

**Alfalfa survey data summary 2014**

**Methods:**

From 148 fields in Alberta, 30 alfalfa stems were collected and mines from leaf miners were counted and photographed. The stem length and number of leaves of 10 of each 30 stems was also measured. The location and abundance of mines in alfalfa leaves were mapped, and correlation was tested between abundance of mines and stem length, number of leaves, field size, and percentage of alfalfa.

From 150 fields in Alberta, 100 sweeps were collected using a sweep net and 180° sweeping pattern. Because of the overabundance of insects collected and time constraints, only one quarter of the total insects at each site were identified, vialled, and tabulated. Insects were identified to order, and in some cases further (i.e. alfalfa weevils from other weevils, leafhoppers from spittlebugs, lygus from other plant bugs, grasshoppers from katydids, wasps from bees, etc.). The results were graphed by region and mapped by location and abundance.

**Table 1.** A full list of the insects vialled and recorded:

<b>Diptera</b>	<b>Hymenoptera</b>	<b>Orthoptera</b>	<b>Lepidoptera</b>	<b>Neuroptera</b>	<b>Thysanoptera</b>
Syrphid flies	Bees	Grasshoppers	Adults	Lacewing adults	Thrips
Leafminer flies	Wasps	Katydid and	Caterpillars	and larvae	
Other flies	Sawfly larvae	crickets			
Fly larvae					

<b>Hemiptera suborders:</b>	
<b>Coleoptera</b>	<b>Heteroptera</b>
Alfalfa weevil adults	Lygus adults
Sitona weevil adults	Lygus nymphs
Weevil larvae	Alfalfa plant bug adults
Ladybird beetles	Alfalfa plant bug nymphs
Ladybird beetle larvae	Minute pirate bug adult
Other beetles	Minute pirate bug nymph
	Black grass bug adult
	Nabids
	Twice-stabbed stink bug
	Other bugs

<b>Non-insects:</b>	
<b>Collembola</b>	<b>Arachnida</b>
Springtails	Spiders
	Opiliones
	Mites

We also vialled and made note of blister beetles, damselflies, stink bugs, and other interesting insects.

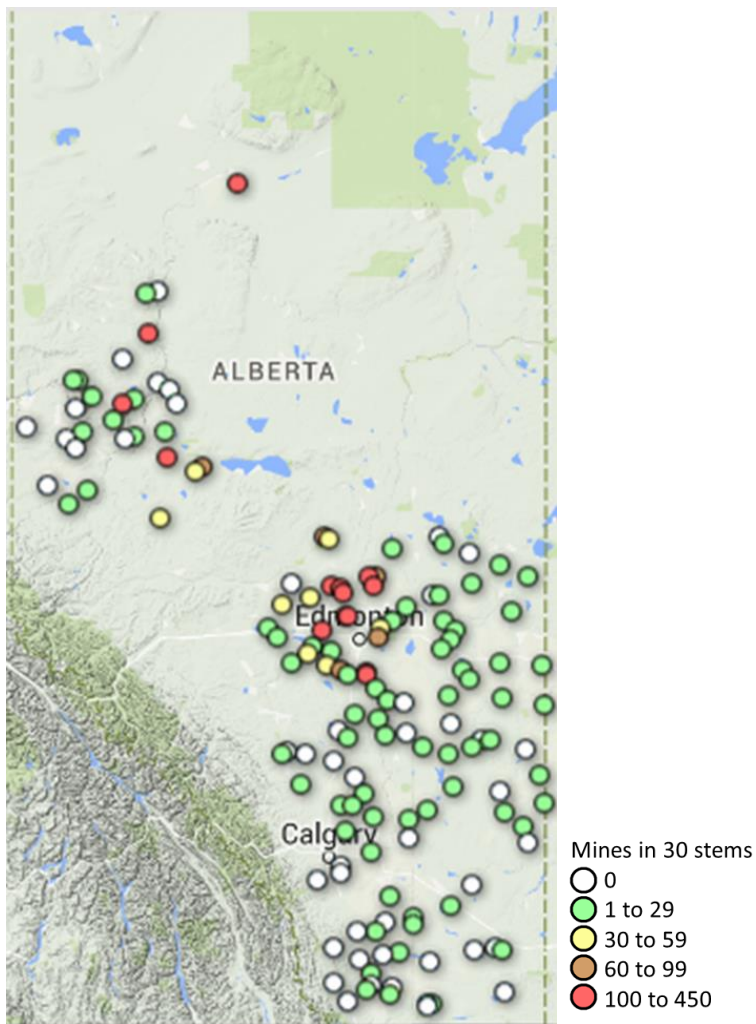
**Table 2.** The number of fields sampled for stems and for sweeps by region.

Region	Fields with stems sampled	Fields swept
South	38	40
Central	28	28
Northeast	26	26
Northwest	27	26
Peace	29	30

**Results and Conclusions:**

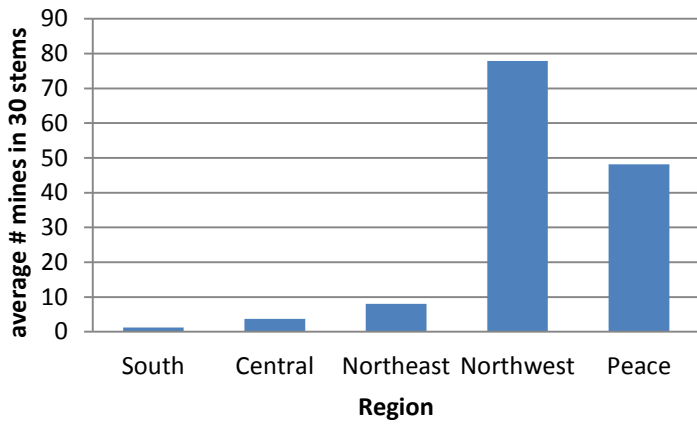
**LEAFMINER AND STEMS**

Maps of mine location and abundance show a higher density in the Northwest and Peace regions of Alberta.

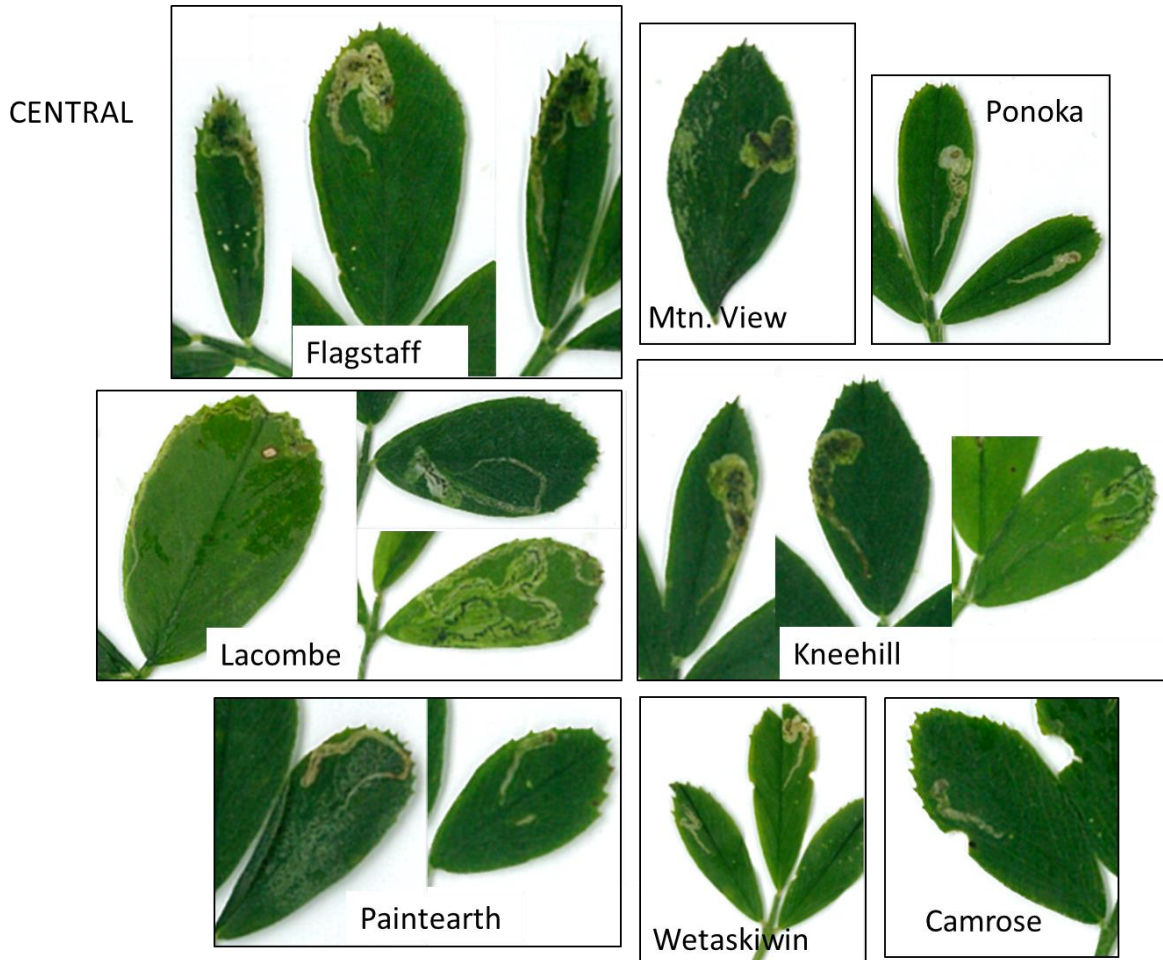


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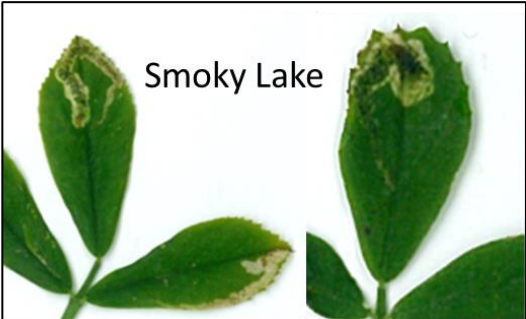
The Northwest and Peace have higher average number of mines than other regions.



Sample photos from each region:

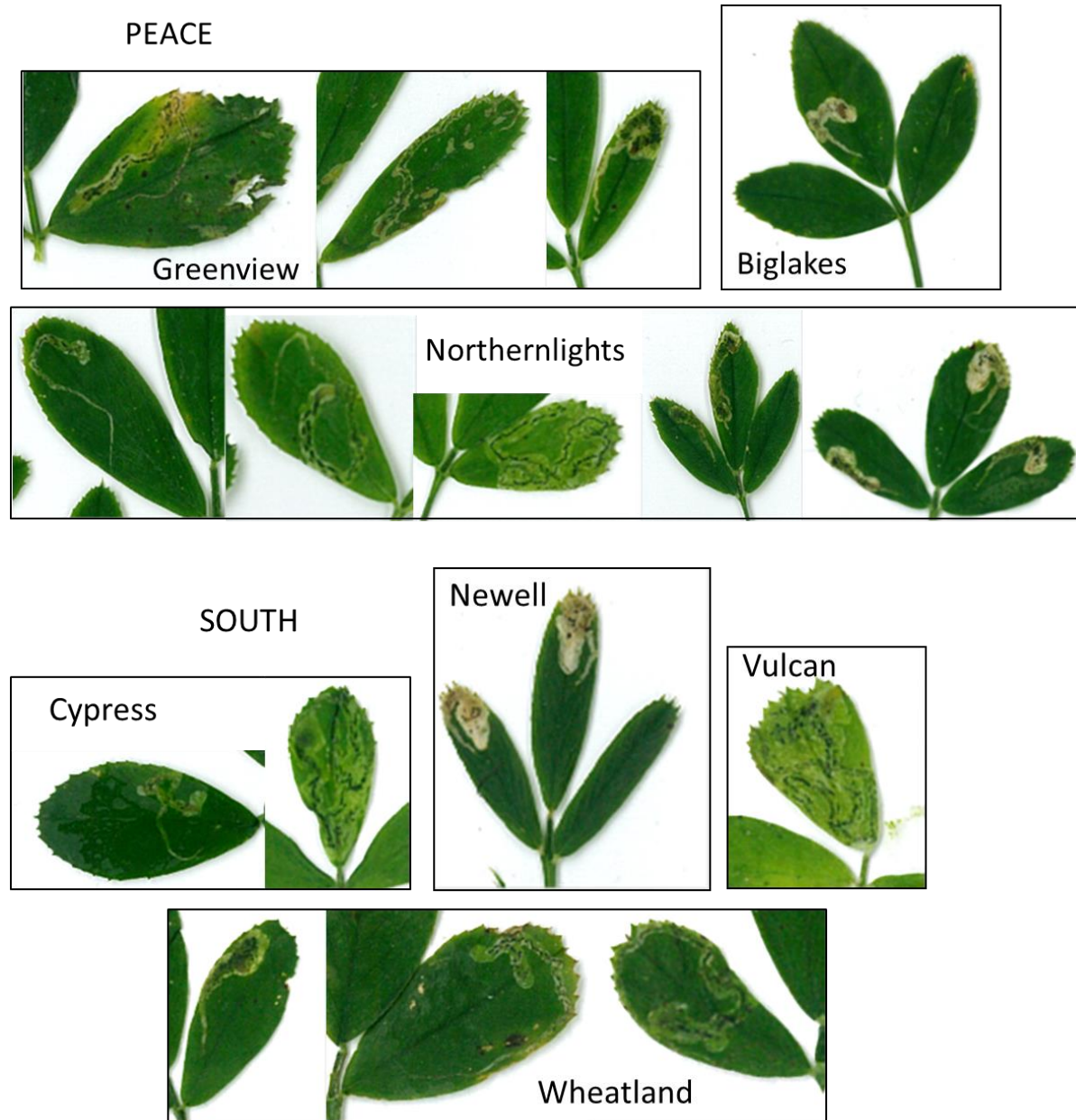


NORTHEAST



NORTHWEST





Most of the mines we collected had a thin tail and large blotch towards the apex of the leaflet (for example the mines from Newell). This is consistent with the leafminer fly *Agromyza nana* the lesser alfalfa blotch leafminer (same genus as *Agromyza frontella* the alfalfa blotch miner), and is a very common species in Europe (and apparently here, too).

