Prairie Pest Monitoring Network Weekly Updates – July 30, 2014

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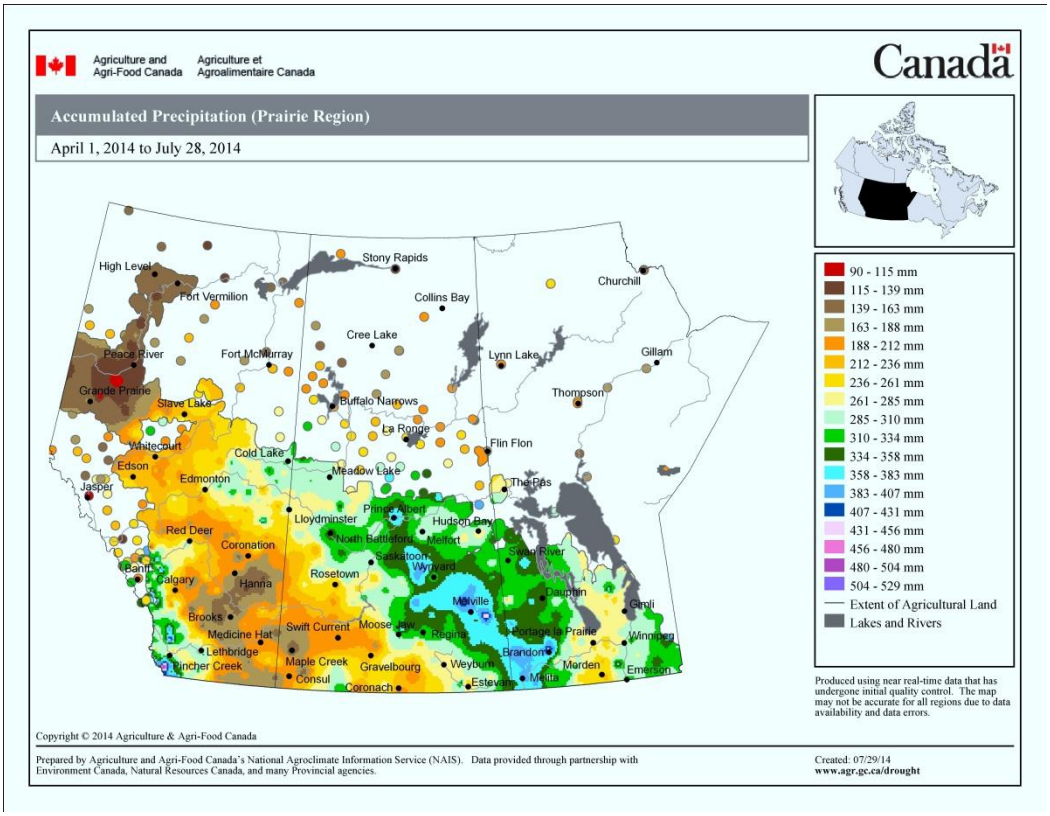
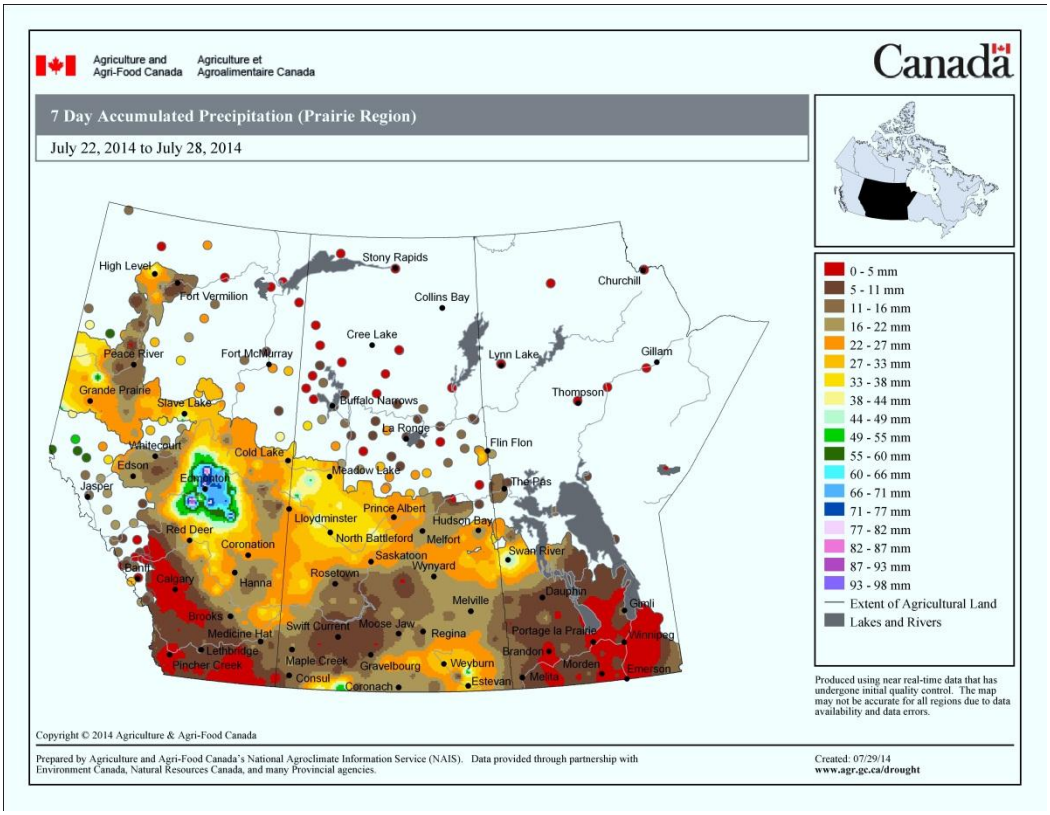
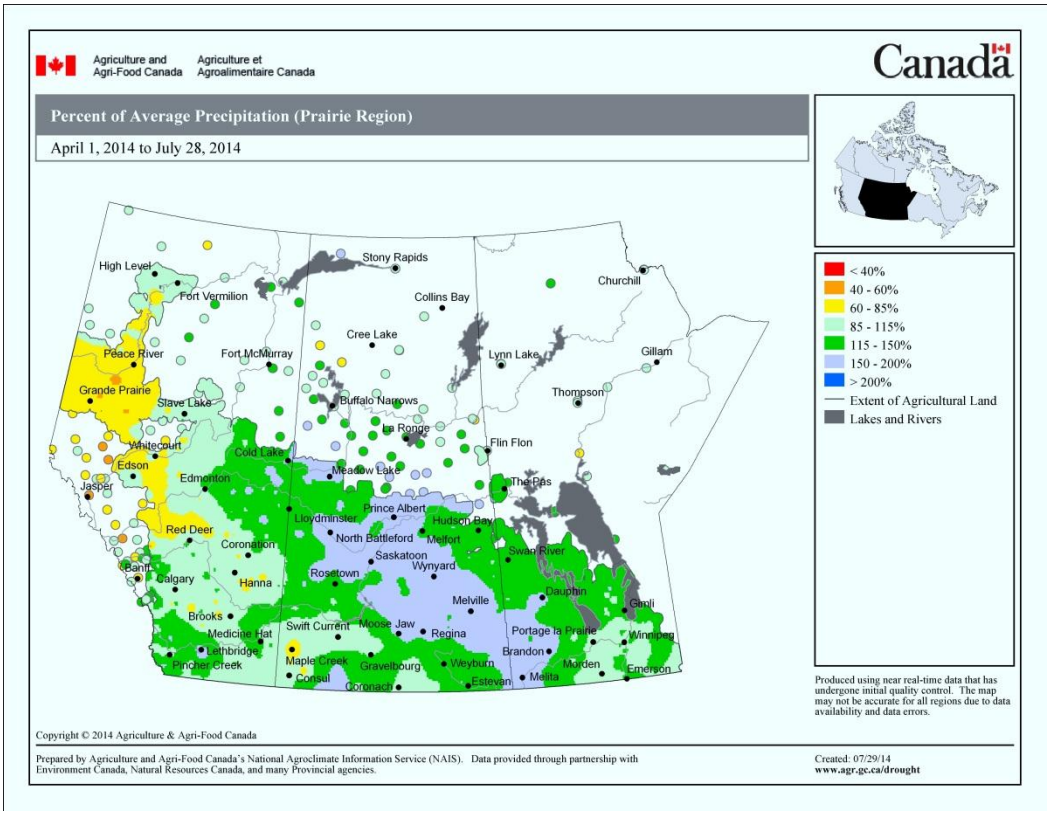
1. Weather synopsis – Below is the **Accumulated Precipitation for the Growing Season** (i.e., April 1-July 28, 2014):



