

Integrated management approaches for controlling lesser clover leaf weevils in red clover for seed production



Soils and Crops
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Red clover for seed production

- Short-lived forage legume (perennial)
- Two types:
 1. Multi-cut early flowering (ON, QC & U.S)
 2. Single cut late flowering (BC, SK & AB)



Red clover values

- High potential to increase Soil Organic Mater (SOM) and Nitrogen.
- Suppress weeds, and breaks up heavy soil.
- Breaks disease and insect cycle.
- Good companion crop in grass mixture.

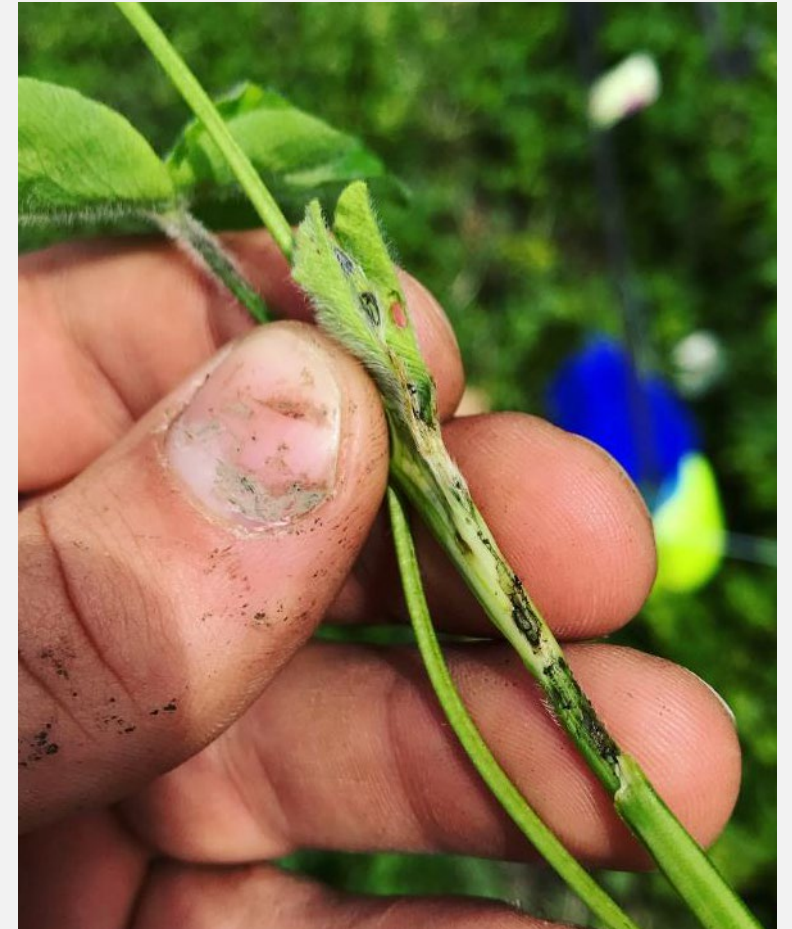
Estimation of N fixation in 4 legumes (kg/ha)

Legume crops	Gray Luvisol (Bayl)	Black solod (Landry)
Red Clover	334	250
Alfalfa	442	171
Sweet Clover	214	125
Alsike clover	303	152



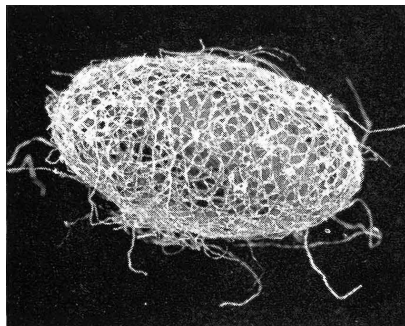
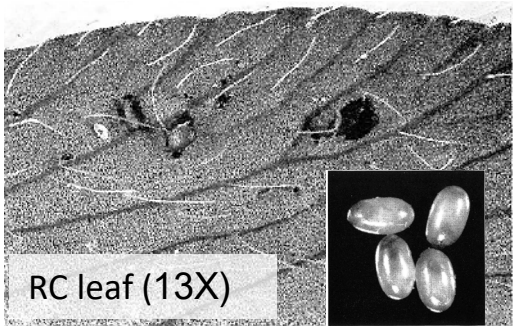
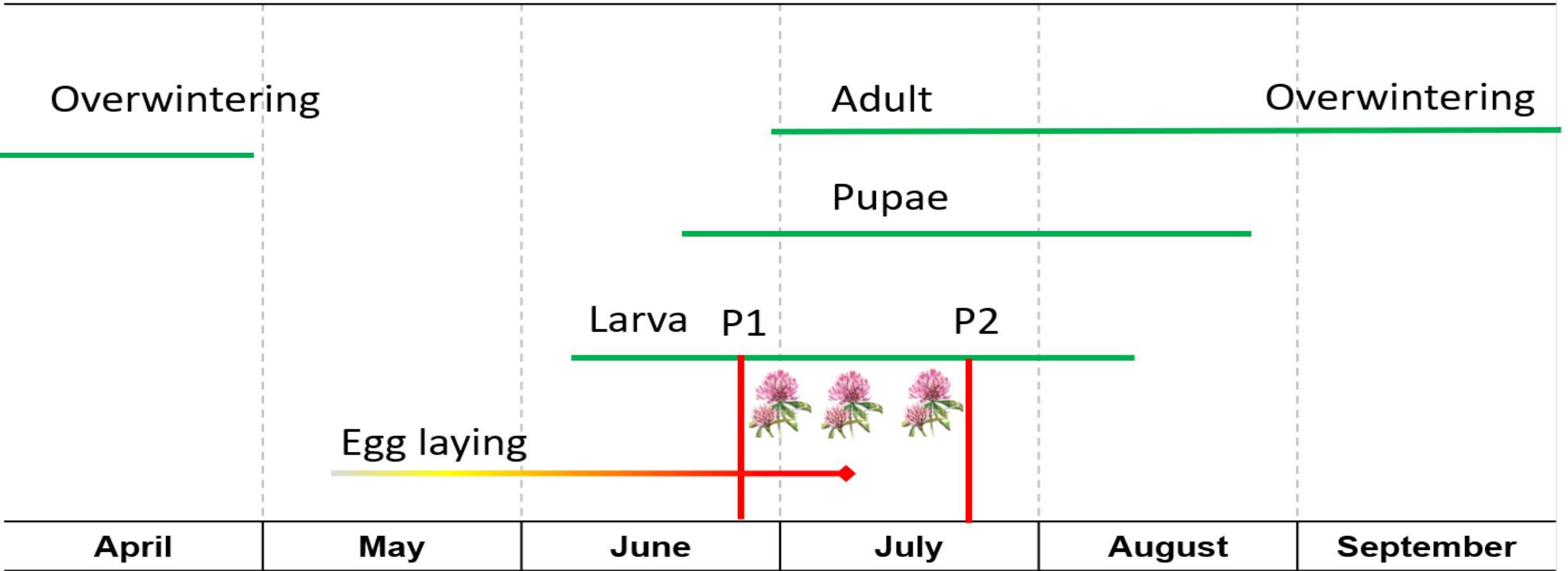
Lesser clover leaf weevil (LCLW)