Very few of the mines did not end in a big blotch, but instead had a longer more convoluted corridor, so I included photos of almost every incident of this type. These mines are likely caused by *Agromyza frontella*, the alfalfa blotch miner. However, these thinner and longer mines can be confused with the serpentine leafminer *Liriomyza* spp. (which is a bright yellow and black fly similar in size and shape to



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the completely black alfalfa blotch miner – and there were lots of flies like this in the sweeps). Next year we will rear out some of these mines to the adult flies for identification.

Online keys for leaf miners according to the mine phenology:

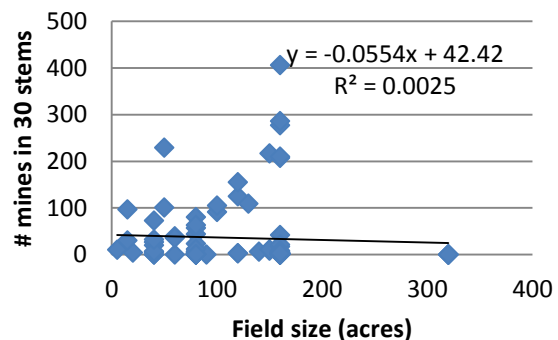
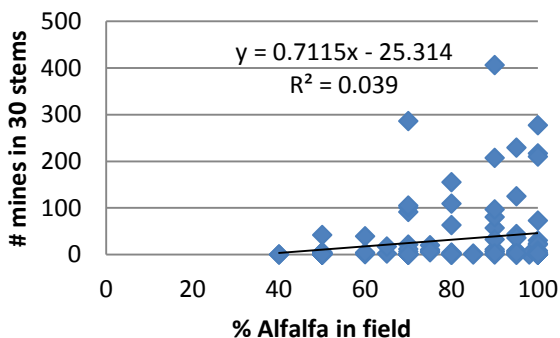
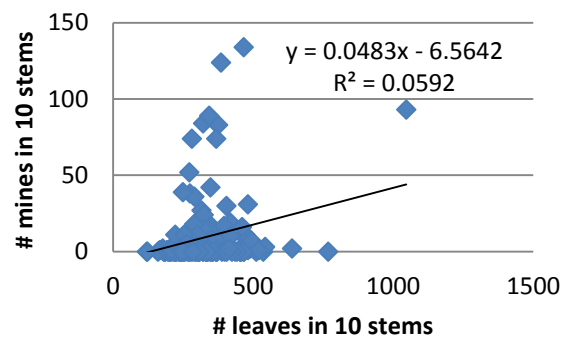
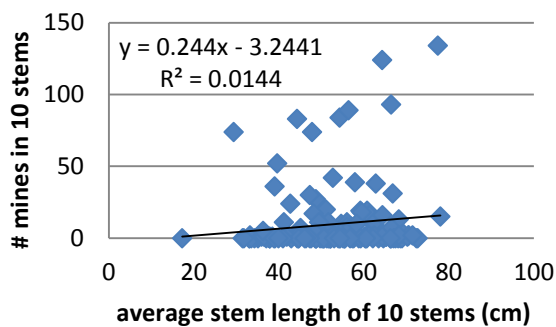
For miners of *Medicago* (alfalfa) in Europe (scroll down for English):

<http://www.bladmineerders.nl/plantenf/pffabaceae/medicago.htm>

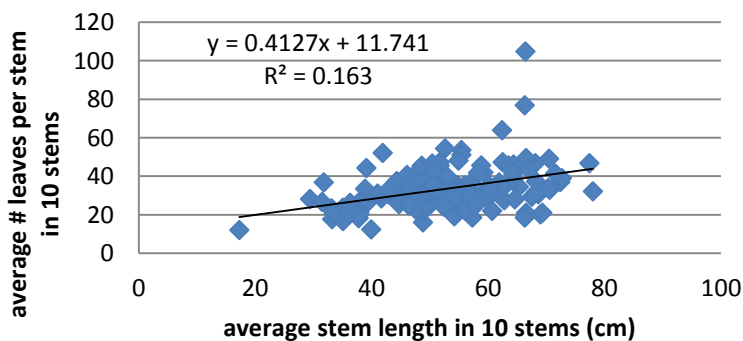
For miners of *Medicago* in the UK with pictures:

<http://www.ukflymines.co.uk/Keys/TRIFOLIUM.php>

There is a positive relationship between the number of mines and stem length, the number of mines and number of leaves, and the number of mines and the % alfalfa in the field. However there is no relationship between the number of mines and the size of the field.

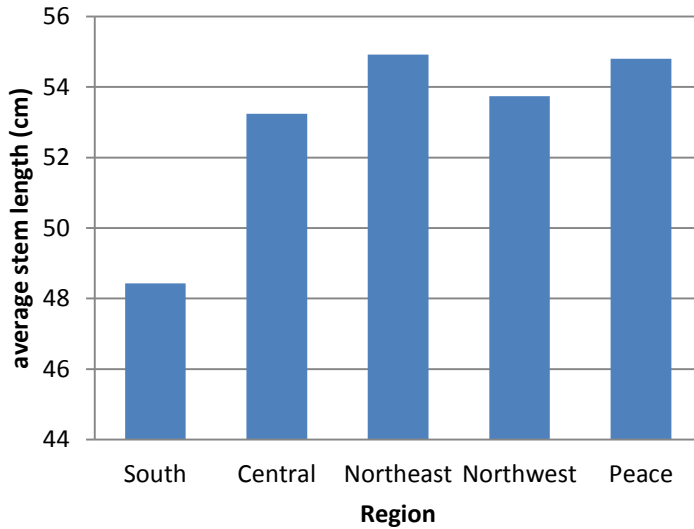


And, just for fun, longer stems do tend to have more leaves.



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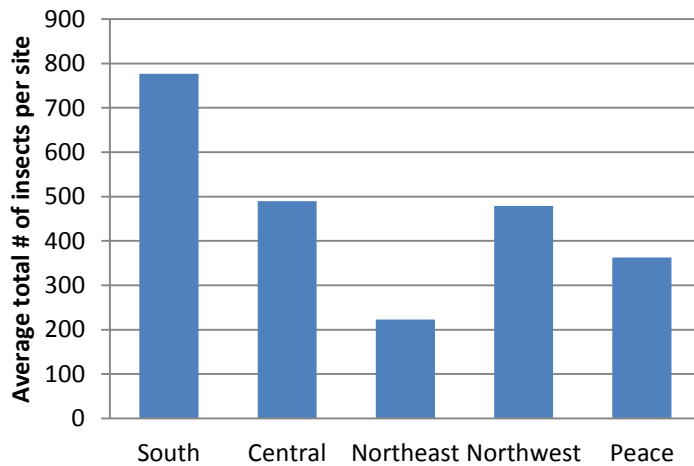
All regions were roughly at the same stage of alfalfa growth, except for the South which was slightly shorter, assuming average stem length is an indication of stage. All regions were sampled between mid-June and early July, however much of the South was sampled closer to mid-June.



## SWEEPS RESULTS

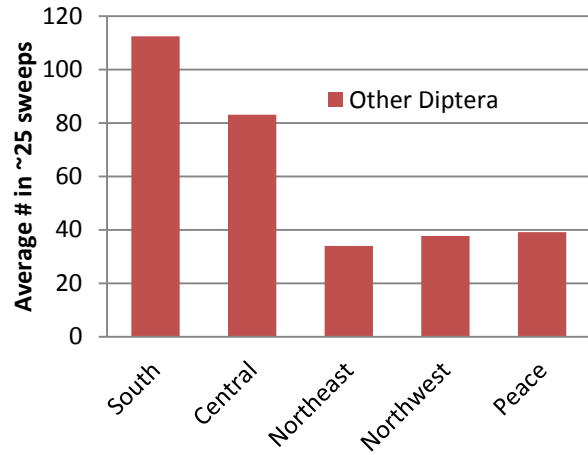
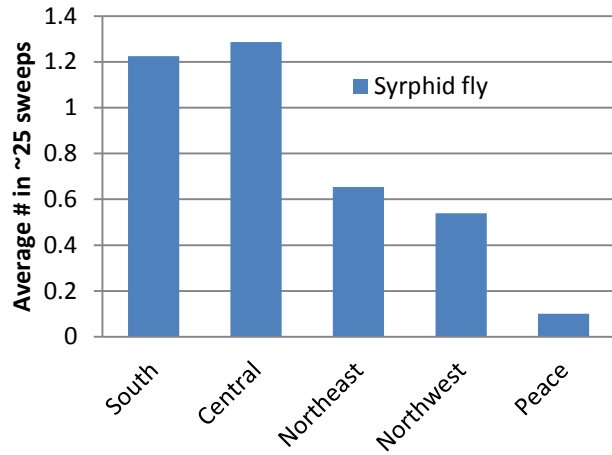
### Overall

In comparing the number of insects in 25 sweeps between regions, the South has more than any other region.



**Flies**

Many flies are pollinators and some are even parasitoids such as syrphid flies, laying their eggs in the larvae of other insects.

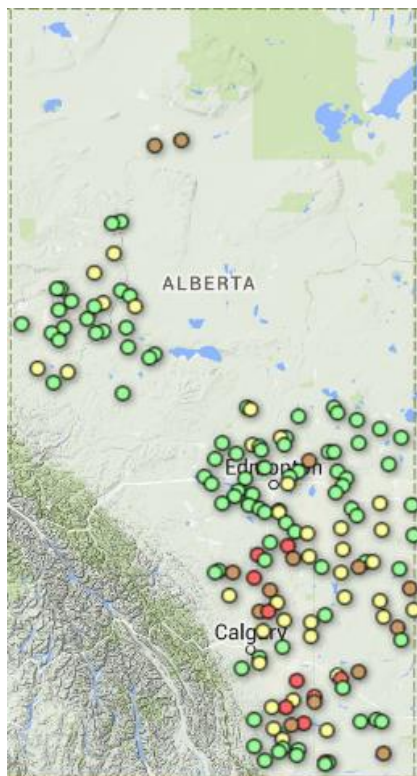
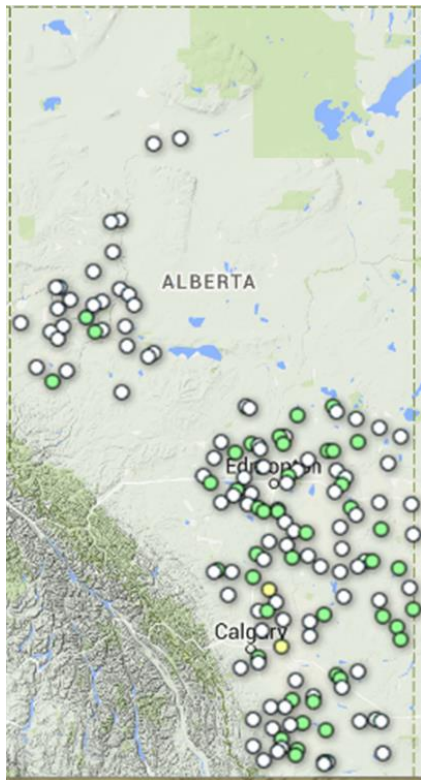