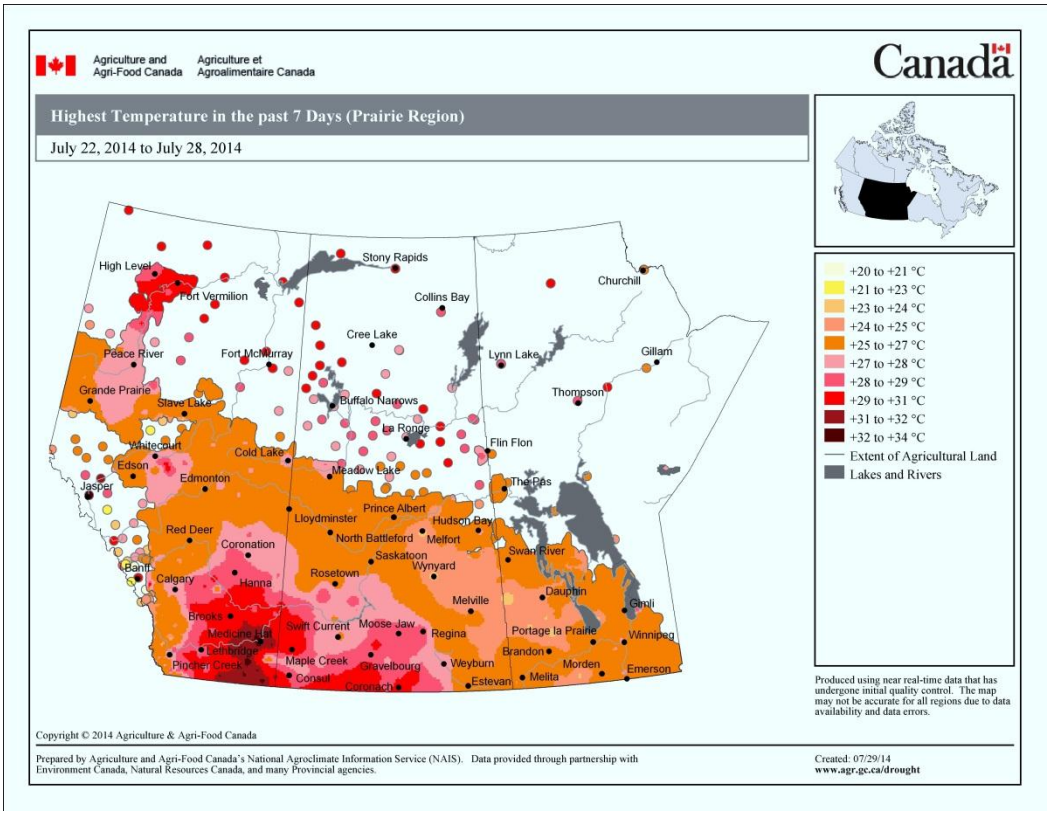
Below is the **Accumulated Precipitation the Past 7 Days** (i.e., July 22-28, 2014):



