

# 2015 BC Peace Collaborative Pest Monitoring Season Summary

## Overview

This report will aim to communicate the primary findings of the 2015 BC Peace Pest Monitoring project. During the 2014 monitoring season, a valuable and expansive data set was generated from key pests in the BC Peace River region, and this was refined, adjusted, and built upon in 2015. Extra investigations into Cereal leaf beetle damage in Farmington was undertaken, and with the help of emergence cages, it was determined that the beetle is still absent from the area and the damage was caused by slugs (Figure 1). In total, 10 weekly monitoring sites were established with cooperators- 5 Canola, 4 Wheat, and 1 extra weather station site with remote data-download capabilities (near Clayhurst, BC) allowing regular transfers to AAFC modellers (Figure 2). Three additional manually shuttled weather stations were again maintained in Rolla, Montney, and Farmington to fill in data gaps for longer term purposes. Collectively, these data will prove extremely valuable for forecasting, modelling, and looking at changes to pest populations over time in this unique region.



Figure 1 Left: "Cereal Leaf Beetle" damage in Farmington, BC. Slugs can also cause this characteristic feeding damage. Right: Emergence cages to verify cereal leaf beetle was not present.

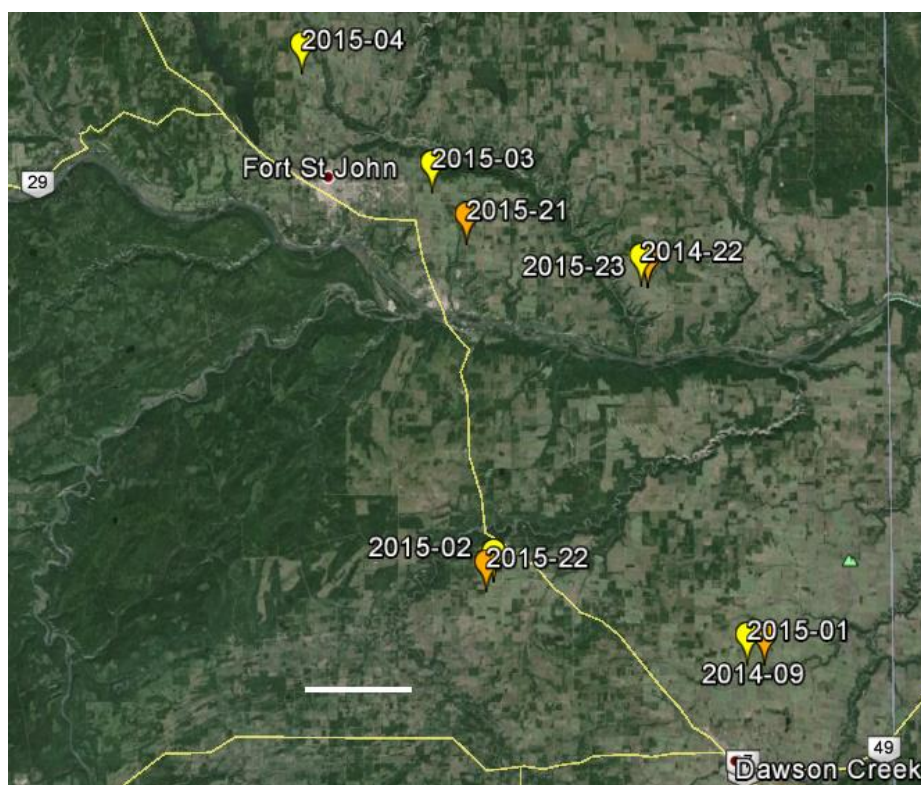


Figure 2: Overview of 2015 weekly monitoring cooperator sites. Orange sites are wheat sites, yellow are Canola. The extra weather station site is ~2km east of 2014-22 near Clayhurst. Red clover casebearer was also monitored from the Canola sites.