- First reported in Saskatchewan in 1985.
- Seed yield reduced by 80% (loss of \$2M – 1986)
- Both larvae and adults can cause damage to red clover.





Lesser clover leaf weevil biology in SK



Management Options



- **Cultural:** burning of red clover fields in spring (where permitted).
- **Biological:** parasitoids (Ichneumonidae, Bracon sp.)
- **Chemical:** Decis and Poleci (deltamethrin), IRAC Group 3, Foliar



Objectives

- Evaluate the efficacy of the long term registered insecticide
- Asses pest management by the alternative compounds
- Examine the effects of our treatments on pollinators community
- Estimate yield losses under four pest management practices

Potential alternatives

Exirel (Cyantraniliprole) - IRAC Group 28

Voliam Xpress (Lambda-cyhalothrin & chlorantraniliprole) - IRAC Group 3 & Group 28

- Provides fast knockdown and residual activity.
- Conserves beneficial arthropods to help in pest control.
- Extended residual control.
- Efficacy on both sucking and chewing pests of agronomic crops.



Product name	\$/ha
Decis	15.4
Voliam Xpress	21
Exirel	76.8

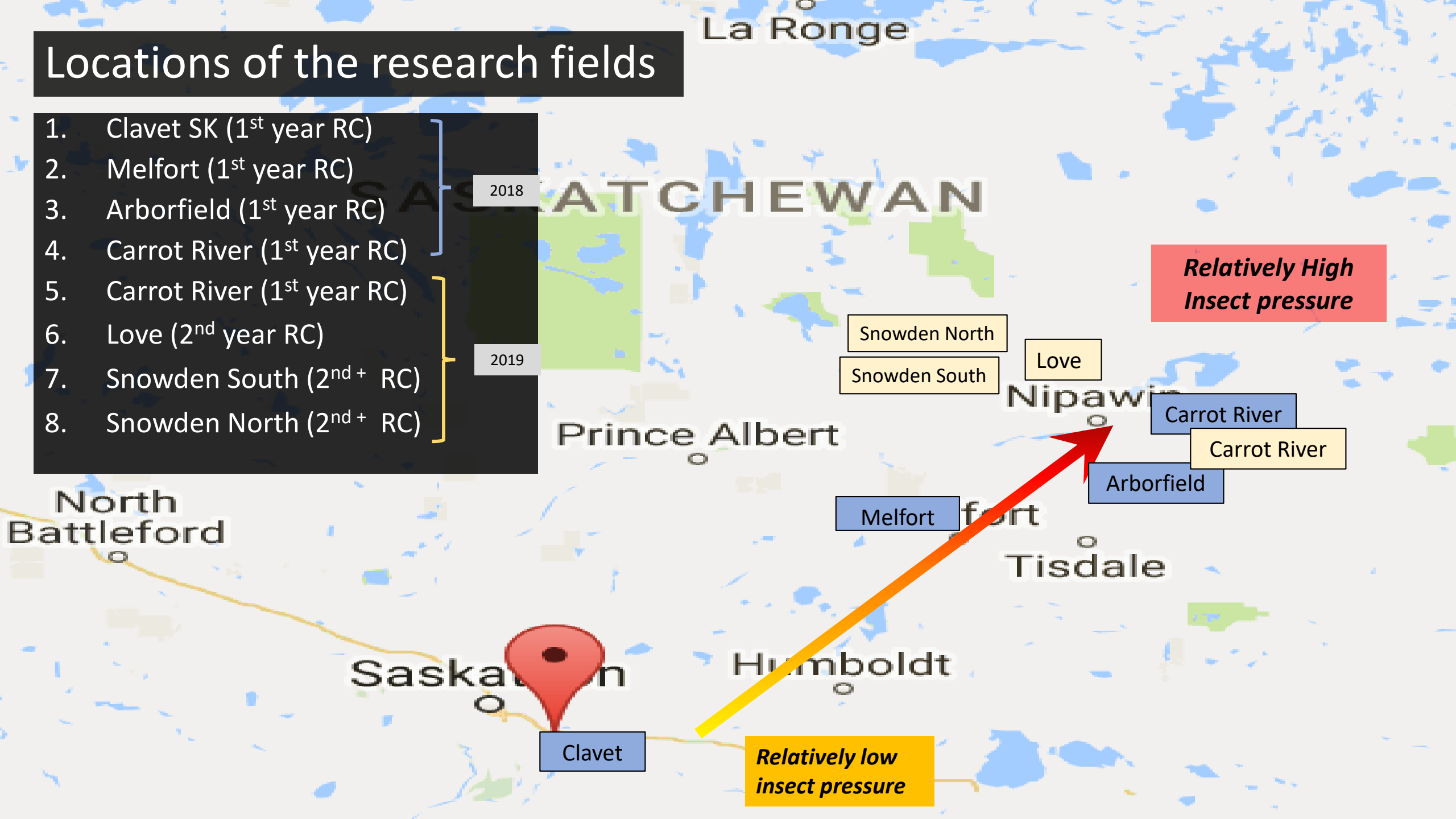


Locations of the research fields

- 1. Clavet SK (1st year RC)
- 2. Melfort (1st year RC)
- 3. Arborfield (1st year RC)
- 4. Carrot River (1st year RC)
- 5. Carrot River (1st year RC)
- 6. Love (2nd year RC)
- 7. Snowden South (2nd+ RC)
- 8. Snowden North (2nd+ RC)

2018

2019



**Relatively High
Insect pressure**

**Relatively low
insect pressure**





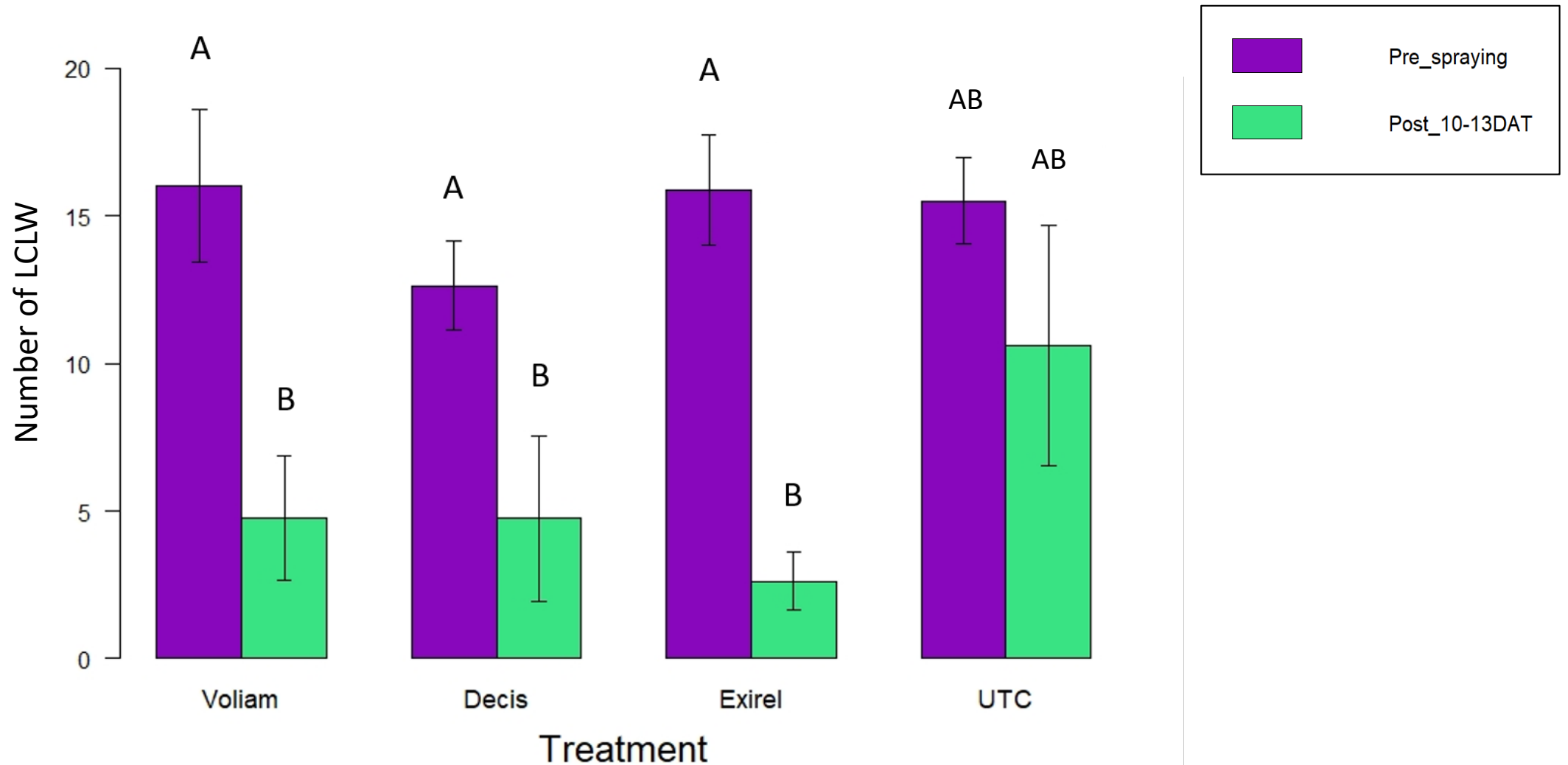
Evaluation of treatments on LCLW

Four weevil control strategies: VoliamXpres, Decis, Exirel, and untreated control.