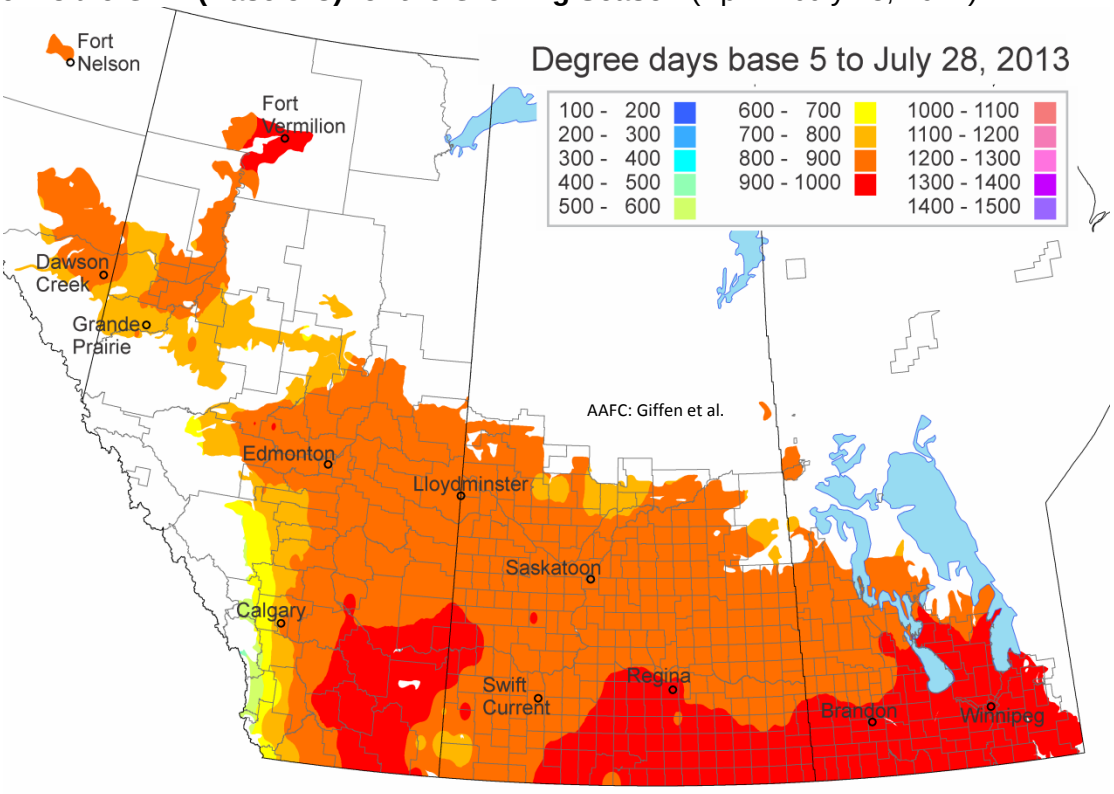
The map below shows the **Percent of Average Precipitation** for the growing season (April 1-July 28, 2014):



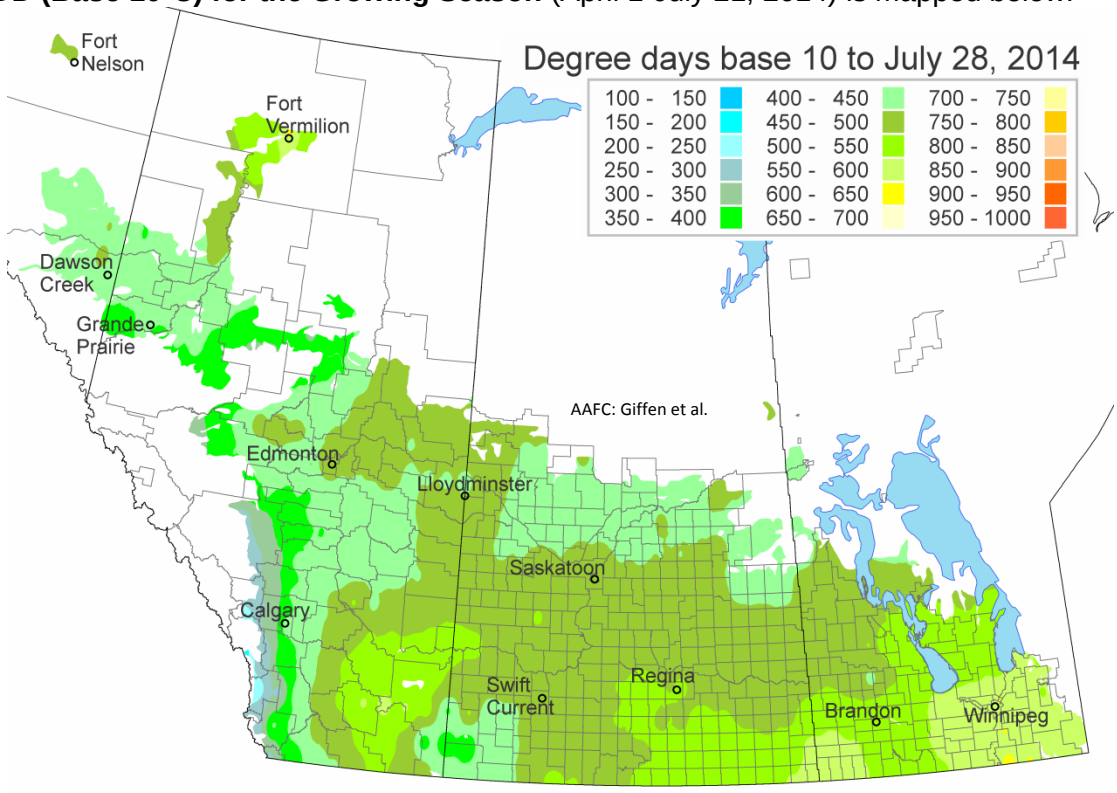
The map below reflects the **Highest Temperatures across the Prairies the past 7 Days** (i.e., July 22-28, 2014).