## Insect Monitoring

Agriculture and Agrifood Canada (AAFC) provided insect monitoring protocols that have been well established for use across the prairies in the Prairie Pest Monitoring Network (PPMN), and these were employed with minor modifications to details such as deployment dates where necessary, as per recommendations from AAFC in Beaverlodge. Monitoring sites were once again set up in Montney, Clayhurst, Baldonnel, Farmington, and Rolla. In Canola, flea beetle sticky cards and Diamondback moth (DBM) pheromone baited traps were deployed early in the season in the first week of May, followed by Swede Midge and Red Clover Casebearer (RCCB) pheromone traps at the end of May. Sweep sampling for *Lygus* bugs was also done periodically at these sites throughout the season. Finally, I was able to add BC Peace data to the annual Peace Canola survey headed by Jennifer Otani in Beaverlodge, AB again; a total of 27 sites from BC were included in the survey that identifies all arthropods in the sweep samples from each site. This aims to identify and quantify the diversity of beneficial insects, quantify key pests during that period (mainly *Lygus*, in early July), and also scout for the presence of the Cabbage seedpod weevil (*Ceutorhynchus obstrictus*).

### Flea Beetles

Across the prairies, the most important and abundant pest species are Crucifer (*Phyllotreta cruciferae*), Striped (*Phyllotreta striolata*), and Hops (*Psylliodes punctulata*), however, anecdotal evidence and data collected last year confirmed that damage in Canola in the BC Peace is primarily caused by striped flea beetles, as is the case in the Alberta Peace. Last year, the non-pest species, *Crepidodera nana*, proved to actually be the most abundant flea beetle on field edges at certain early points in the year, illustrating the importance of performing damage assessments to make control decisions (Figure 3). This year, populations shifted much further towards striped flea beetle dominance (figure 4), and *C. nana* was only significant early on in Baldonnel (Figure 5). Early season peaks in striped and *C. nana* flea beetles occurred at roughly the same points in the year in 2015 compared to 2014, but the initial striped peaks were higher in 2015. Hops flea beetles seemed to once again peak and decline earlier than other flea beetles, and did so at a lower level (figure 6).

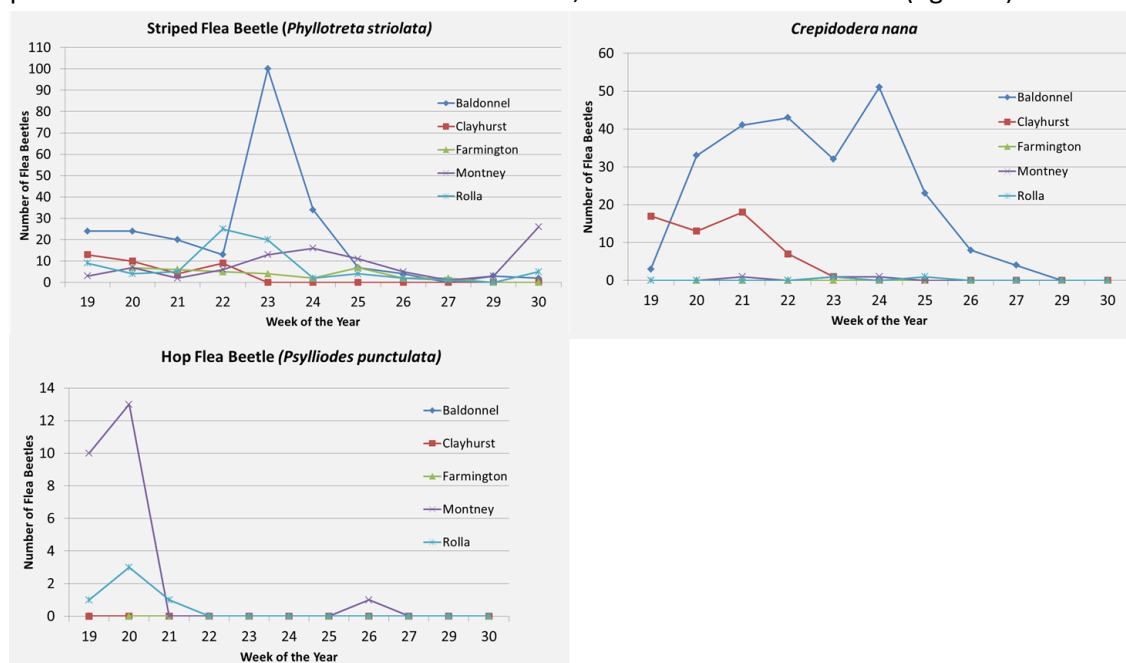


Figure 3: 2014 Flea Beetle populations over time and across 5 canola sites in the BC Peace. Notice the difference in scale on the y-axis for different species.