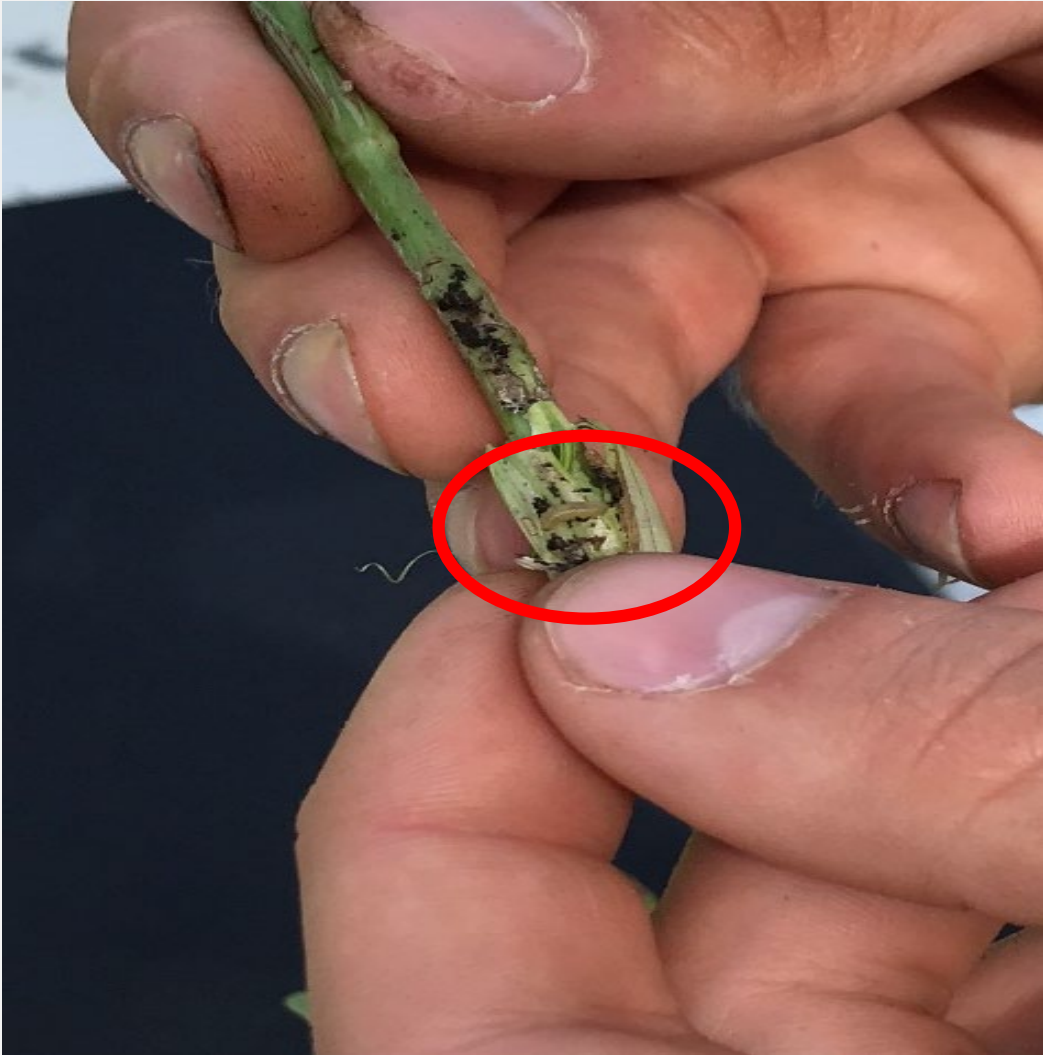
1. Rearing larva in a laboratory (20 stems).
2. Field scouting (10 stems).
3. Sweep netting and yellow sticky cards.