Syrphid flies in 25 sweeps

- 0
- 1 to 9
- 10 to 19

Other flies in 25 sweeps

- 0
- 1 to 49
- 50 to 99
- 100 to 149
- 150 to 1000

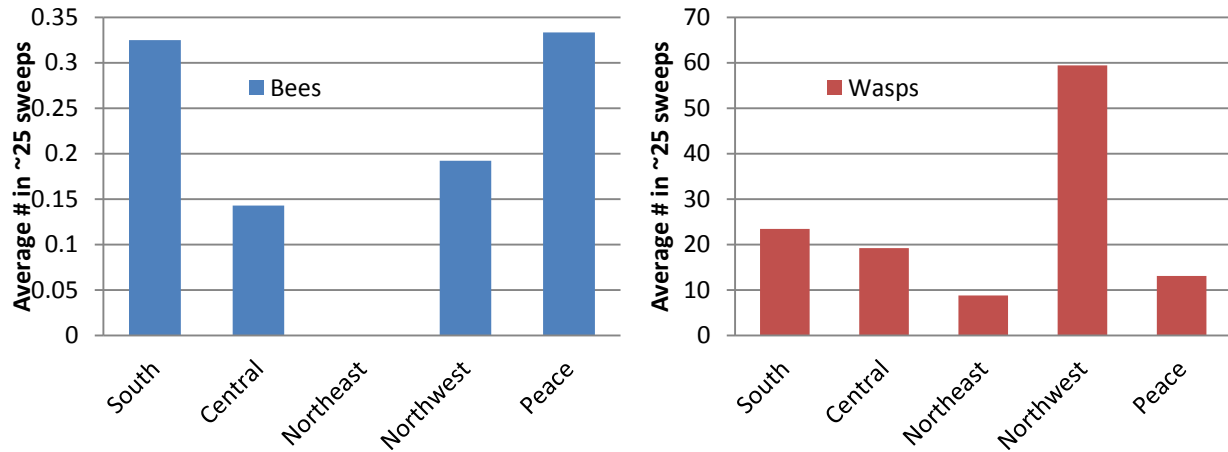




### Hymenoptera

Bees, including bumblebees, leafcutter bees, honeybees, and others, are strong fliers and largely evaded our nets, but they are found throughout Alberta. Both bees and wasps are important pollinators.

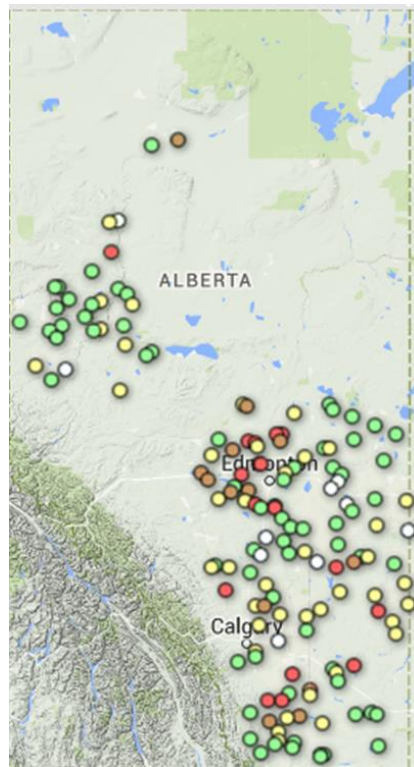
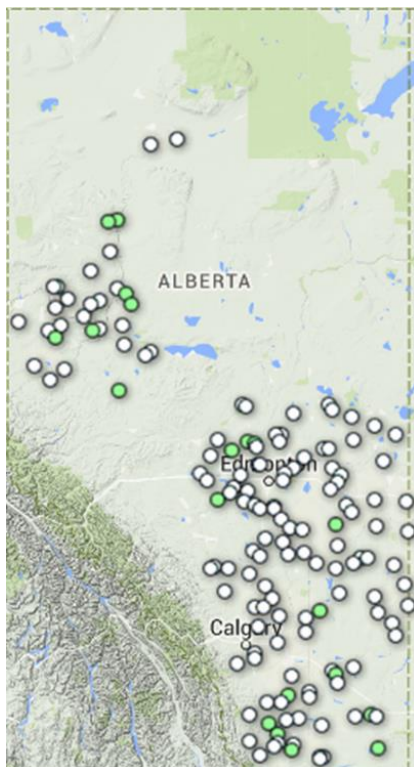
Wasps, which include various parasitoids from the “stump-stabbing” ichneumonid and braconid wasps to the very tiny chalcid wasps, are found throughout Alberta.



#### Bees in 25 sweeps

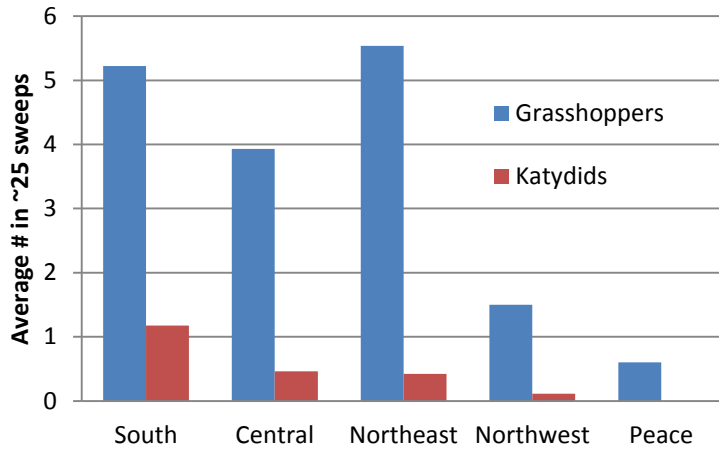


#### Wasps in 25 sweeps



### Grasshoppers and katydids

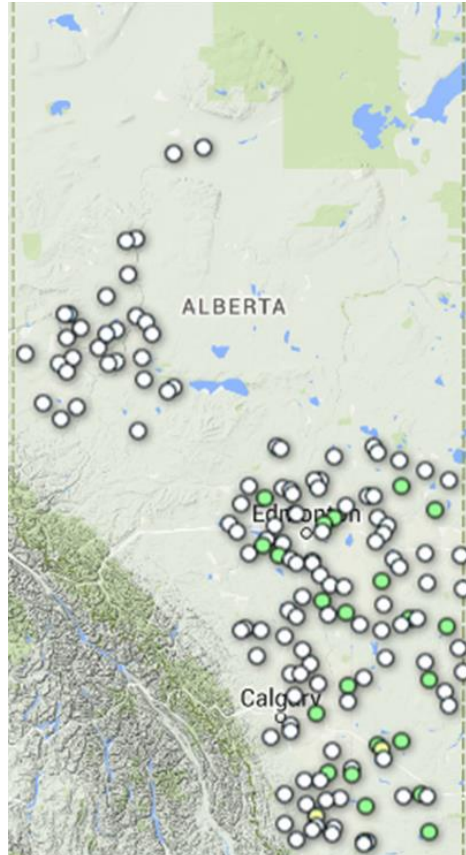
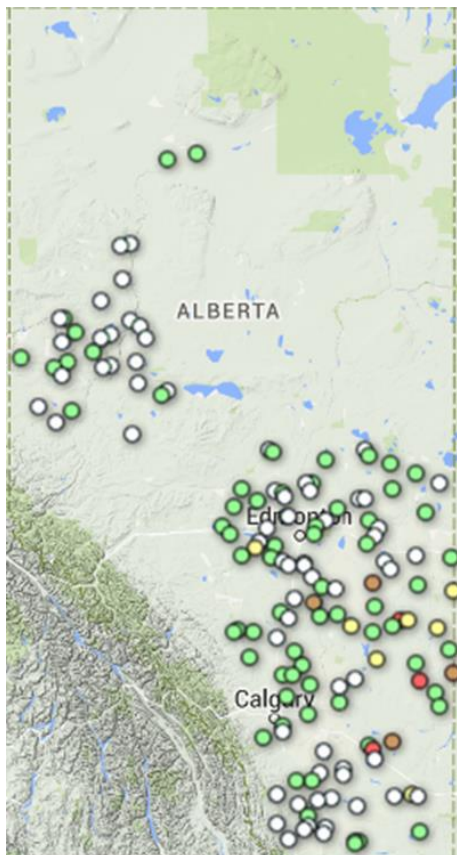
Grasshoppers are found throughout Alberta but are usually not found in large numbers in alfalfa. Katydids seem to be only in southern and central Alberta. Most of the katydids are either slender meadow katydids, prairie meadow katydids, or gladiator katydids.



Grasshoppers in 25 sweeps

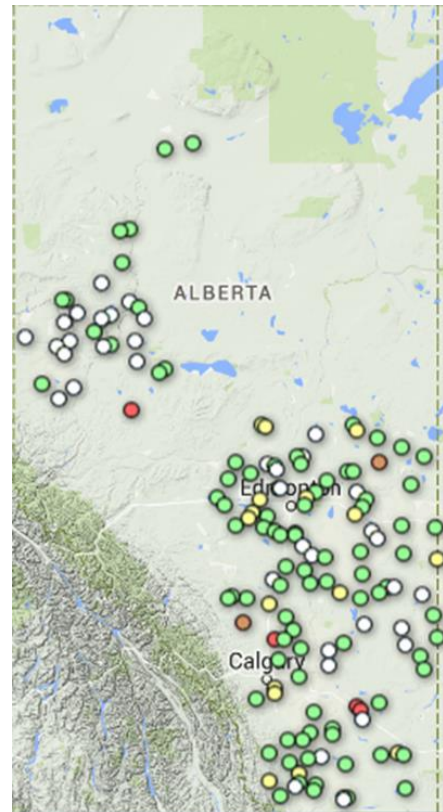
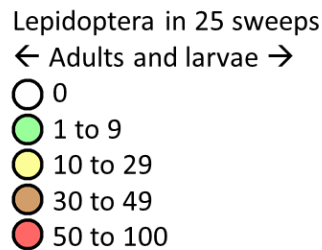
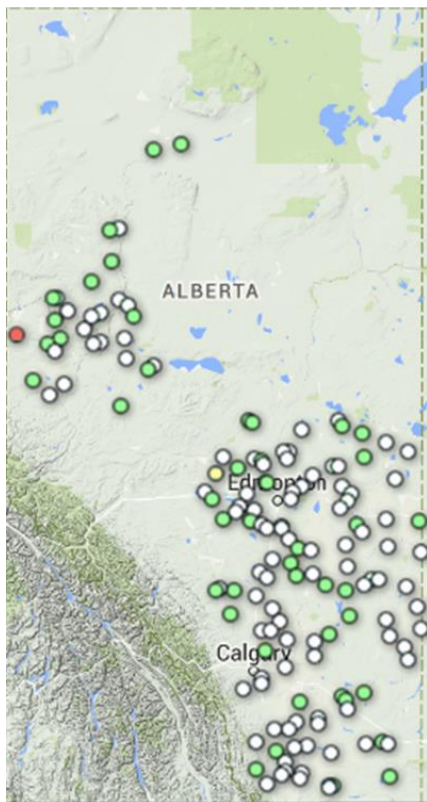
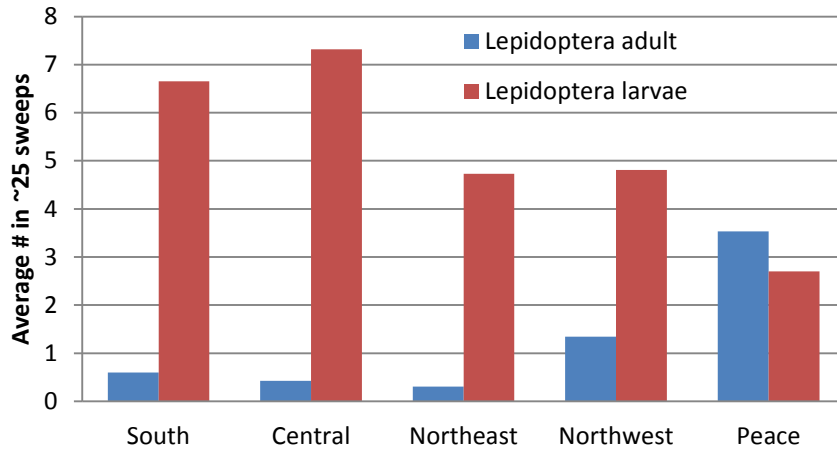