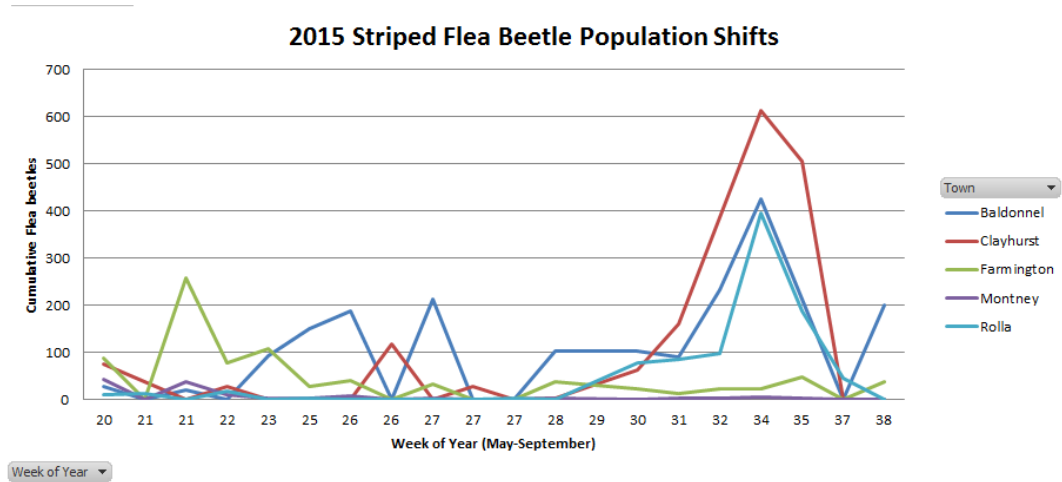


Figure 4: 2015 Striped flea beetle populations over the season. Notice the second peak is larger as expected. This is when the second generation emerges to find overwintering grounds.

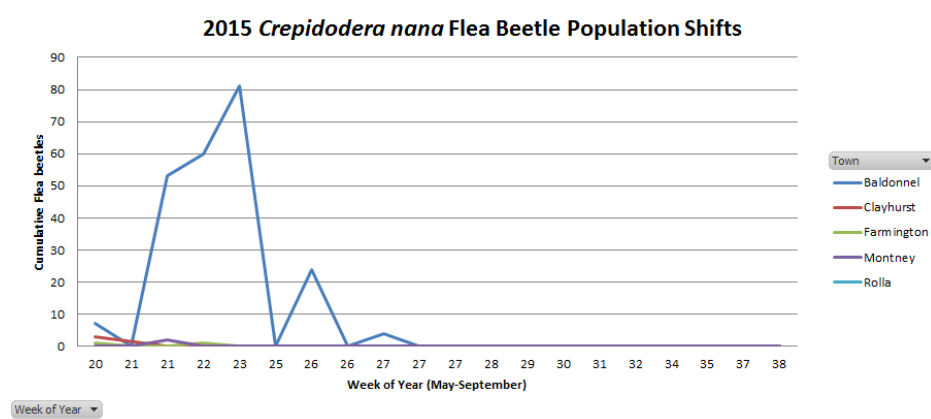


Figure 5: 2015 *Crepidodera nana* populations over the course of the season. This is not known to be a pest species and has been observed feeding on trees along field edges.