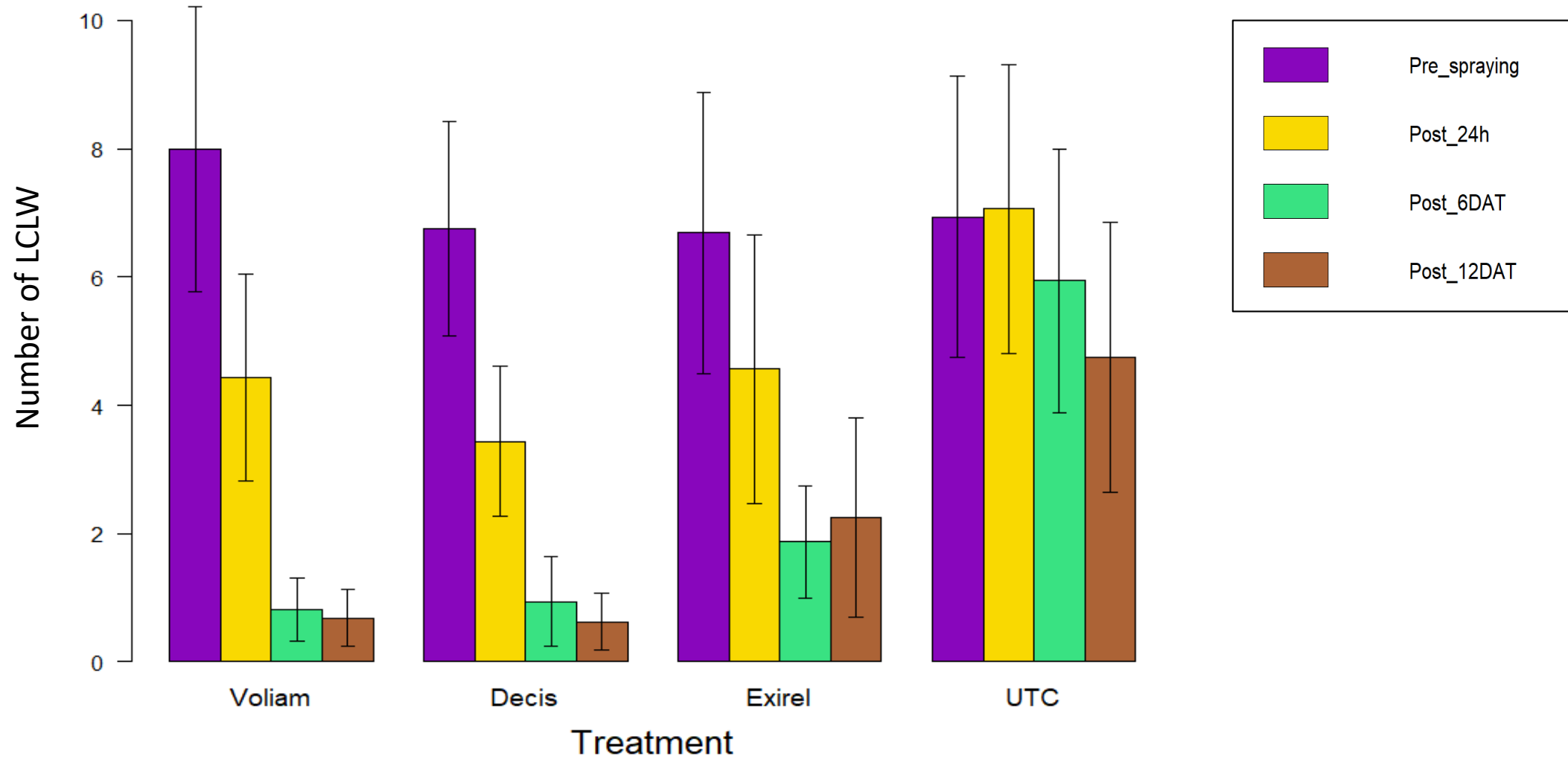
Insecticide treatments reduce weevil number (lab experiment)