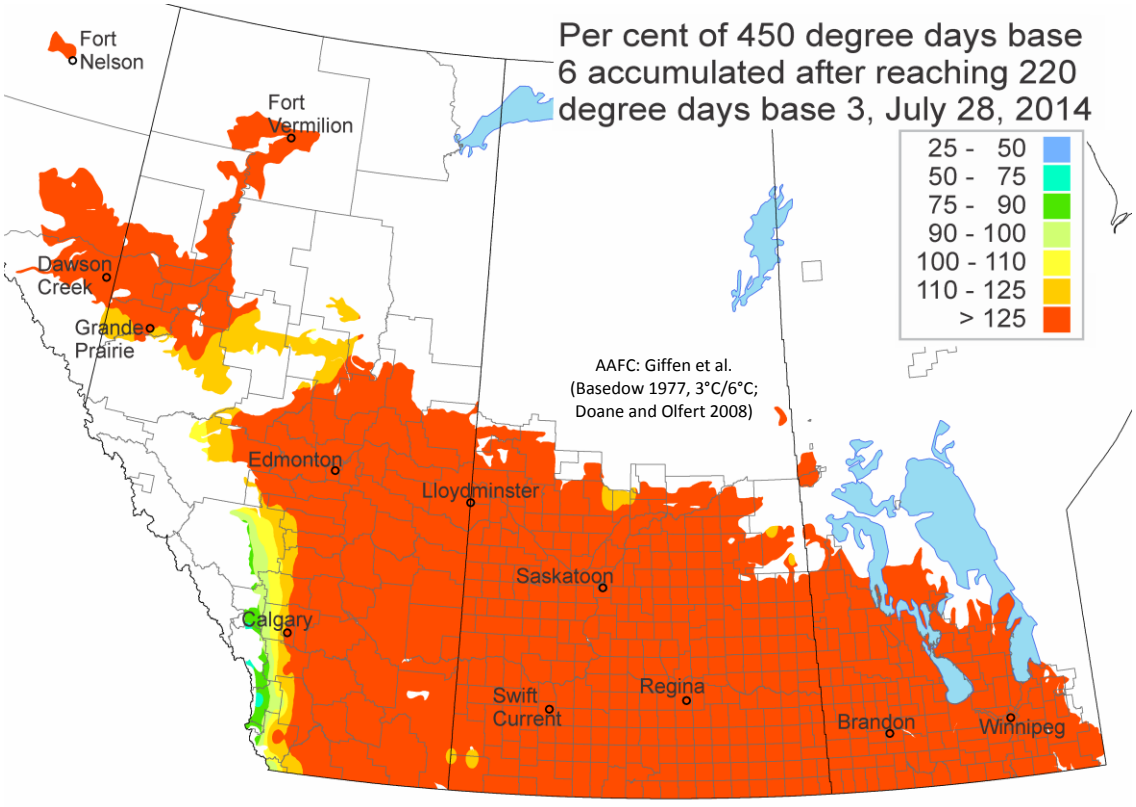
Growing degree day (GDD) estimates reflect the growing season, in terms of heat accumulation, across the prairies. Below is the **GDD (Base 5ºC) for the Growing Season** (April 1-July 28, 2014):



While the **GDD (Base 10ºC) for the Growing Season** (April 1-July 21, 2014) is mapped below:



2. Wheat Midge (*Sitodiplosis mosellana*) – The predicted percent of wheat midge emerged across the prairies has been mapped below using prairie-wide temperature data for the present growing season. The map below predicts midge emergence (as of July 28, 2014) is drawing to an end for the growing season.



Wheat midge biology and monitoring information can be located by clicking here or linking to your provincial fact sheet (Saskatchewan Agriculture, Alberta Agriculture and Rural Development).

REMEMBER that in-field counts of wheat midge per head remain the basis of economic threshold decision. Also remember that the parasitoid, *Macroglenes penetrans*, is now out actively searching for wheat midge. Preserve this parasitoid whenever possible and remember your insecticide control options for wheat midge also kill these beneficial insects which help reduce midge populations.

In-field monitoring for wheat midge should be carried out in the evening (preferably after 8:30 pm or later) when the female midges are most active. On warm (at least 15ºC), calm evenings, the midge can be observed in the field, laying their eggs on the wheat heads. Midge populations can be estimated by counting the number of adults present on 4 or 5 wheat heads. Inspect the field daily in at least 3 or 4 locations during the evening.

Economic Thresholds for Wheat Midge:

a) **To maintain optimum grade:** 1 adult midge per 8 to 10 wheat heads during the susceptible stage.
b) **For yield only:** 1 adult midge per 4 to 5 heads. At this level of infestation, wheat yields will be reduced by approximately 15% if the midge is not controlled.

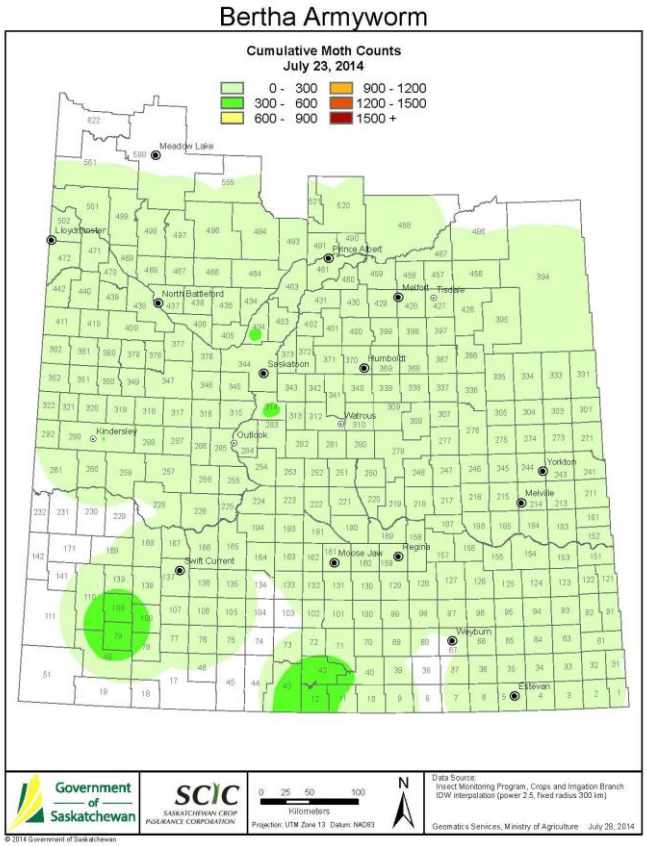
Inspect the developing kernels for the presence of larvae and the larval damage.