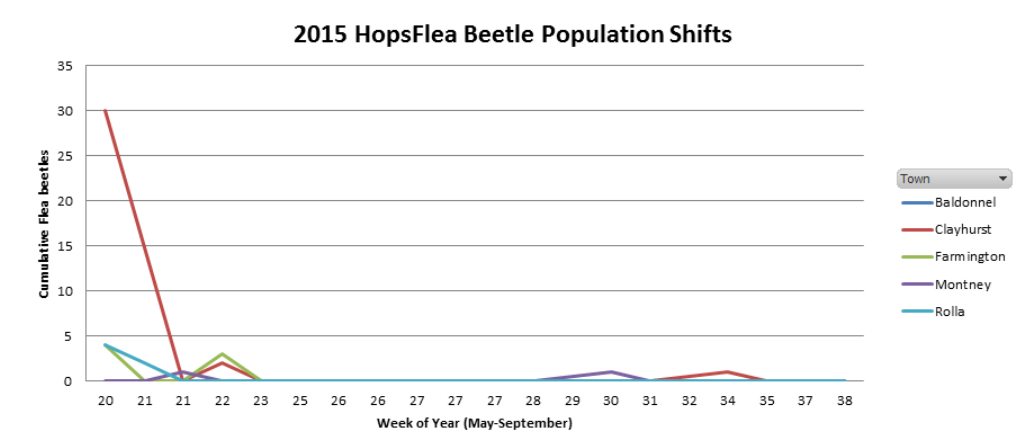


Figure 6: 2015 Hops flea beetle populations over the course of the season. This appears to be the second most prevalent pest species in the Peace, after striped flea beetles and likely doesn't contribute much to yield losses.

The figures above confirm that, once again, the striped flea beetle is likely the most important damage causing species in the BC Peace, but in some areas at certain times of the year, a large proportion of flea beetles

present are actually non-pests. A total of two Crucifer flea beetles were detected all season, in Farmington, and as such were an extremely minor factor in infestations; this reiterates the value of population data of this nature- proper differentiation of *C. nana* from the morphologically similar *P. cruciferae*, is key to understanding the unique pest dynamics of Canola in the BC Peace.

**Diamondback Moths**

Diamondback moth (DBM), which is not known to overwinter in the Prairies to any meaningful degree, showed slightly higher numbers this season, but were still well below threshold levels across the Peace. Annual infestations in the Peace are due entirely to populations from southern wind trajectories, and the degree and localization of infestations are dependent on when and where the wind currents come early in the season. If the climate shifts to allow colonization and overwintering of this pest, we could see drastic shifts in the frequency of problem years as it’s capable of multiple generations in short periods of time. Pheromone monitoring in the Peace allows us to track arrival times, and adult population levels throughout the season to see if they are rising towards “larval check” thresholds. The earlier the moth arrives, and if in sufficient numbers, the more time the population will have to establish and cause a problem that year. In the 2014 season, arrival times varied within the Peace by up to a month (see Fig. 7), however in 2015 they arrived much earlier and more uniformly; by May 19<sup>th</sup> 2015, DBM were detected at all sites except Montney where they arrived the following week. Adult populations never reached levels where heavy infestations were likely, and only small densities of larvae were observed in Farmington (Figure 8).

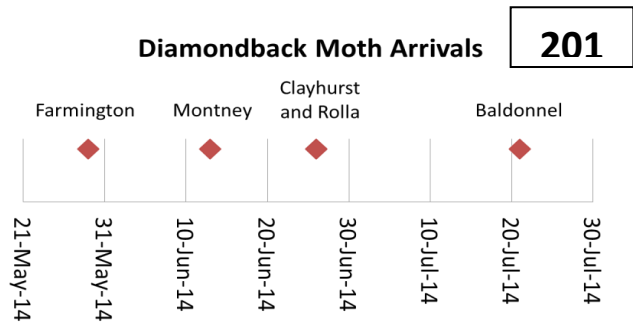


Figure 7: Diamondback moth arrival dates during the 2014 growing season. When the moth arrives in a region is entirely dependent on southern-originating wind currents. Adult moth populations were extremely low and larvae were only rarely observed in canola crops this season.