2. Field larvae counting (10 stems)

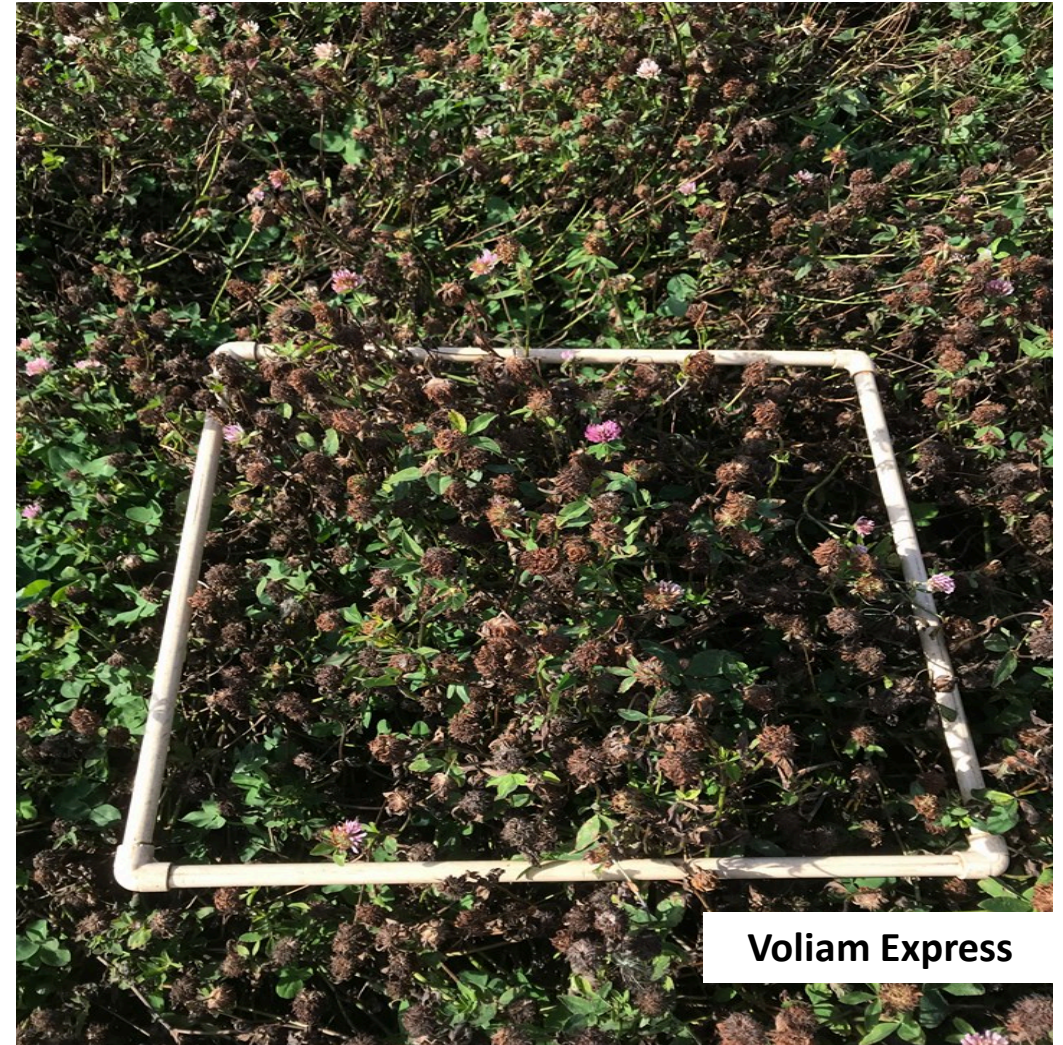
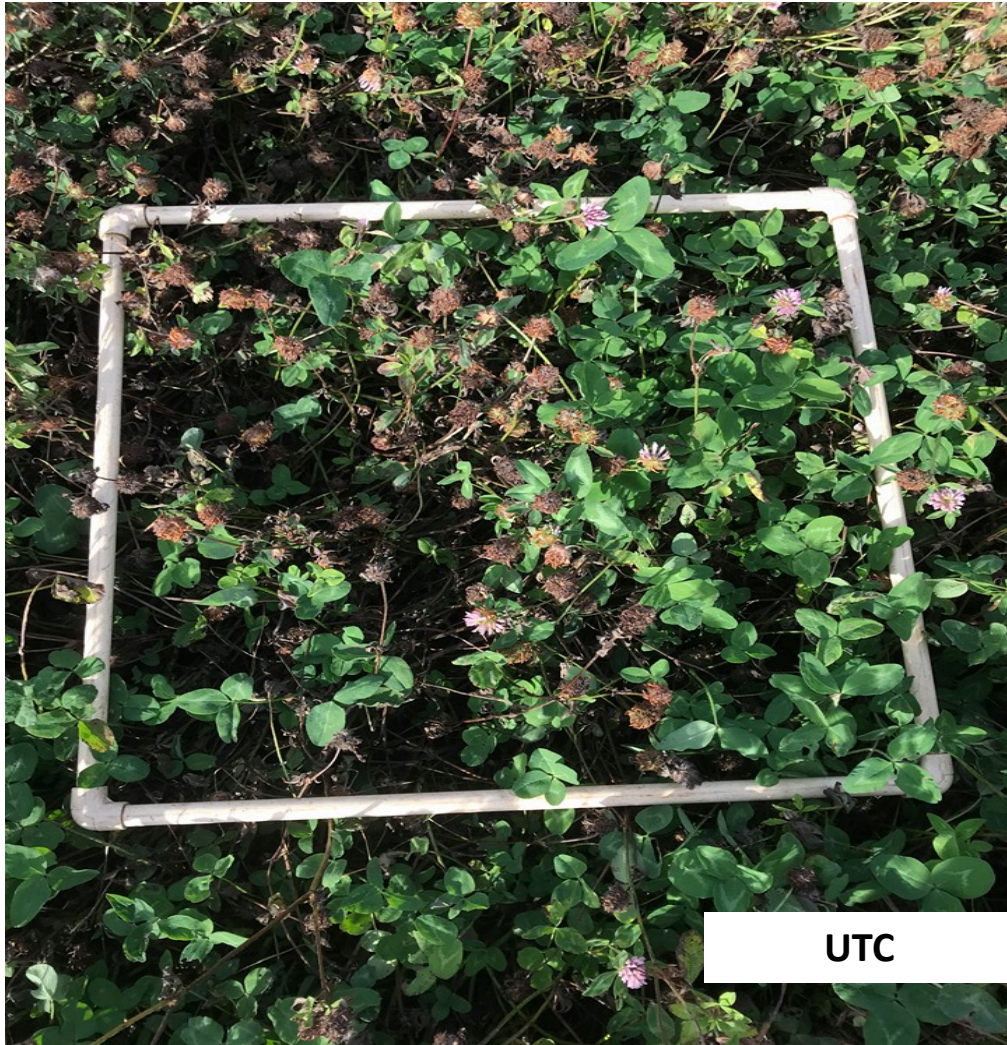