3. Diamondback Moth (*Plutella xylostella*) – Remember, the **Action Threshold for DBM in canola is applicable at pod stage and is 200-300 larvae/m^2 or 20-30 larvae per 0.1 m^2.** Be mindful that beneficial insects targeting DBM larvae are already in fields. Please also refer to **fact sheets for DBM** posted by **Manitoba Agriculture, Food and Rural Development, Saskatchewan Agriculture, Alberta Agriculture and Rural Development, and the Prairie Pest Monitoring Network.**

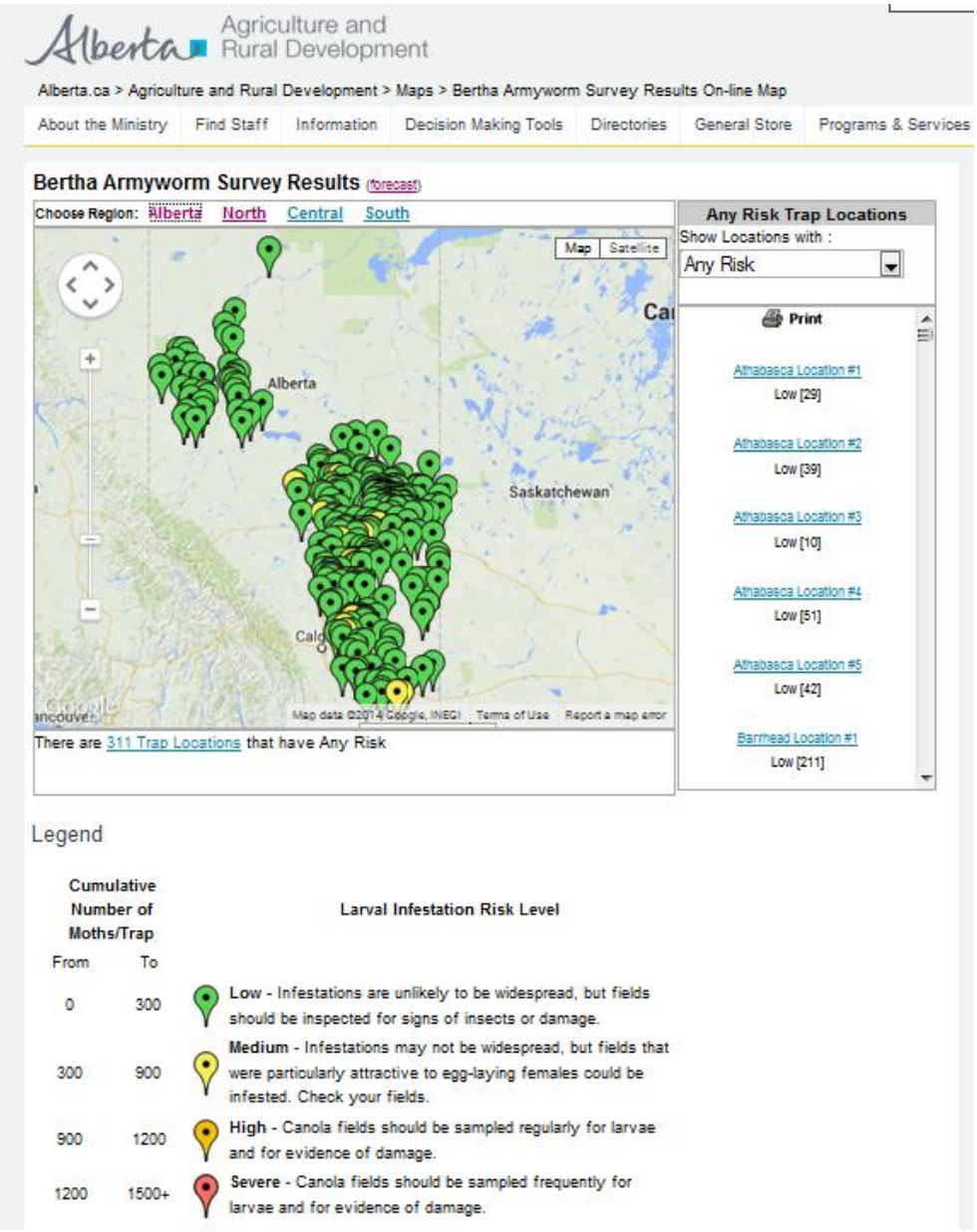
Fig. A. Diamondback larva (left) and pupal silk cocoon (right). Photos were courtesy of Dr. Lloyd Dosdall.

4. Bertha Armyworm – Results from BAW pheromone traps deployed to monitor male moths are now available. Areas showing elevated risk associated with high moth counts now need to pay particular attention to in-field monitoring for the economically important larvae.