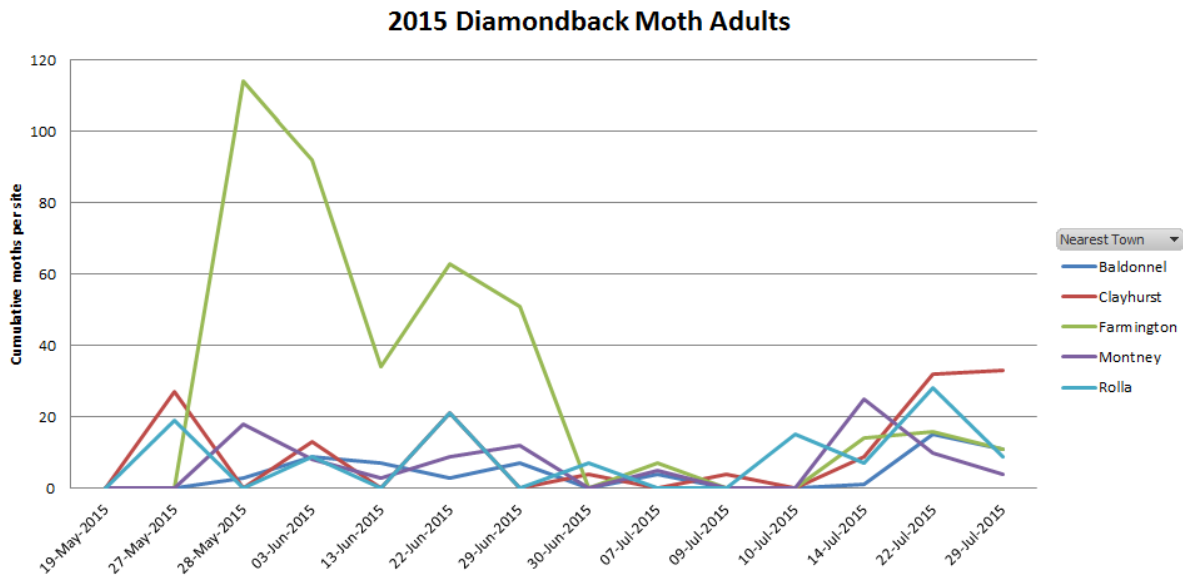


Figure 8: 2015 Diamondback moth pheromone trap counts throughout the season. Larvae were only detected in Farmington where counts were highest, but still in very low levels.

### Swede Midge

Swede Midge pheromone monitoring confirmed that this pest is likely still not present in the BC Peace. It's a highly destructive pest in some areas of Ontario where Brassica crops, including canola, simply aren't viable anymore. This is because the midge is extremely difficult to control, and once in a region, long crop rotations are the only available means of managing it. It's established populations in areas of the prairies and modelling efforts indicate that if it were introduced in the BC Peace, it would likely survive and reproduce, so proactive monitoring for this pest is crucial.

### Wheat Midge

Wheat Midge pheromone traps were set out at wheat sites in 2015 between the end of June and the end of July, and adult midge were detected at all sites within the first week as with 2014 (Figures 9 and 10). They were most abundant in the south-eastern portion of the BC Peace, in Rolla, though in terms of risk levels populations were still low across the region.

#### 2014 BC Peace Wheat Midge Populations

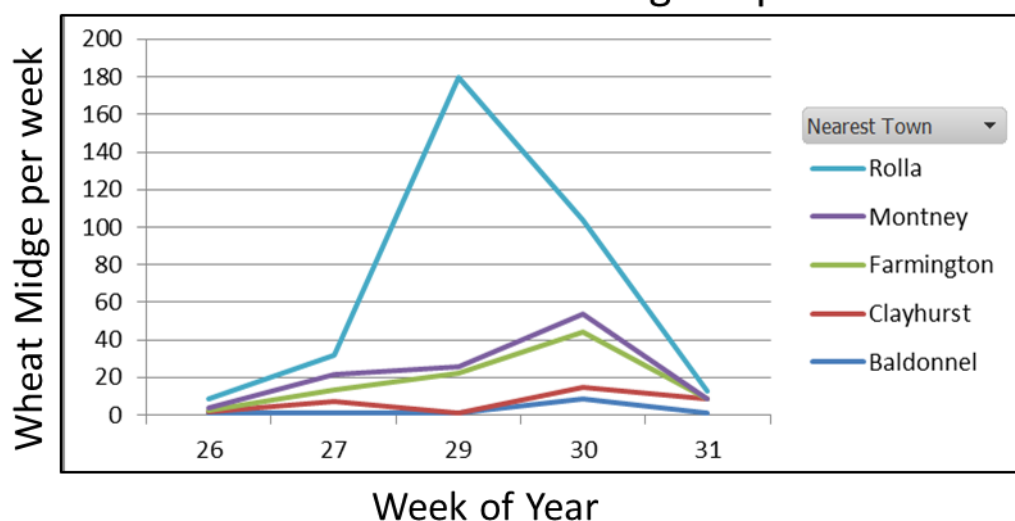


Figure 9: 2014 Wheat midge pheromone trapping results. Week of year values are based on collection dates and run from the first week of July (26th WoY) to the first week of August (31st WoY). Wheat midge counts were weekly and represent the sum of 4 traps per site, 50m apart.