Insecticide treatments reduce weevil number, but not immediately

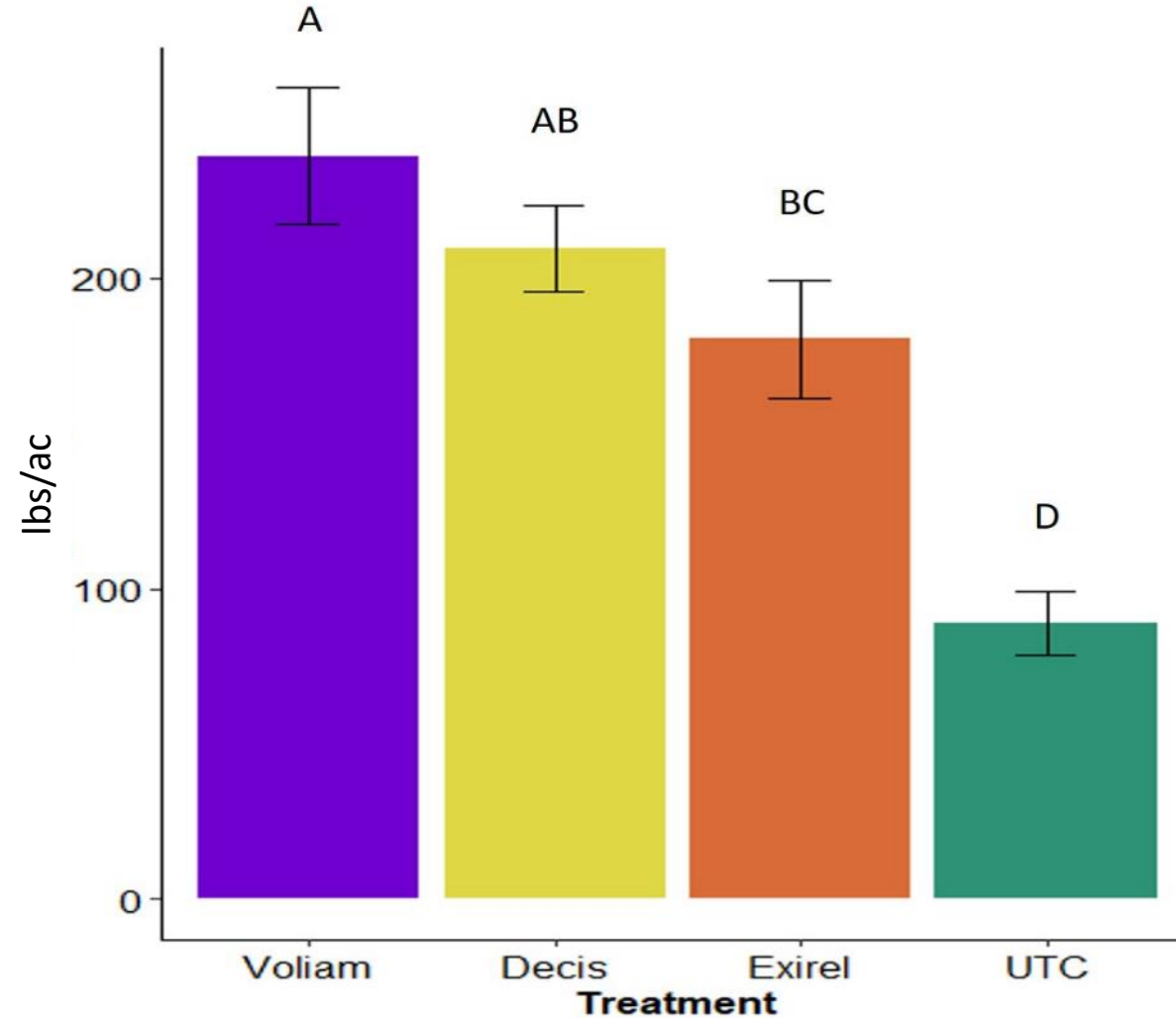


Yield differences

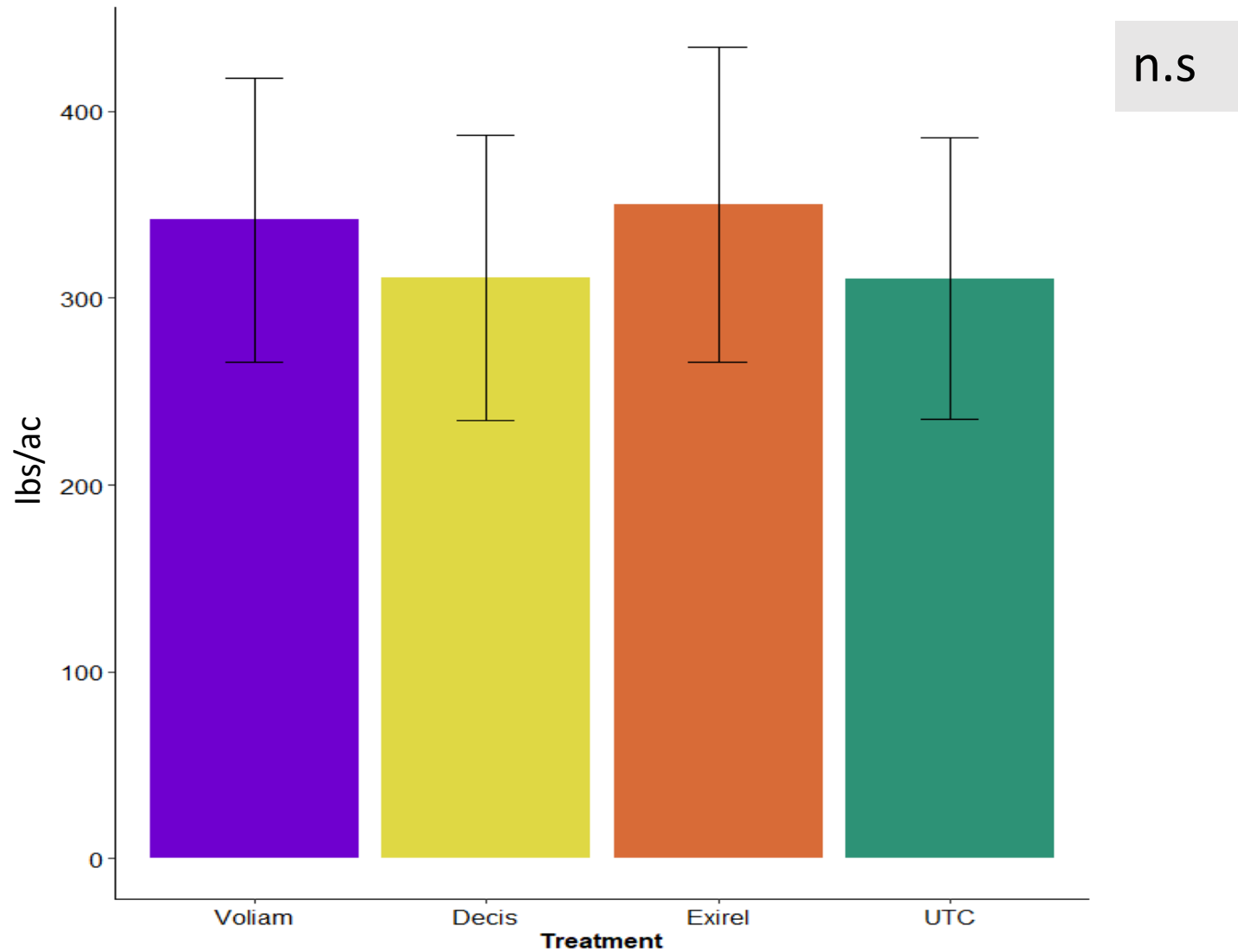
High LCLW pressure sites (Snowden North & Snowden South)