Cumulative counts of BAW collected in pheromone traps in the **province of Saskatchewan for 2014 are updated and posted** [here](). Note the following from Saskatchewan Agriculture's website: "The map displays the cumulative male moth counts reported from traps at nearly 200 locations in Saskatchewan. In 2014, co-operators include producers, Regional Crops Specialists, researchers and industry agronomists. The map will be updated until early August." Saskatchewan Agriculture's map (July 23, 2014) is included below:



Alberta Agriculture and Rural Development updates their BAW pheromone trap map [here] and a screen shot is included below:



In-field monitoring for egg masses (Fig. B) and newly emerged larvae (Fig. C) should initially focus on the undersides of leaves plus watch the margins of leaves for feeding. Bertha armyworm larvae will also feed on newly developing pods (Fig. D) so the whole plant should be examined. Watch for the following life stages:

Fig. B. Bertha armyworm eggs laid on the underside of a canola leaf. Note that eggs are laid in batches, eggs are deposited in a single layer, each round egg measures ~1 mm in dia., creamy-white egg colour will change as the embryo develops, dark eggs are often parasitized by beneficial wasp species.

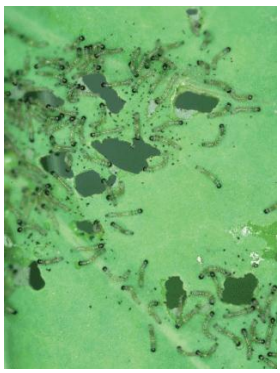


Fig. C. Newly emerged larvae are 0.3 cm long, pale green with pale yellowish stripe along each side.

Fig. D. The larva has six instar stages and passes through color phases of green and pale brown before becoming a large black caterpillar measuring 4-5 cm long.

Reminder: Some bertha armyworm larvae remain green or pale brown throughout their larval life. Large larvae may drop off the plants and curl up when disturbed, a defensive behavior typical of cutworms and armyworms. Young larvae chew irregular holes in leaves, but normally cause little damage. The fifth and sixth instars cause the most damage by defoliation and seed pod consumption. Crop losses due to pod feeding will be most severe if there are few leaves. Larvae eat the outer green layer of the stems and pods exposing the white tissue. At maturity, in late summer or early fall, larvae burrow into the ground and form pupae.

Monitoring:
Larval sampling should commence once the adult moths are noted. **Sample at least three locations**, a minimum of 50 m apart. At each location, **mark an area of 1 m^2 and beat the plants growing within that area to dislodge the larvae**. **Count them and compare the average** against the values in **the economic threshold table below**:

Table 1. Economic thresholds for Bertha armyworm in canola (courtesy Manitoba Agriculture, Food and Rural Initiatives).

	Expected Seed Value - $ / bushel*										
Spraying cost – $ / acre	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
	Number of Larvae / metre^2 *										
7	20	17	15	13	12	11	10	9	9	8	8
8	23	20	17	15	14	13	11	11	10	9	9
9	26	22	19	17	16	14	13	12	11	10	10
10	29	25	22	19	17	16	14	13	12	11	11
11	32	27	24	21	19	17	16	15	14	13	12
12	34	30	26	23	21	19	17	16	15	14	13
13	37	32	28	25	22	20	19	17	16	15	14
14	40	35	31	27	24	22	20	19	17	16	15
15	43	37	32	29	26	23	22	20	19	17	16

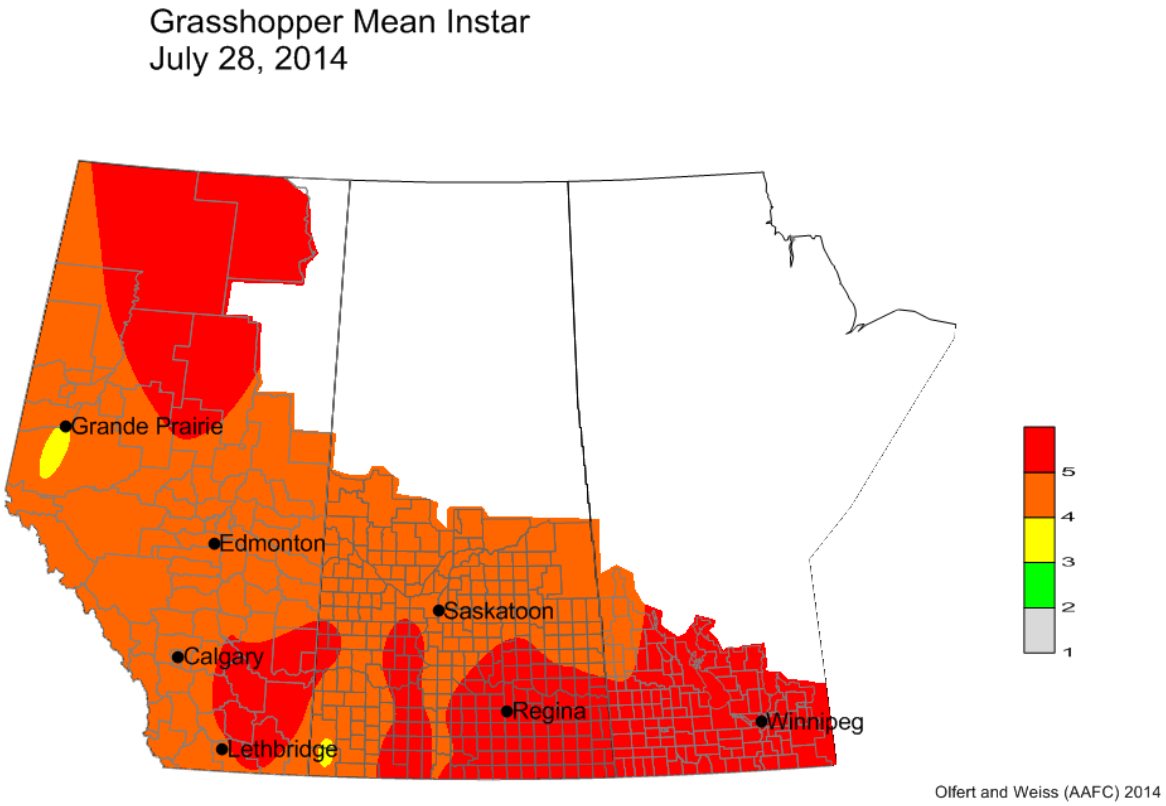
***** Economic thresholds for bertha armyworm are based on an assumed yield loss of 0.058 bu/acre for each larva/metre^2 (Bracken and Bucher. 1977. Journal of Economic Entomology. 70: 701-705).