Katydids in 25 sweeps



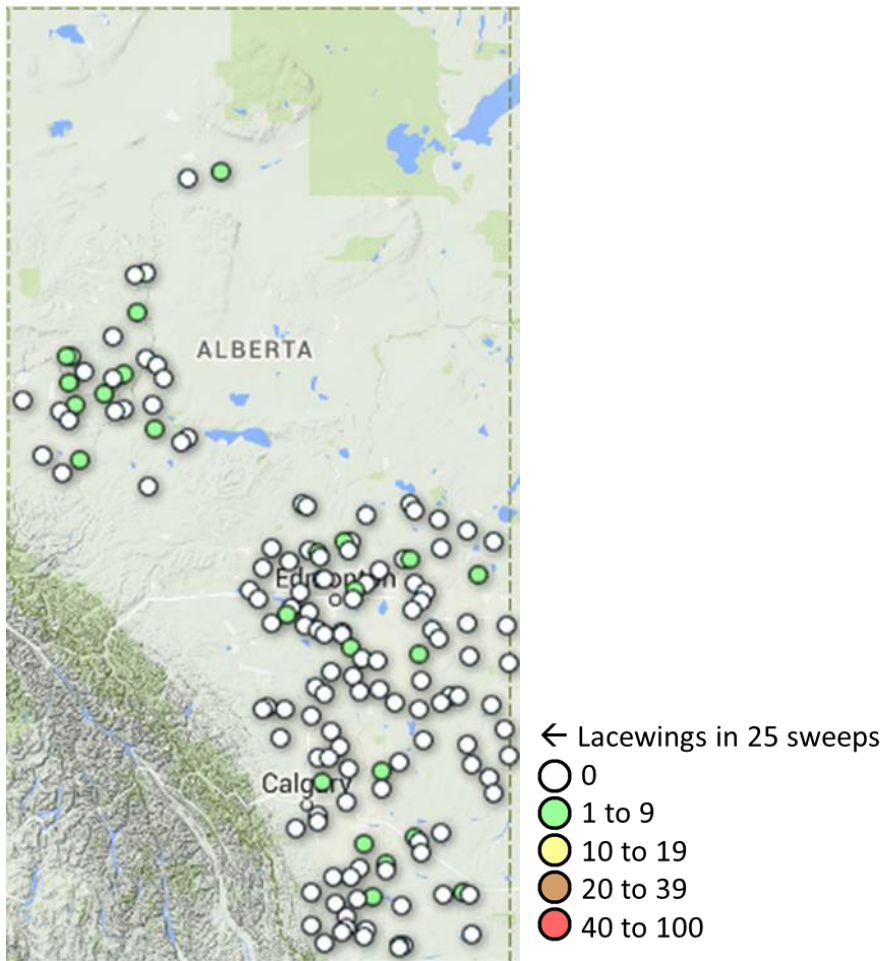
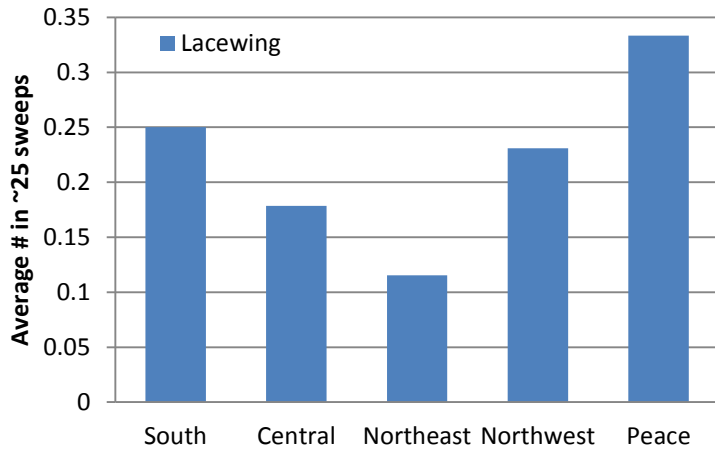
### Lepidoptera

We saw moths, butterflies, and skippers throughout Alberta. Most of these were non-descript small white moths, cabbage butterflies, and European skippers. The caterpillars of European skippers feed on timothy and other grasses.



### Lacewings

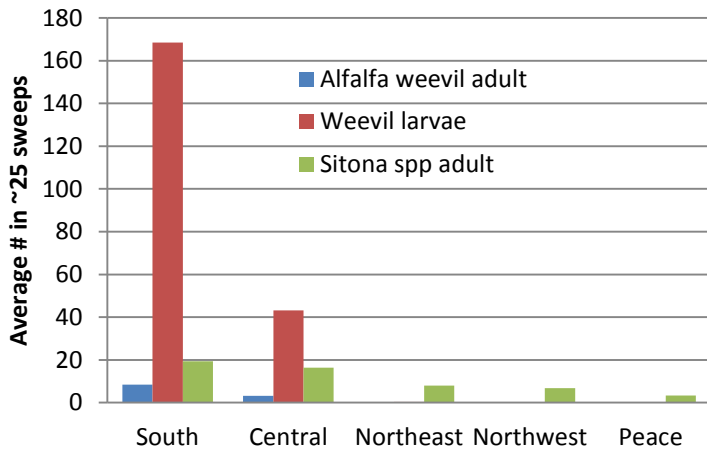
Lacewings, including the green lacewing commonly found in Alberta, are beneficial insects. The larvae are voracious predators of aphids and other soft bodied insects such as caterpillars. The adults largely feed on pollen, nectar, and honeydew, although they will occasionally eat aphids and mites, too.





## Weevils

Alfalfa weevils can be a major pest, and their range has been advancing into Alberta from the south and east in recent years. We found that the range of the Alfalfa weevil remains largely in the south, but has encroached into central Alberta. We also looked at the pea leaf weevil and sweetclover weevil, which are species of the genus *Sitona*. We found *Sitona* weevils throughout the growing region of Alberta. Although there were weevil larvae found near Edmonton, it is likely that they belonged to *Sitona*.



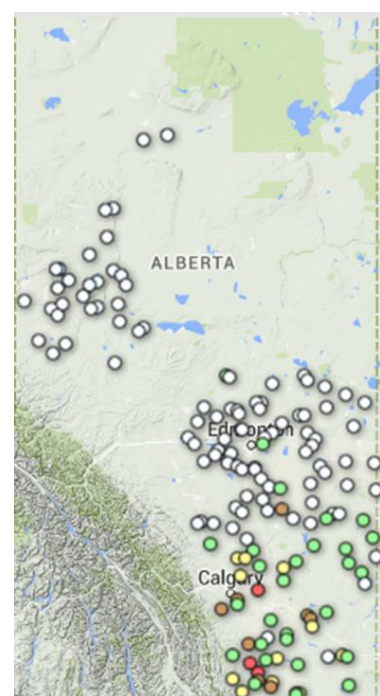
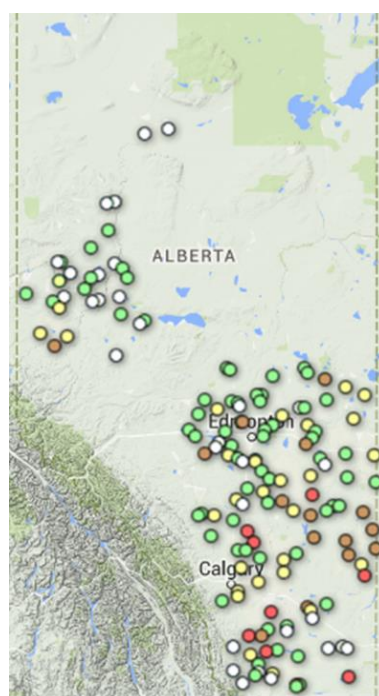
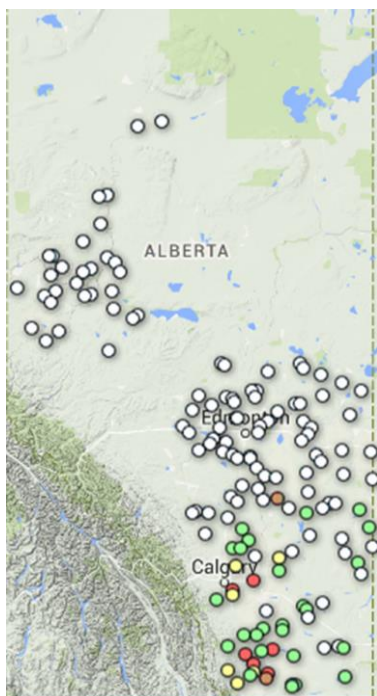
Alfalfa weevil adults in 25 sweeps



*Sitona* weevil adults in 25 sweeps



Weevil larvae in 25 sweeps



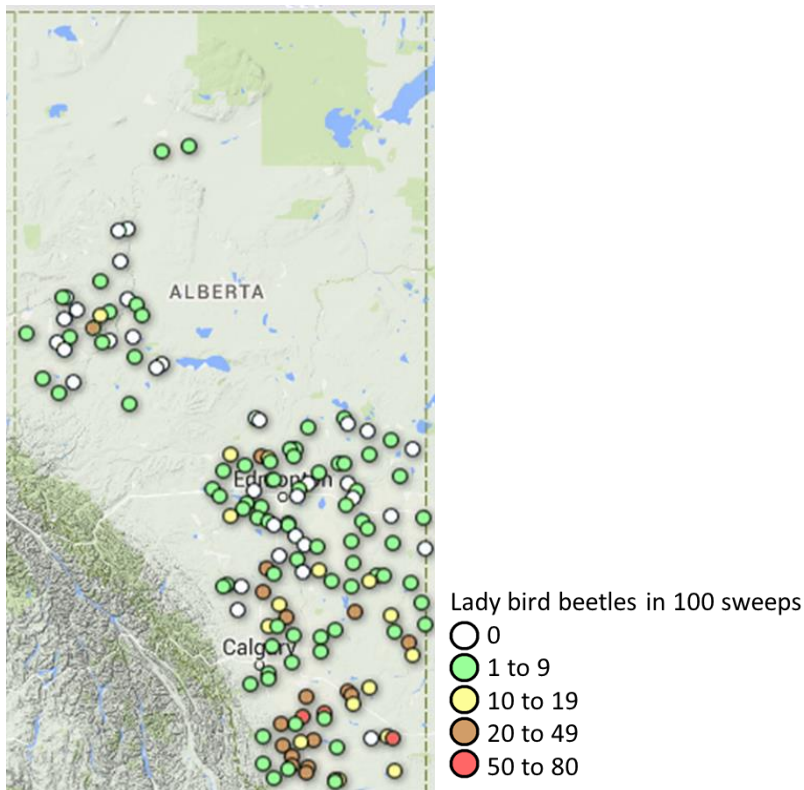
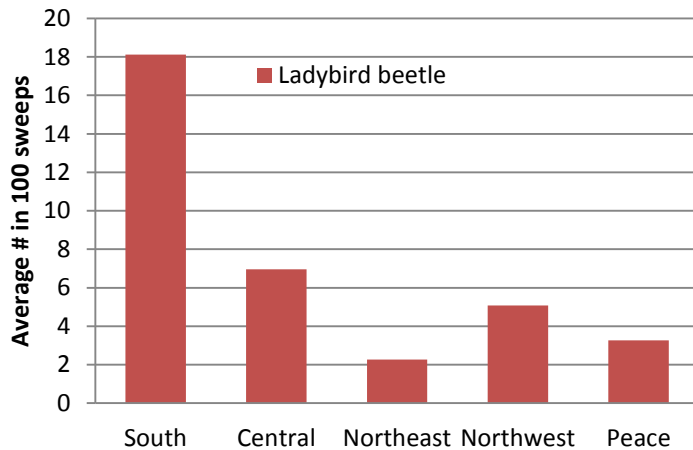


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We also found a number of other weevils, some of which we noticed were abundant in crops heavily infested with dandelion. We sent some of these to Ottawa for identification, and found they were the species *Ceutorhynchus punctiger*, whose larvae feed on dandelion seeds. These weevils belong to the same genus, and look very similar, to the cabbage seedpod weevil and the flixweed weevil, but can be distinguished by the distinct white spot in the center of their back.

