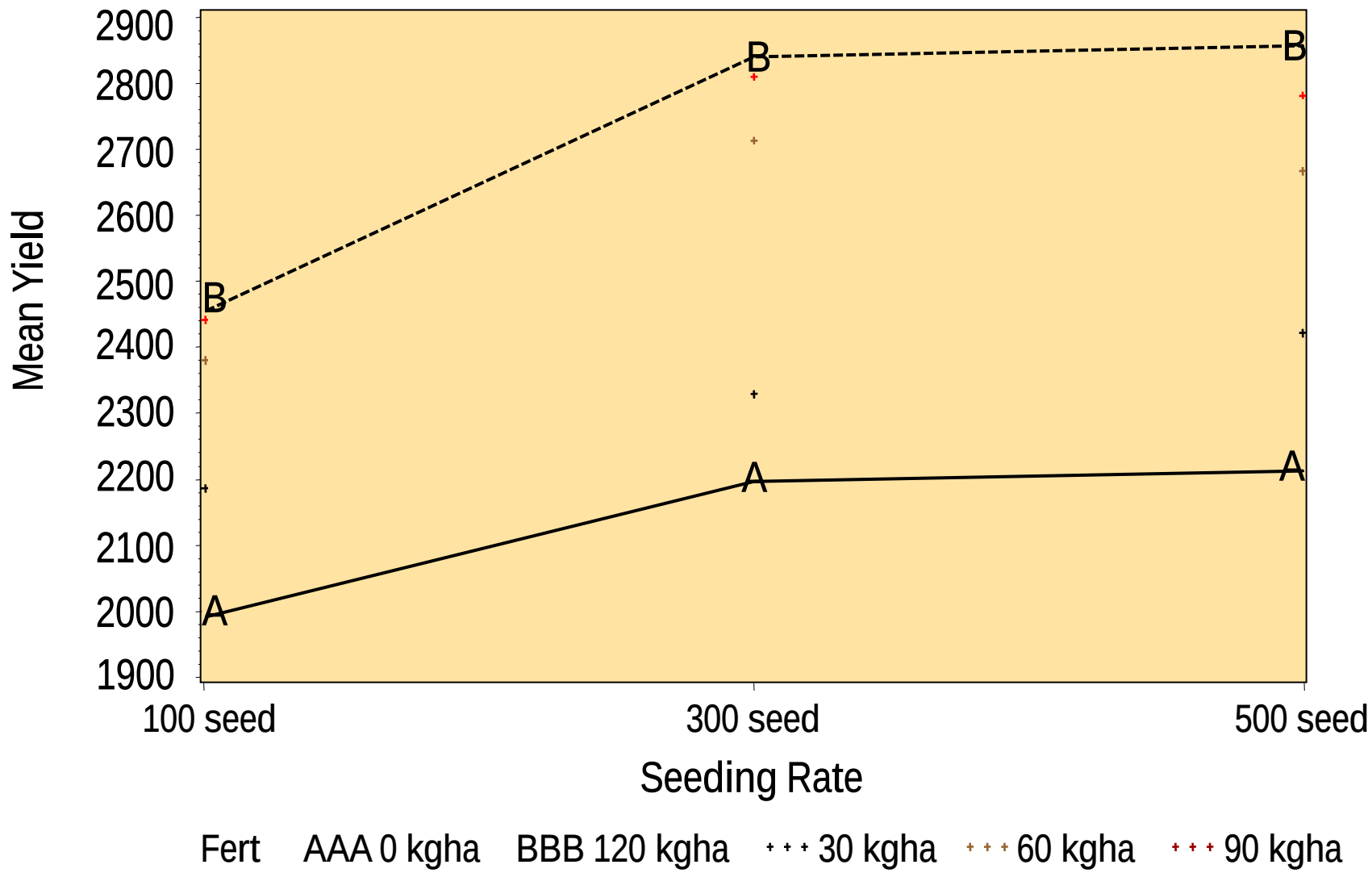
1) 100 seeds m^{-2} seeding rate (.05 bu/ac)
2) 300 seeds m^{-2} seeding rate (1.5 bu/ac)
3) 500 seeds m^{-2} seeding rate (2.5 bu/ac)

– **Locations:** Three sites: Lethbridge, Bow Island (Fallow), and Bow Island (Stubble)

Effect of Seeding Rate and Banded N on Cutting Resistance of Solid-stemmed Hard Red Spring Wheat



Effect of Seeding Rate and N on Dryland Wheat Yield



Concluding Remarks

- Agronomic studies usually demonstrate a significant advantage for solid-stemmed wheat when growing bread wheat
- BUT underscore the fact that ‘resistant cultivars’ are not the solution and must be a component of holistic IPM/ICM approach
- Seeding Systems: Disc vs. hoe/knife were similar but sweep not recommended
- Seed Rates: Lower for solid-stemmed wheat ie 300 seeds m^{-2}, and higher rates for hollow-stemmed ie. 400-450 seeds m^{-2}
- Residue Mgmt: Re-cropping infested wheat stubble ie. Cont. cropping systems is a better strategy vs. fallow phases AND preseed harrowing seemed effective.
- Harvest Mgmt: Higher cutting bar heights help conserve beneficial insects, and combines equipped with straw choppers were not detrimental.

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Questions?

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