#### 2015 Wheat Midge Pheromone Trapping

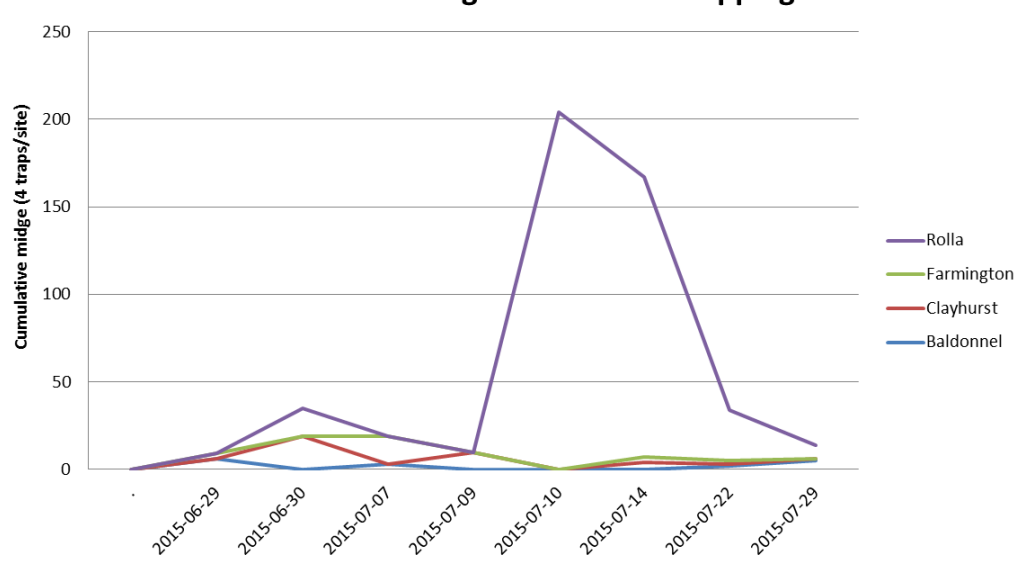


Figure 10: 2015 Wheat midge pheromone trapping results. The scale is almost identical to last year, covering the same span of time and using the same protocol. Notice populations were a bit higher in Rolla in 2015, but quite stable overall. Keep in mind that the cumulative counts are from 4 pheromone traps per site, and threshold values cannot be inferred from pheromone data, though anecdotally, problem areas for midge elsewhere in the Prairies would see much higher counts..



Wheat Midge will be a growing problem in the coming years, as reports show populations still seem to be rising in nearby Alberta regions as well as the BC Peace, but we still don't understand well how this pest's biology will affect it in the Peace. The window of crop susceptibility to this pest is very short- only after heads emerge, but before flowering, so climate data will be increasingly valuable to tracking this pest's crucial synchrony with its host, and tracking its populations will allow the region to make necessary shifts towards tolerant varieties as needed. Sweep samples from 2014 Canola crops did recover the Wheat Midge parasitoid, (*Macroglenes penetrans*), so this will be an important consideration in future management regimes. It is hypothesized that the parasitoid uses the nectar from Canola as a food source and the canopy for resting in between searching host Wheat midge eggs; this means following economic thresholds in all crops is key for maintaining healthy pest-predator dynamic. So far, midge population levels are still far below threshold values (which currently only consist of counting in-flight adults in the crop), but this could change in the future.

### **Grasshoppers**

Grasshoppers caused major damage, mainly in Northern areas of the Peace, during the 2014 growing season, but ideal weather conditions in the Fall and 2015 Spring did not lead to high population densities in the 2015 growing season. The crash was likely due to a build-up of parasites and natural enemies associated with the booming grasshopper populations. Interestingly, Alberta saw a large grasshopper boom this year, which seemed to consist of the same main species from the 2014 BC problems (predominantly Two-striped (*Melanoplus bivittatus*) and Migratory (*Melanoplus sanguinipes*). This suggests that perhaps the BC and AB Peace share similar pest dynamics, but the boom-bust cycle is desynchronized and thus the two areas constitute distinctly different management regions. Pests like grasshoppers usually follow these cycles, and understanding their local biology will be key in developing future forecasting models to better predict when farmers need to be ready for a problem year. There were plans to expand grasshopper monitoring efforts during the 2015 season to provide more accurate/useful long-term population data that would include periodic sweep samples across multiple sites, as well as late season egg counts, however, the crash in populations meant priorities were shifted to other efforts.