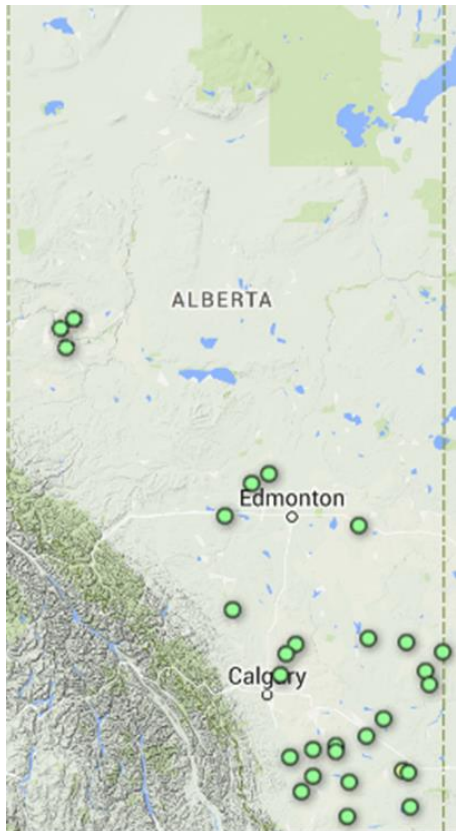
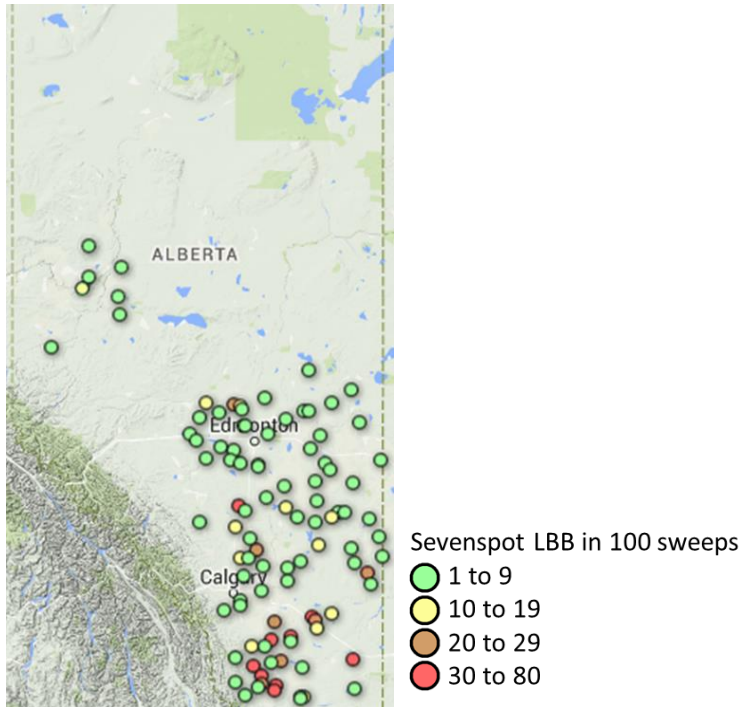
### Ladybugs

The vast majority of the ladybugs we found were seven-spot beetles, but we also found a few other species. These included the parenthesis, expurgate, thirteenspot, three-banded, twospot, fivespot, sinuate, and the wee-tiny ladybird beetles.

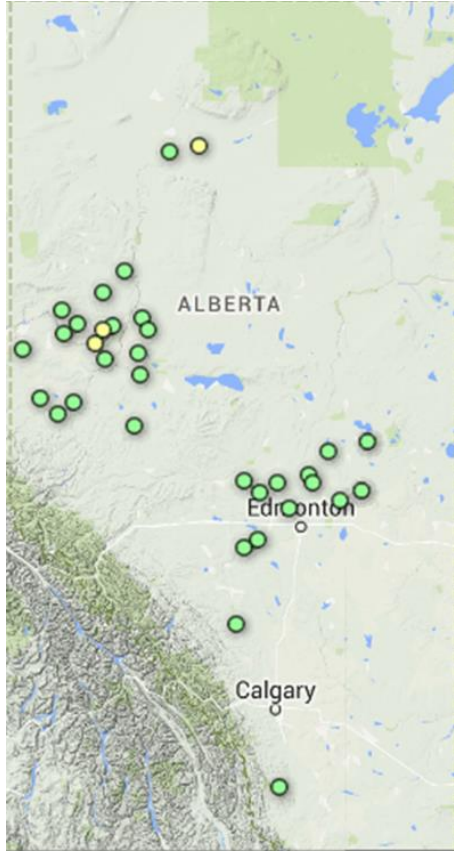


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Species break down:



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← Threebanded and Expurgate →  
● 1 to 9  
● 10 to 19

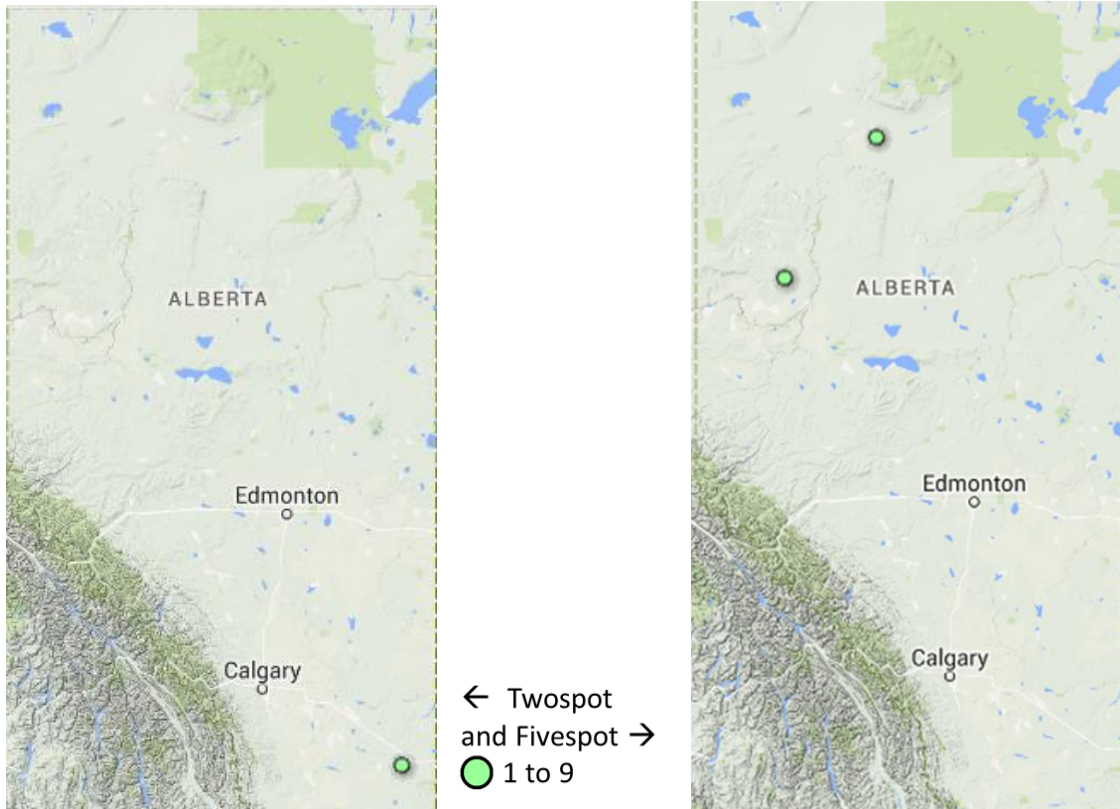


← Sinuate and Wee-tiny →  
● 1 to 9



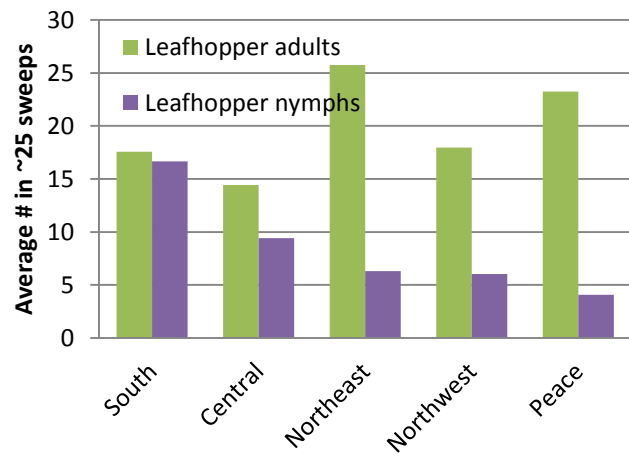
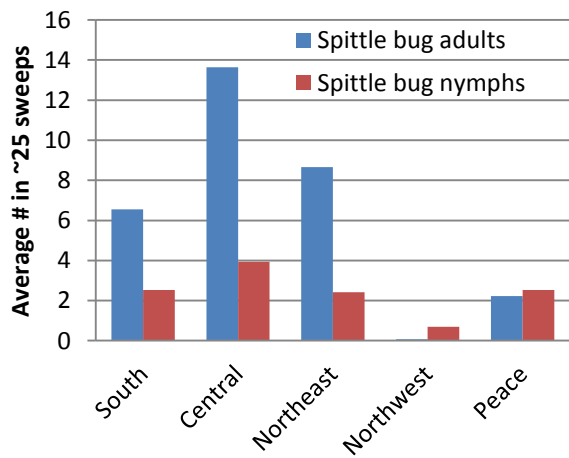


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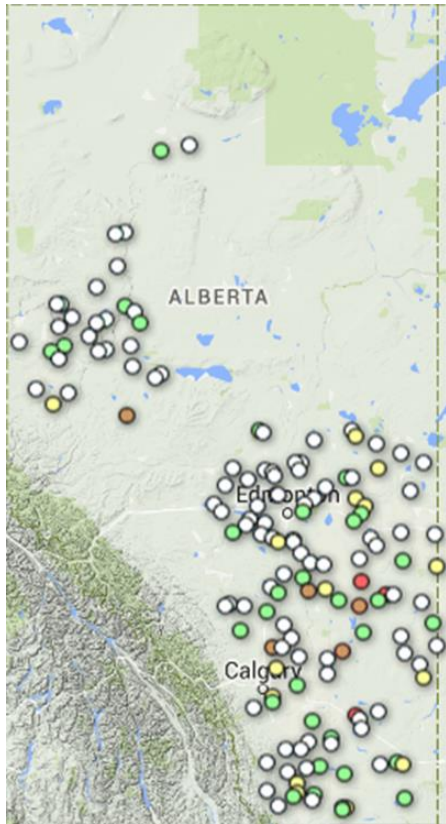


## Leafhoppers and Spittlebugs

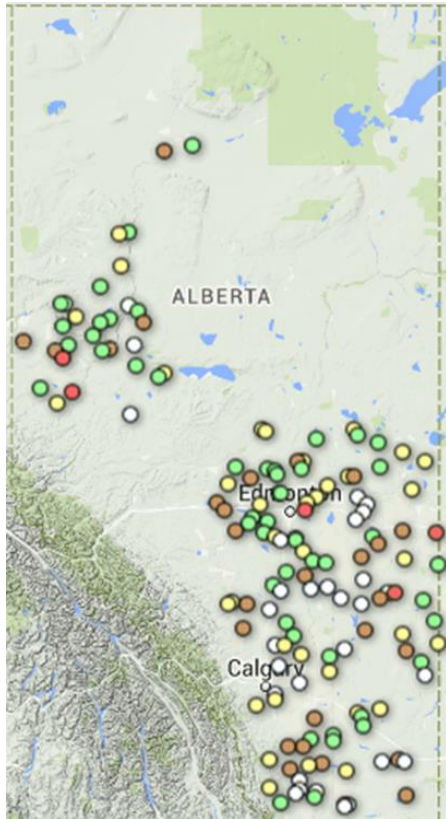
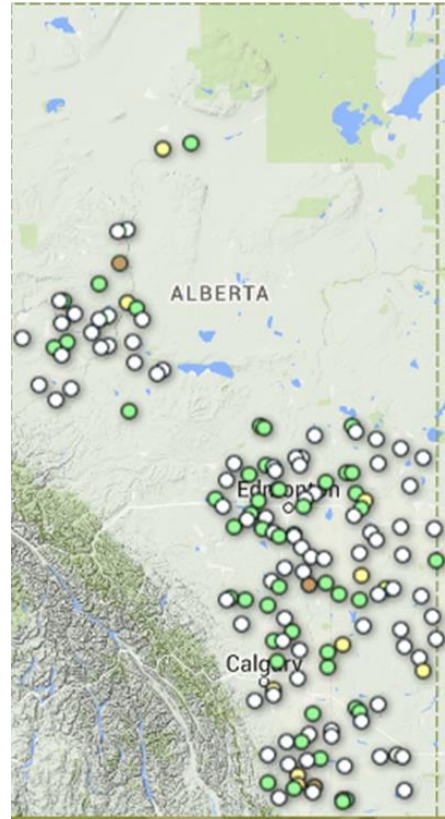
Leafhoppers and spittlebugs are found across Alberta.