Provincial fact sheets describing the biology and related pest management information for bertha armyworm are posted by Manitoba Agriculture, Food and Rural Development, Saskatchewan Agriculture, Alberta Agriculture, and Rural Development, or BC Ministry of Agriculture.

5. Grasshoppers - Biological and monitoring information can be linked by clicking here or you can access fact sheets produced by the provinces of Manitoba, Saskatchewan, Alberta or British Columbia.

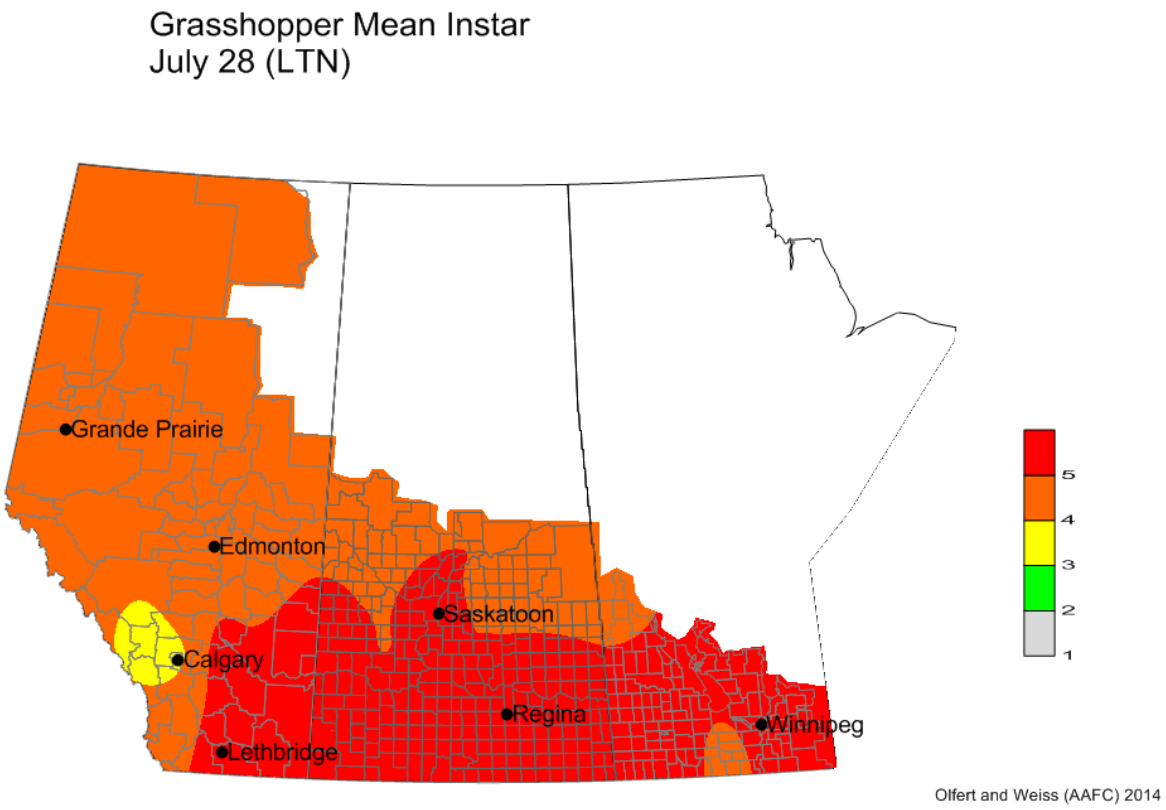
Temperatures this week were warm and dry across the southern prairies. This resulted in optimal conditions for grasshopper development. Grasshopper populations are almost entirely in the 4th and 5th instar stages this week, with adults beginning to appear across the prairies. Grasshopper development is most advanced in the Peace River region as well as in Manitoba and southeast Saskatchewan **(Fig. A).**

Fig. A.



Compared to Long Term Normal Temperatures, grasshopper development is somewhat slower than normal in southern Alberta and southwest Saskatchewan. Conversely, the Peace River region and Manitoba continue to experience advanced rates of grasshopper development (Fig. B).

Fig. B.



6. *Lygus* – The **economic threshold for *Lygus* in canola is applied at late flower and early pod stages**. Biological and monitoring information can be linked by clicking here or you can access the Manitoba, Alberta or British Columbia fact sheets. Biological and in-field monitoring information has been included below.

Adult: In western Canada, four species *Lygus lineolaris* (tarnished plant bug), *L. borealis, L. elisus* and *L. keltoni* have been observed in canola (Fig. A). Adult lygus bugs are 5-6 mm long and 2.5 mm wide. They vary in color from pale green to reddish brown and have a distinct triangle or "V" shaped mark on the back. Adult lygus bugs overwinter under litter, debris, or plant cover in shelterbeds, headlands and field margins. In the spring adults become active and feed on early-growing plants. Lygus bugs utilize a wide range of host plants that are available sequentially through the season. **Adults start to lay eggs in mid-May in the southern prairies and in mid-June in the Peace River region**. Eggs are inserted individually into the stems (Figure 2) and leaves of host plants. Egg laying usually lasts 3 weeks but may continue for up to 7 weeks and may vary depending upon the host crop and duration of the growing season.

Fig. A: Adult *L. lineolaris* (5-6 mm long) (photo: AAFC-Saskatoon).

Eggs: Eggs are slightly curved and approximately 1 mm long with a eye-shaped cap.

Nymphs: There are five nymphal instars. Young nymphs are light green and wingless (Fig. B). Older nymphs develop black dots on the top of the thorax and abdomen. Wing buds are evident in the fourth and fifth instars. Hot dry weather favors build up of lygus bug populations. There are two generations per year in the southern prairies, but only one in the northern areas.

Fig. B: Fifth instar lygus bug nymph (3-4 mm long) (photo: AAFC-Saskatoon).