Insects were again, by far responsible for most pest problems during the 2015 season, but pathology and weed sampling was also carried out to try and get an idea of their distribution in the BC Peace.

## *Pathology and Weed Monitoring*

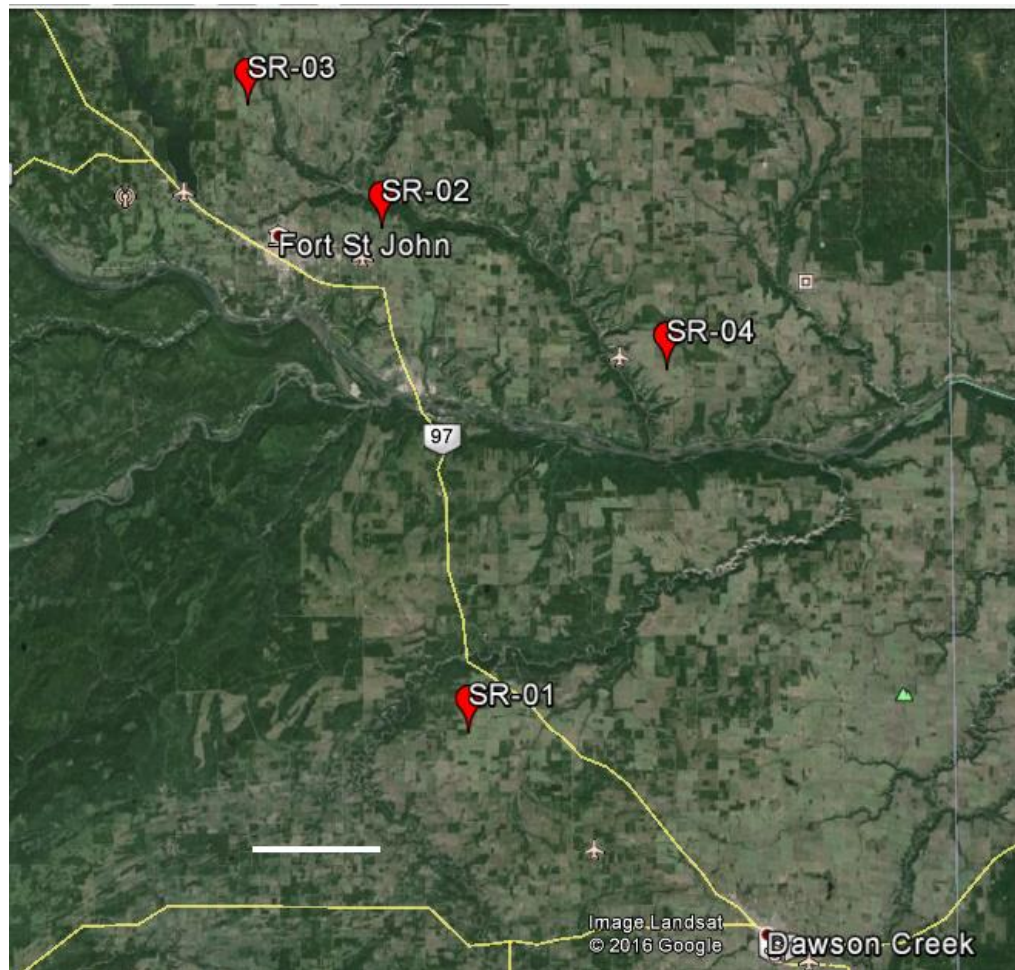
In the 2014 Season, pathology and weed monitoring was carried out in the form of late season surveys, and notes taken throughout field monitoring at and around cooperator insect monitoring sites. Efforts suffered from a lack of organized, established protocols which are so well characterized for insects. However, using advice from AAFC scientists, important crops and pathogens were identified as focus systems for our area, and survey protocols were designed based off these. Weed surveys were adapted from a 2009-2010 protocol followed in Alberta by the provincial and federal governments. These still yielded few results so the approach was adjusted for 2015.