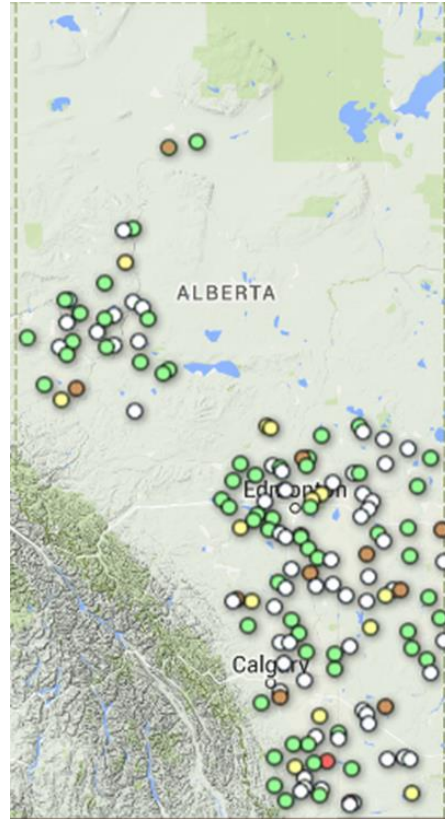
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Spittle bugs in 25 sweeps  
 ← Adults and nymphs →  
 ○ 0  
 ● 1 to 9  
 ● 10 to 29  
 ● 30 to 99  
 ● 100 to 150



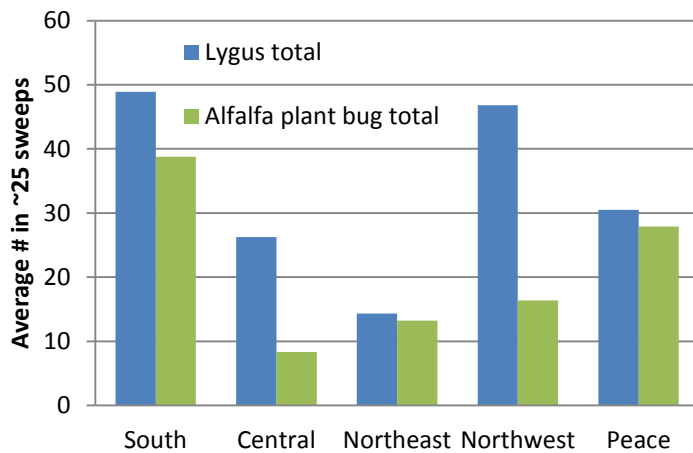
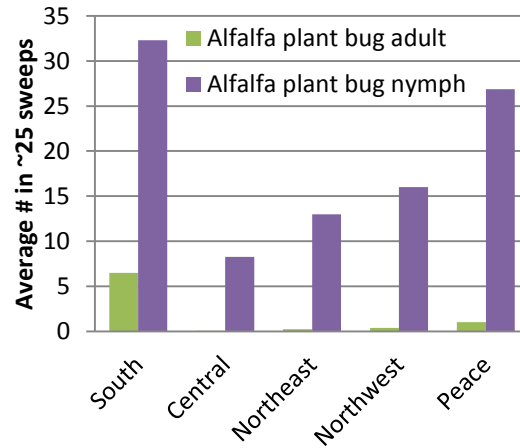
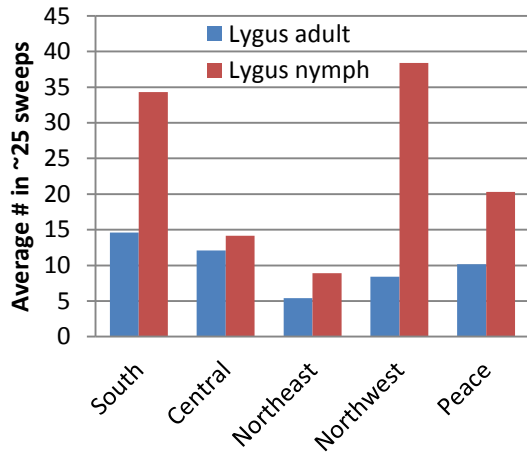
Leafhoppers in 25 sweeps  
 ← Adults and nymphs →  
 ○ 0  
 ● 1 to 9  
 ● 10 to 29  
 ● 30 to 99  
 ● 100 to 350



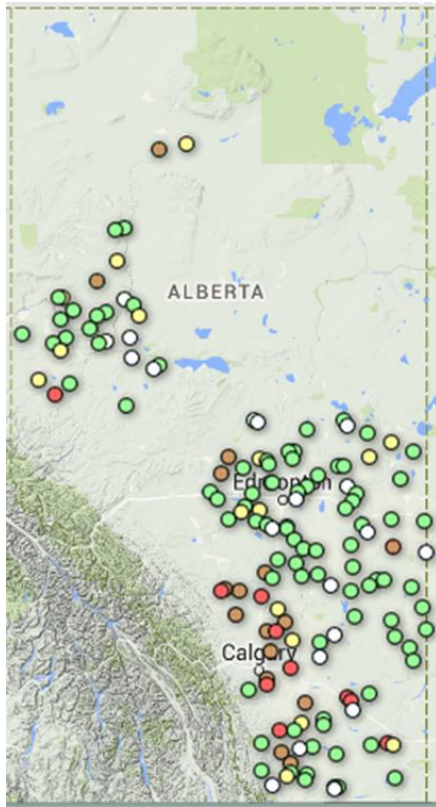


### Lygus and Alfalfa plant bugs

Nymphs of lygus and alfalfa plant bugs out-numbered their adult forms in our survey, likely due to the timing of the sampling. The numbers of lygus and alfalfa plant bug nymphs seem to match each other in each region, except for the Northwest where lygus nymphs more than double the number of alfalfa plant bug nymphs. The alfalfa plant bug can impact seed production.



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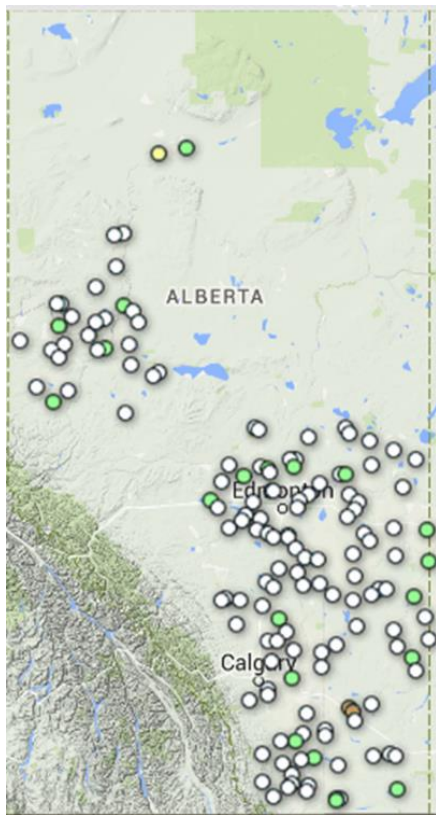
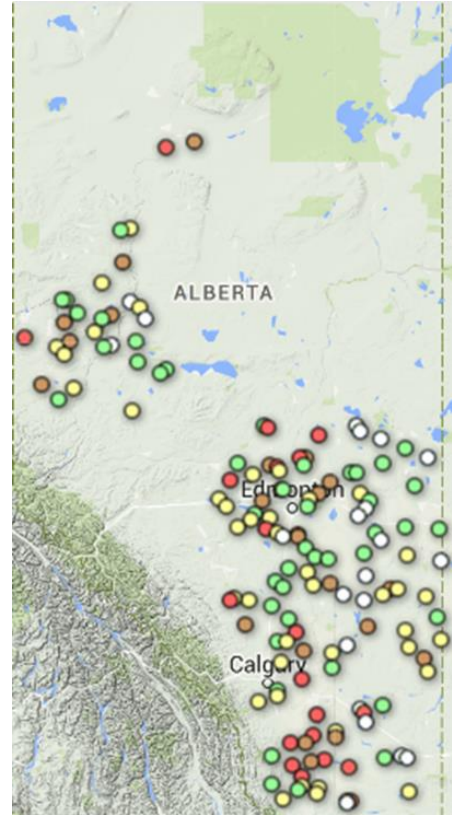


← Lygus adults in 25 sweeps

- 0
- 1 to 9
- 10 to 19
- 20 to 29
- 30 to 150

Lygus nymphs in 25 sweeps →

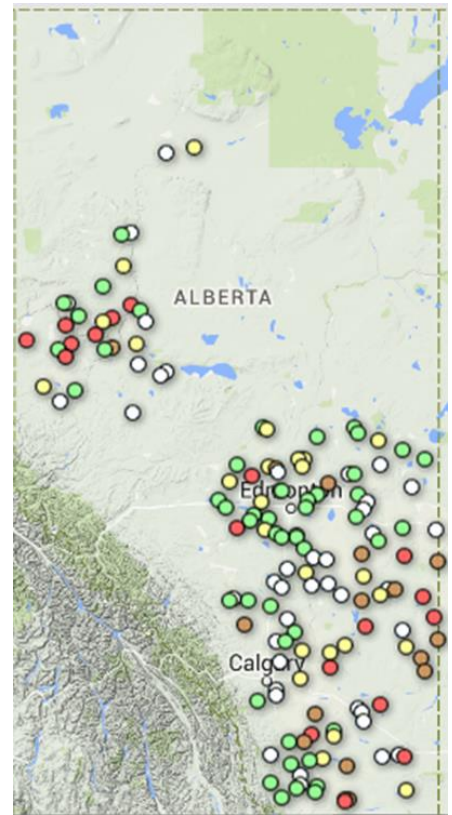
- 0
- 1 to 9
- 10 to 29
- 30 to 49
- 50 to 160



Alfalfa plant bugs in 25 sweeps

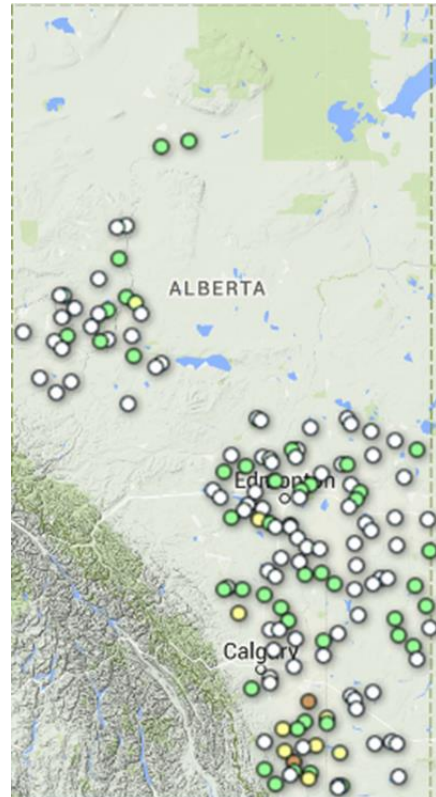
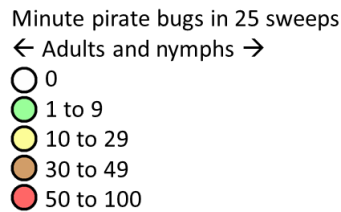
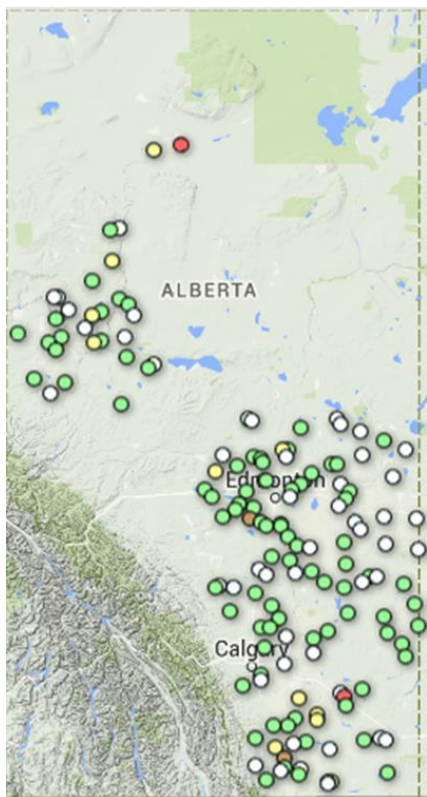
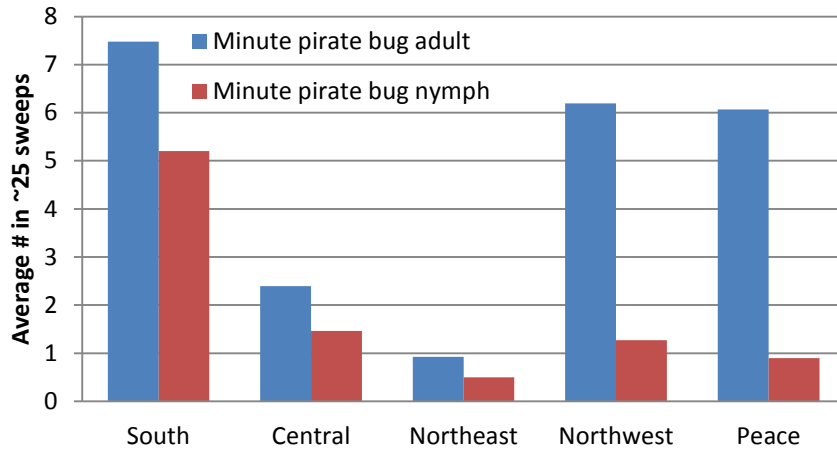
← Adults and nymphs →