Seed yield differences between treatments (High LCLW pressure sites)



Yield differences between treatments (Low LCLW pressure sites)

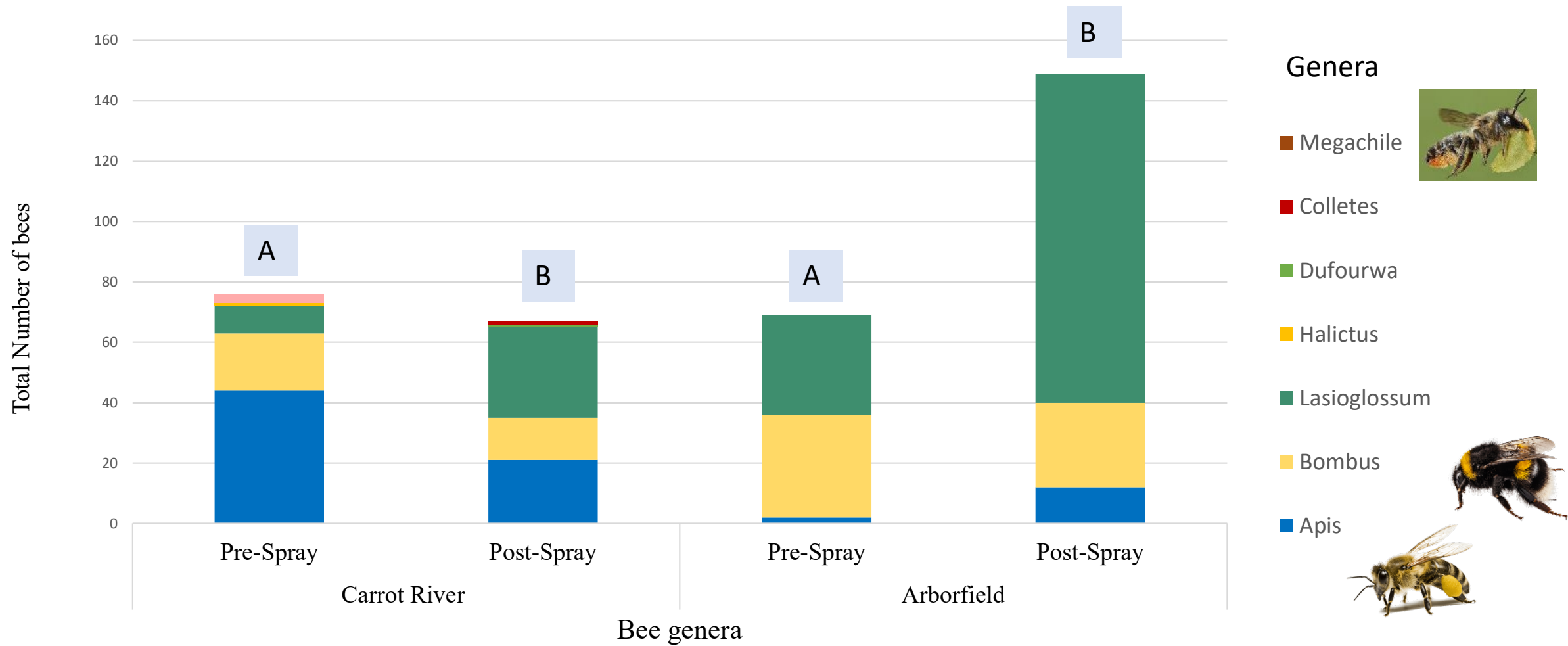


Evaluation effects of pesticides on pollinators number and diversity

Estimation of pollinators community:

- “Bee-Cups”
- “Blue Vane Traps”





Over 10 genera were identified from each of the two sites in north Saskatchewan before spraying and after spraying.

- Insecticide treatments did not have a significant effect on bees abundance.
- However, time (pre and post spraying) significantly affected the number of bees.

Majority of red clover pollinators are native bees

- Long-tongued bumble bees are considered as the most efficient pollinators of red clover
- Free bees are already in a field





Conclusions:

- Both alternative and registered insecticides are effective at controlling LCLW pressure.
(Voliam Xpress may not be registered)*
- No resistance to Decis was observed.
- Voliam Xpress performed better yield protection than Exirel.
- Most of the red clover pollinators are native bees.



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Prager Lab

Thank you