### **Pathology**

The pathology was monitored on a case by case basis. When an issue was observed or brought to my attention, I would investigate and collect samples if necessary to get proper identification from a trained pathologist. I responded to a couple calls, one of which turned out to be a false alarm, and the other which turned out to be webworms in a hay crop near Toms Lake. There were some minor stripe rust outbreaks across the region, which like Diamondback moths, almost exclusively arises from windblown spores of a southern

March 21, 2016 Arlan Benn

United States origin as they require a living host plant to overwinter in and fairly mild conditions with heavy snow cover. The outbreaks I observed only covered small patches at the edges of fields, but these should be taken care of with fungicides as soon as possible when necessary because they spread very rapidly (Figure 11). The predominantly hot, dry conditions usually make for low disease years, and high insect years, as was the case this season.



**2: Striperust outbreaks observed in 2015.** In all cases the outbreak was localized to the edges of the field (within 10m) and usually no more than ~20m in length. SR-03 was south of Montney, SR-02 near the Fort St. John Airport, SR-04 in the Golata Creek area, and SR-01 in Farmington which was the worst infection. I also received reports of striperust closer to Dawson Creek as well.

### **Weeds**

Weed surveys were carried out with assistance from Talon Gauthier with the Peace Region Forage Seed Association (PRFSA). This joint effort was crucial in lining up more forage-seed cooperators and establishing working relationships with them.

This helped solve the 2014 difficulties of contacting cooperators with the desired fescue crops which resulted in only 3 out of 5 fields visited being assessed at a single point late in the season. In 2015 by contrast, there were 11 sites sampled twice each, once early, and then once later in the season in an attempt to gauge the change in weed populations over time. In 2015 the protocol still consisted of all weeds being identified and quantified along a roughly 50 pace arc through the field. Weeds were distinguished as being found on the edges or further in. Foxtail barley, a weed especially important in forage seed production, was often present throughout the fields sampled, whereas Canada thistle was usually present in ditches or along field edges when observed. This data is far more useful than the 2014 season's data, and as such will be provided to the PRFSA for continued use.

## *Extension Work*

One other useful opportunity this position provided throughout the season was a person on the ground to support other valuable monitoring and data collection efforts in the region which crucially gives us access to a wider array of forecasting materials, and pest information. One project, a late season *Verticillium* wilt survey was performed in conjunction with the CFIA as an early test for the disease in Canola. This was in response to the

March 21, 2016 Arlan Benn

first documented case in Canola in Manitoba. This type of proactive monitoring is important for establishing when a new pest is inevitably introduced to our region. An additional project was in coordination with researchers in AAFC in Summerland, BC who are coordinating a national effort to develop a crop pathogen forecasting and modelling system called “Phytoshield”. The ultimate goal is to develop PCR protocols for monitoring various agriculturally important pathogens to then predict when and where outbreaks will arise. Currently there are monitoring efforts localized in Western Canada, mostly down in Southern BC, but I was able to run a monitoring station in the BC Peace which the BCGPA has agreed to carry on with for the duration of that project. This will give the researchers, and us, access to a map of what pathogens are frequently encountered in the area, and help them develop tools for predicting their movement and manifestation as disease in crops in the region.

## *Final Notes*

This project has gathered a large amount of data on pests and beneficials in the region which should provide insight into which specific areas can expect which pests in future years. This, along with the highly accurate weather data collected, will allow the agriculture sector to better prepare for any potential outbreaks in coming years. It can also prove to be useful in assessing how pests biologies might change in our region compared to the better characterized prairie regions. Crucially, this project has shown certain devastating pests, namely Swede Midge, Cabbage Seedpod Weevil, and Cereal Leaf Beetle, still seem to be absent from the region, and this is useful twofold: it gives peace of mind to the producers in the region and assures them they are still safe to practice agriculture as previously without worrying about shifting rotations or added cultural/chemical control costs, and it could also help with marketing the region as a strong agricultural area.

Participation in nationwide surveys and research allows our region to be proactive in detecting and responding to new and emerging threats and means we’ll be better equipped and able to adapt to any new pest issues that arise and develop here. Having as much time as possible to shift practices or develop mitigation techniques/products will help our growers sustain a lucrative agricultural practice no matter what the future brings.