- 0
- 1 to 9
- 10 to 29
- 30 to 49
- 50 to 250



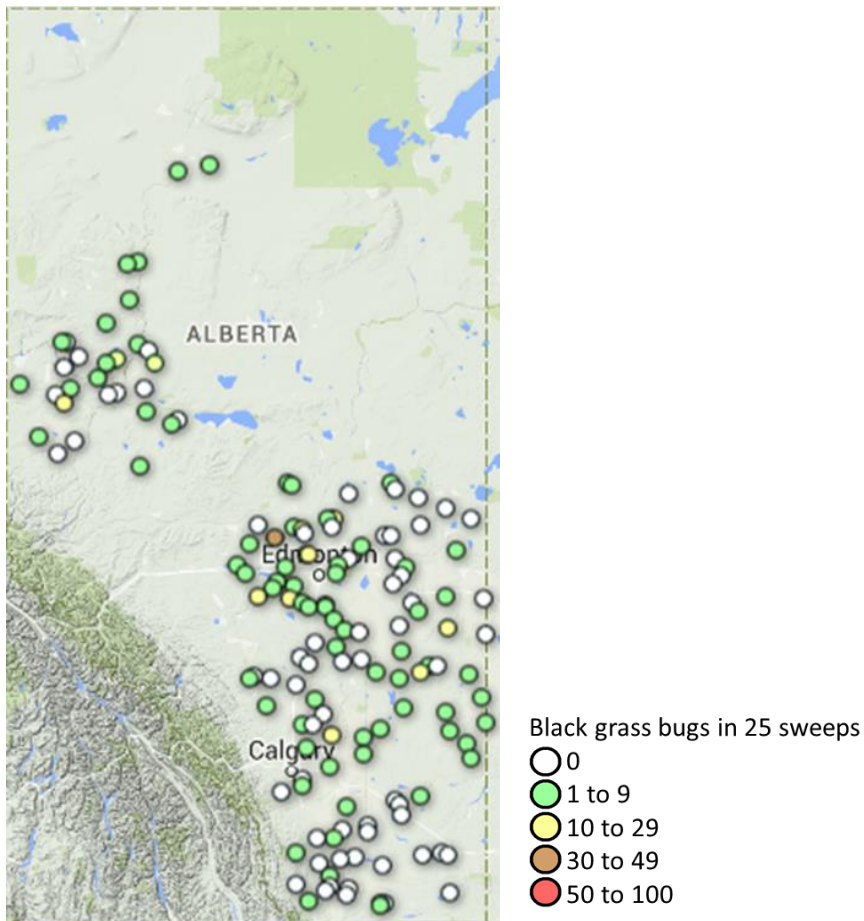
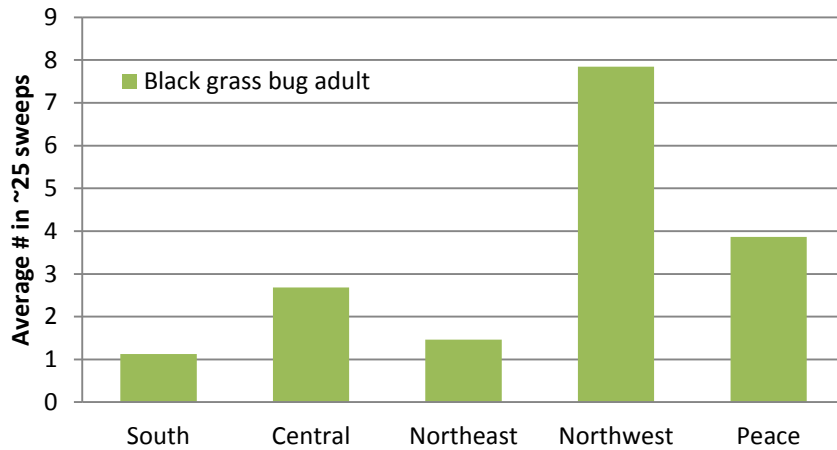
### Minute pirate bugs

Minute pirate bugs are very small predators with a distinct black and white X pattern on their back. They feed on spider mites as well as eggs and small nymphs of aphids and leafhoppers. When prey is not available they feed on pollen and plant juices.



### Black grass bugs

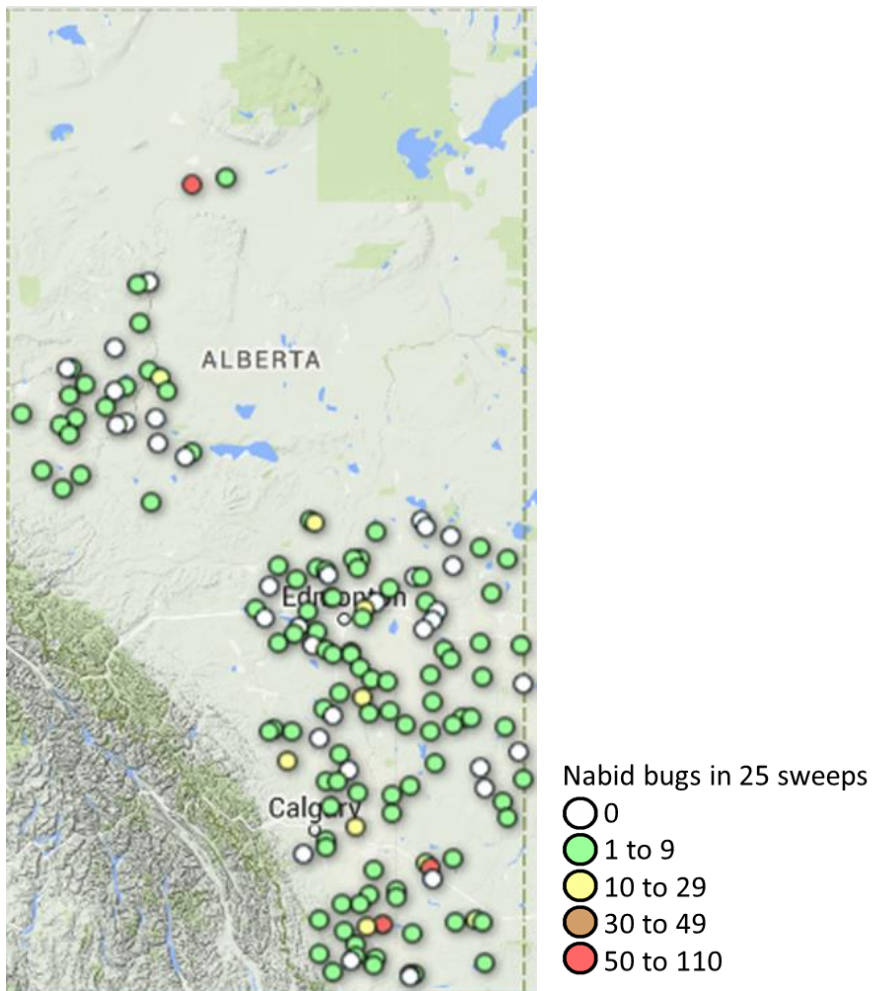
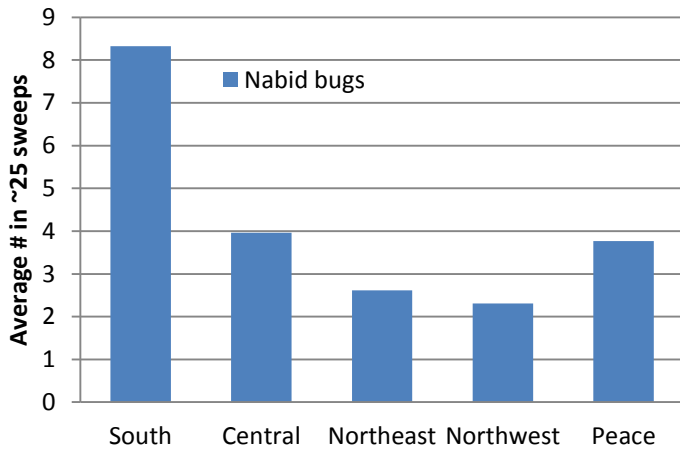
Black grass bugs feed on various native and introduced range grasses, and are likely abundant in alfalfa because many of the fields we swept were mixed alfalfa-grass. There are many species of black grass bugs and at high populations they can be a pest.





### Nabids

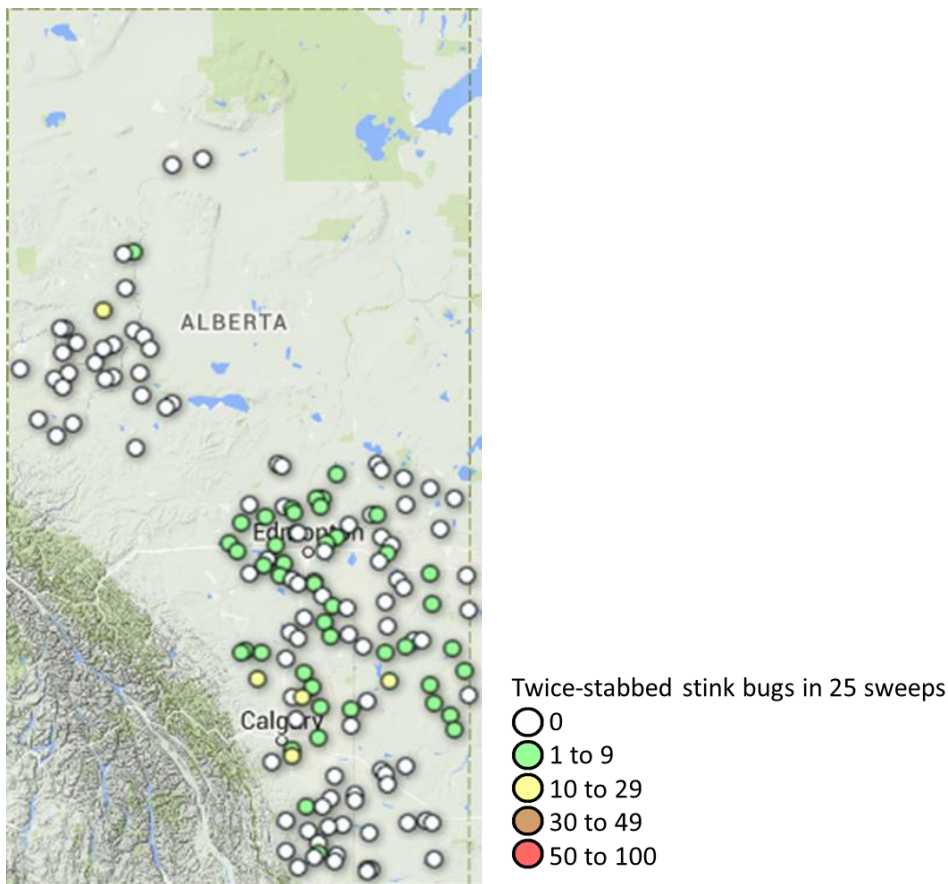
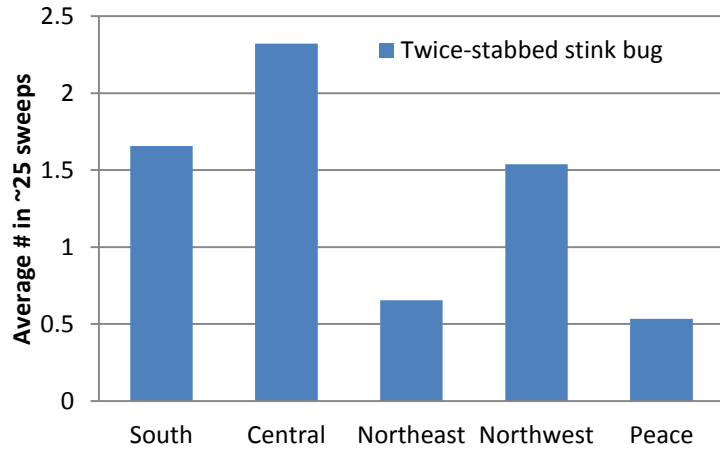
Nabid bugs (or damsel bugs) are predators of aphids and nymphs of other insects. This data combined adults with nymphs, but the vast majority were adults.





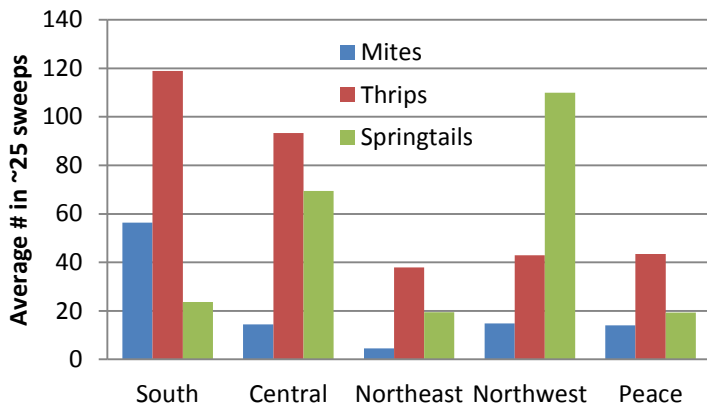
### Twice-stabbed stink bug

This little black and red stink bug feeds on seeds, but there is not much data about what kind of seeds.

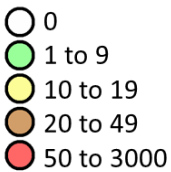


**Mites, thrips, and springtails**

Mites (usually spider mites, but sometimes red velvet mites and others), thrips, and springtails (or collembola) are all found throughout Alberta. Spiders mites suck plant juices and can be a pest in large numbers, but usually a good rainfall or irrigation will wash them from the plants, so they are rarely a problem for alfalfa. Other mites can be parasites on insects or feed on insect eggs or fungi. Thrips suck plant juices as well, but rarely cause economic damage in alfalfa. Springtails feed on soil microorganisms and detritus. We found a few different types of springtails.



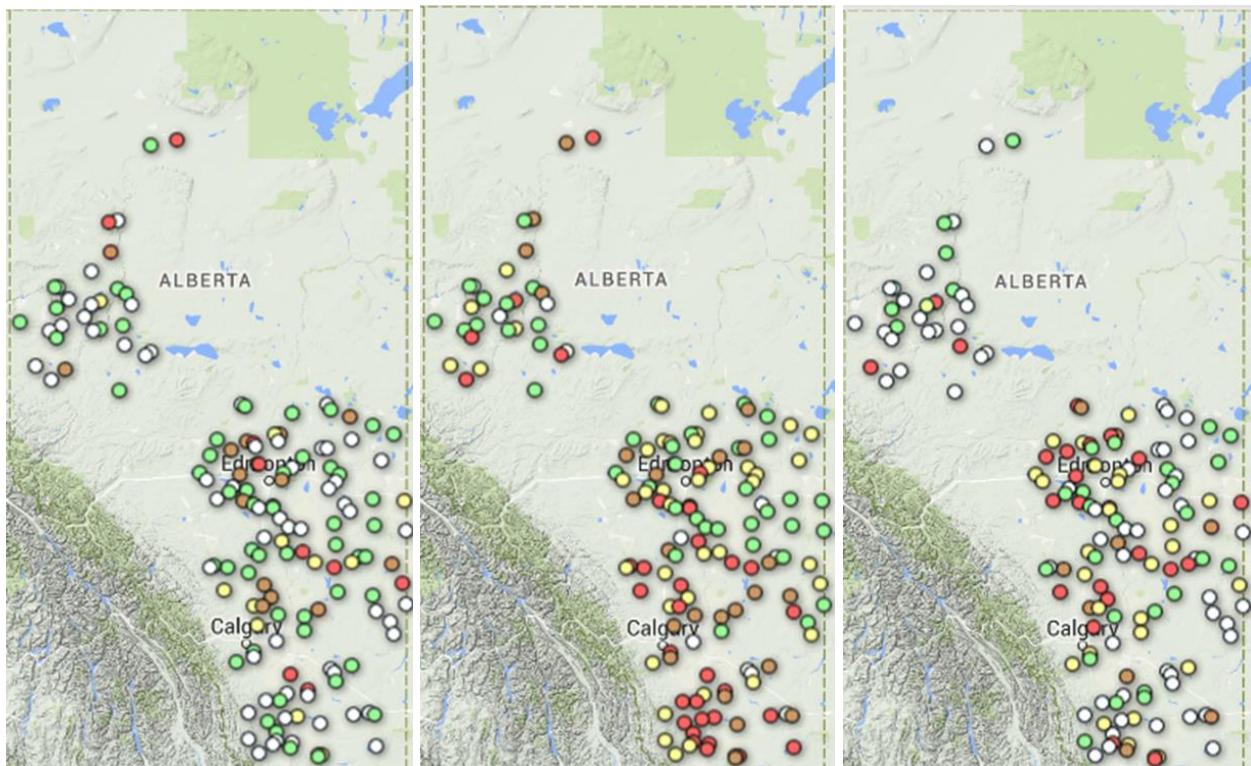
Mites in 25 sweeps



Thrips in 25 sweeps



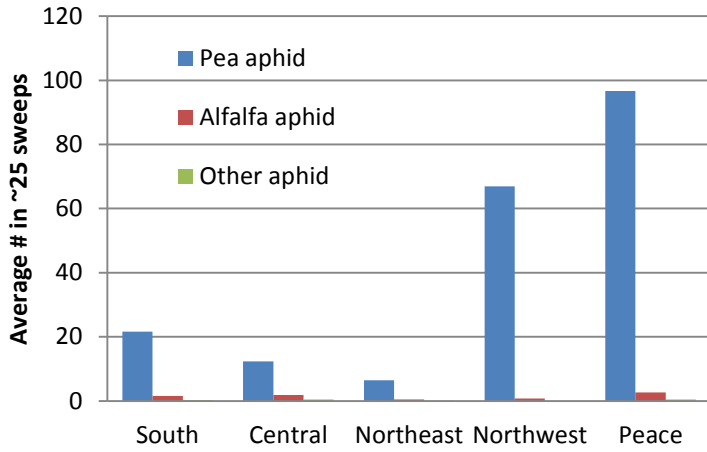
Springtails in 25 sweeps



2014 Alfalfa Survey data summary

**Aphids**

Aphids are everywhere in Alberta, and pea aphids greatly outnumber other aphids in alfalfa.



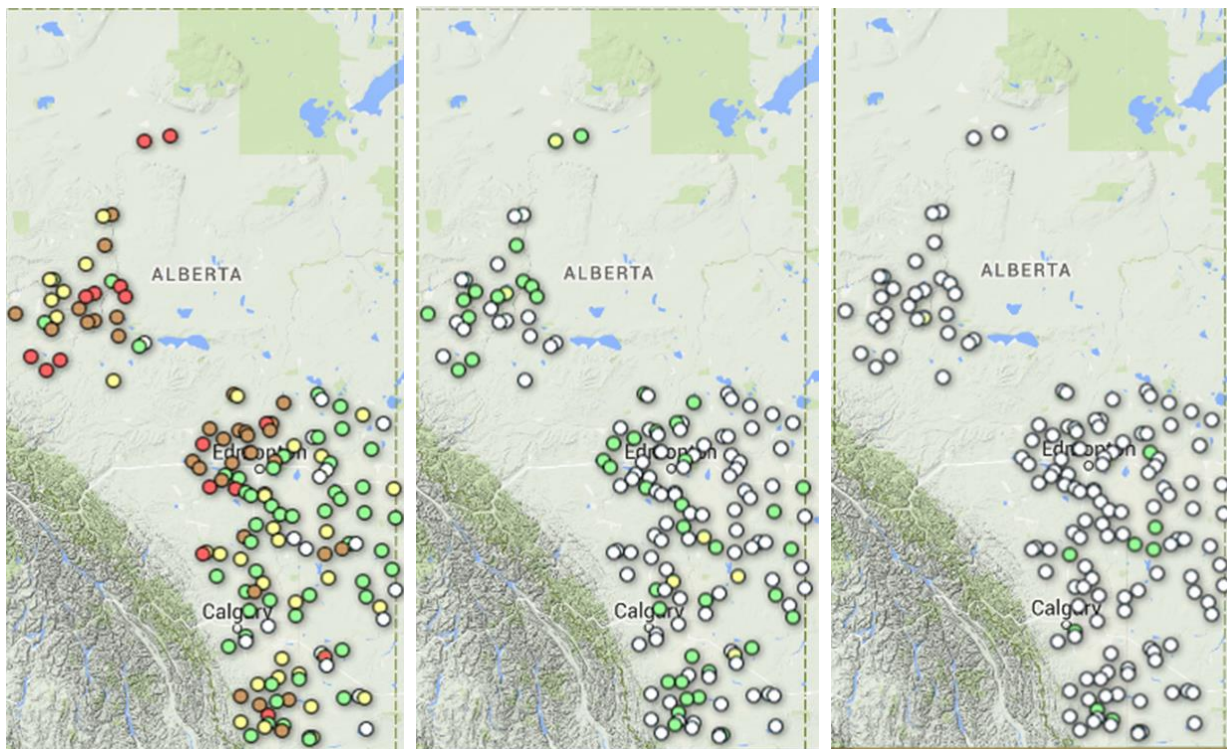
Pea aphids in 25 sweeps



Alfalfa aphids in 25 sweeps



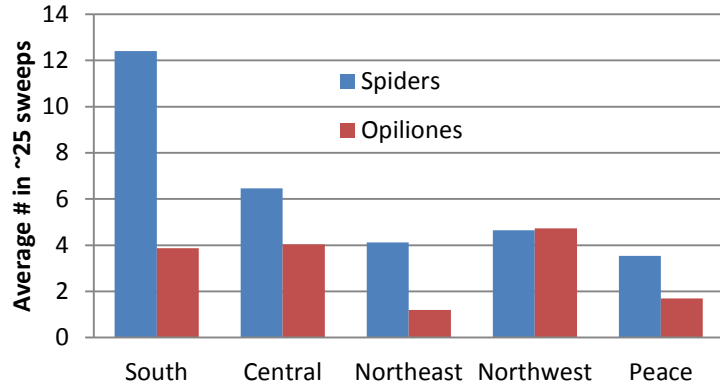
Other aphids in 25 sweeps





### Spiders and Opiliones

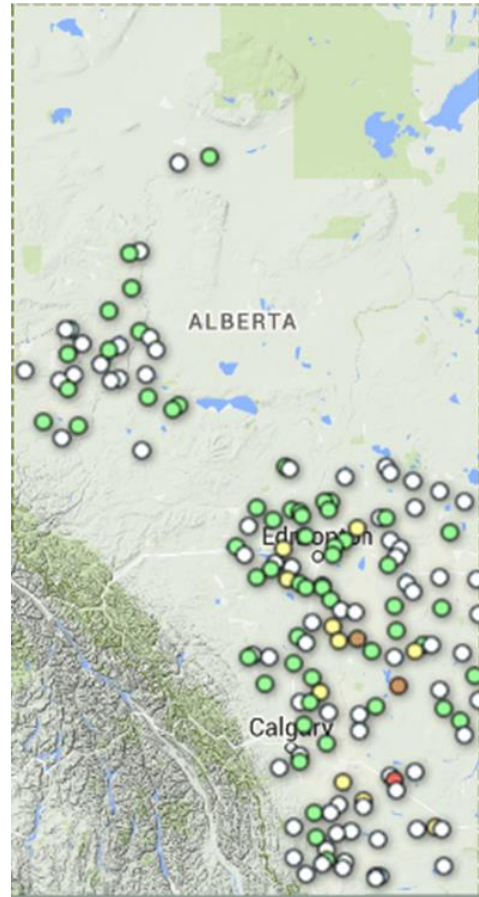
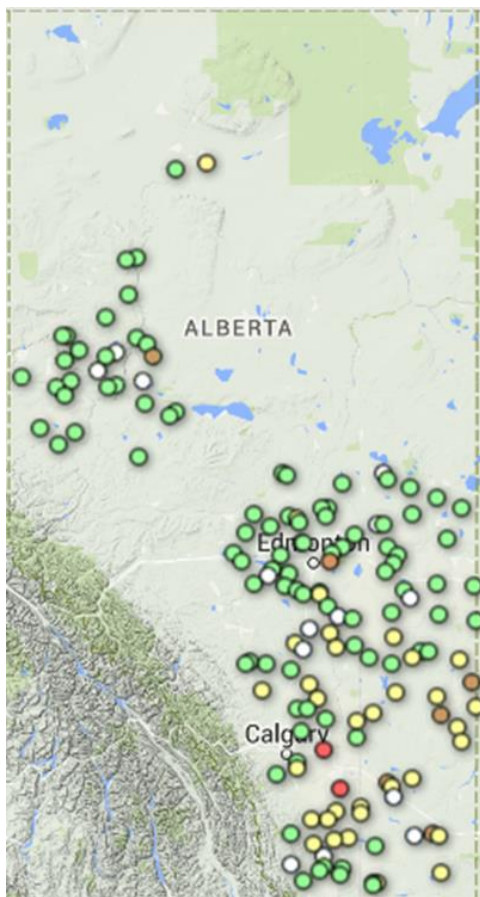
Spiders and opiliones (harvestmen or daddy-long-legs) are found throughout Alberta. Spiders, as everyone knows, are predators and largely eat small insects. Opiliones are omnivorous scavengers and eat fungi, plant material, dead things, and sometimes small insects.



Spiders in 25 sweeps



Opiliones in 25 sweeps



**ACKNOWLEDGEMENTS**

We are grateful to ACIDF for funding this project. We would also like to thank Jacob Mafro from MARA, Danika Bonowicz, David Brennan, and Jennifer Todd who helped collect the samples and Jan Lepp who helped with data entry.