Damage: Lygus bugs have piercing-sucking mouthparts and physically damage the plant by puncturing the tissue and sucking plant juices. The plants also react to the toxic saliva that the insects inject when they feed. Lygus bug infestations can cause alfalfa to have short stem internodes, excessive branching, and small, distorted leaves. They feed on buds and blossoms and cause them to drop. They also puncture seed pods and feed on the developing seeds causing them to turn brown and shrivel.

Begin monitoring canola when it bolts and continue until seeds within the pods are firm. Since adults can move into canola from alfalfa, check lygus bug numbers in canola when nearby alfalfa crops are cut.

Sample the crop for lygus bugs on a sunny day when the temperature is above 20°C and the crop canopy is dry. With a standard insect net (38 cm diameter), take ten 180° sweeps. Count the number of lygus bugs in the net.

Repeat the sampling in another 14 locations. Samples can be taken along or near the field margins. Calculate the cumulative total number of lygus bugs and then consult the sequential sampling chart (Figure C). If the total number is below the lower threshold line, no treatment is needed. If the total is below the upper threshold line, take more samples. If the total is on or above the upper threshold line, calculate the average number of lygus bugs per 10-sweep sample and consult the economic threshold table.

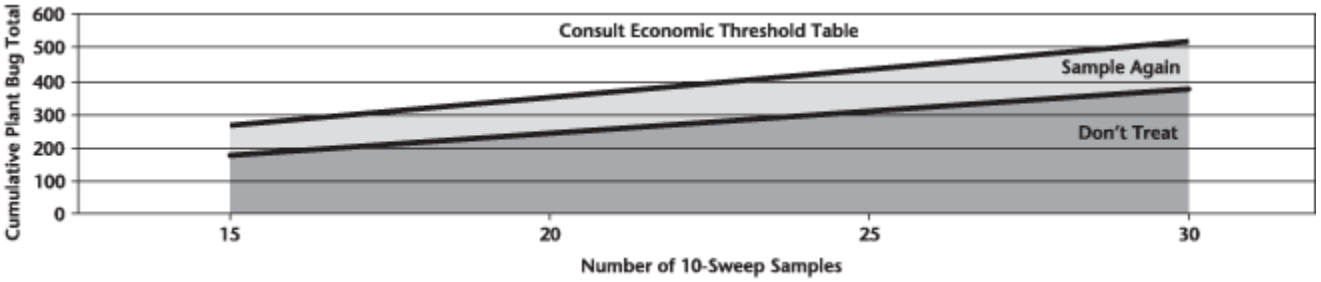


Figure C: Sequential sampling for lygus bugs at late flowering stage in canola.

The **economic threshold for lygus bugs in canola** covers the end of the flowering (Table 1) and the early pod ripening stages (Table 2). Once the seeds have ripened to yellow or brown, the cost of controlling lygus bugs may exceed the damage they will cause prior to harvest, so insecticide application is not warranted.

Consider the estimated cost of spraying and expected return prior to making a decision to treat a crop. **Remember that insecticide applications at bud stage in canola have not been proven to result in an economic benefit in production.** The exception to this is in the Peace River region where early, dry springs and unusually high densities of lygus bug adults can occasionally occur at bud stage. In this situation, high numbers of lygus bugs feeding on moisture-stressed canola at bud stage is suspected to result in delay of flowering so producers in that region must monitor in fields that fail to flower as expected.

Table 1. Economic thresholds for lygus bugs in canola at late flowering and early pod stages (Wise and Lamb 1998).

Control costs		Late flower to early pod (Canola crop stages 4.4-5.1[1])						
$/ac	$/ha	Economic Injury Level[2]						
$8.00	$19.77	8	6	5	4	4	3	3
$10.00	$24.71	10	8	7	6	5	4	4
$12.00	$29.65	12	9	8	7	6	5	5
$14.00	$34.59	14	11	9	8	7	6	5
$16.00	$39.54	16	13	10	9	8	7	6
$18.00	$44.48	18	14	12	10	9	8	7
$20.00	$49.42	20	16	13	11	10	9	8
Canola	**$/bu**	$8.00	$10.00	$12.00	$14.00	$16.00	$18.00	$20.00
value	**$/tonne**	$352.42	$440.53	$528.63	$616.74	$704.85	$792.95	$881.06

[1] Canola crop stage estimated using Harper and Berkenkamp 1975).

[2] Economic thresholds are based on an assumed loss of 0.1235 bu/ac per lygus bug caught in 10 sweeps (Wise and Lamb. 1998. The Canadian Entomologist. 130: 825-836).

Table 2. Economic thresholds for lygus bugs in canola at pod stage (Wise and Lamb 1998).

Control costs		Early pod (Canola crop stages 5.2[1])						
$/ac	$/ha	Economic Injury Level[3]						
$8.00	$19.77	11	9	7	6	5	5	4
$10.00	$24.71	14	11	9	8	7	6	5
$12.00	$29.65	16	13	11	9	8	7	7
$14.00	$34.59	19	15	13	11	10	9	8
$16.00	$39.54	22	18	15	13	11	10	9
$18.00	$44.48	25	20	16	14	12	11	10
$20.00	$49.42	27	22	18	16	14	12	11
Canola	**$/bu**	$8.00	$10.00	$12.00	$14.00	$16.00	$18.00	$20.00
value	**$/tonne**	$352.42	$440.53	$528.63	$616.74	$704.85	$792.95	$881.06

[3] Economic thresholds are based on an assumed loss of 0.0882 bu/ac per lygus bug caught in 10 sweeps (Wise and Lamb. 1998. The Canadian Entomologist. 130: 825-836).

Caution: If soil moisture levels and rainfall are high from bud formation through flowering, plants likely will be able to compensate for damage caused by lygus bug populations that are well above economic thresholds and control may not be necessary. If the plants are under moisture stress during this time they are less able to compensate for feeding injury. Spray using the economic thresholds above.

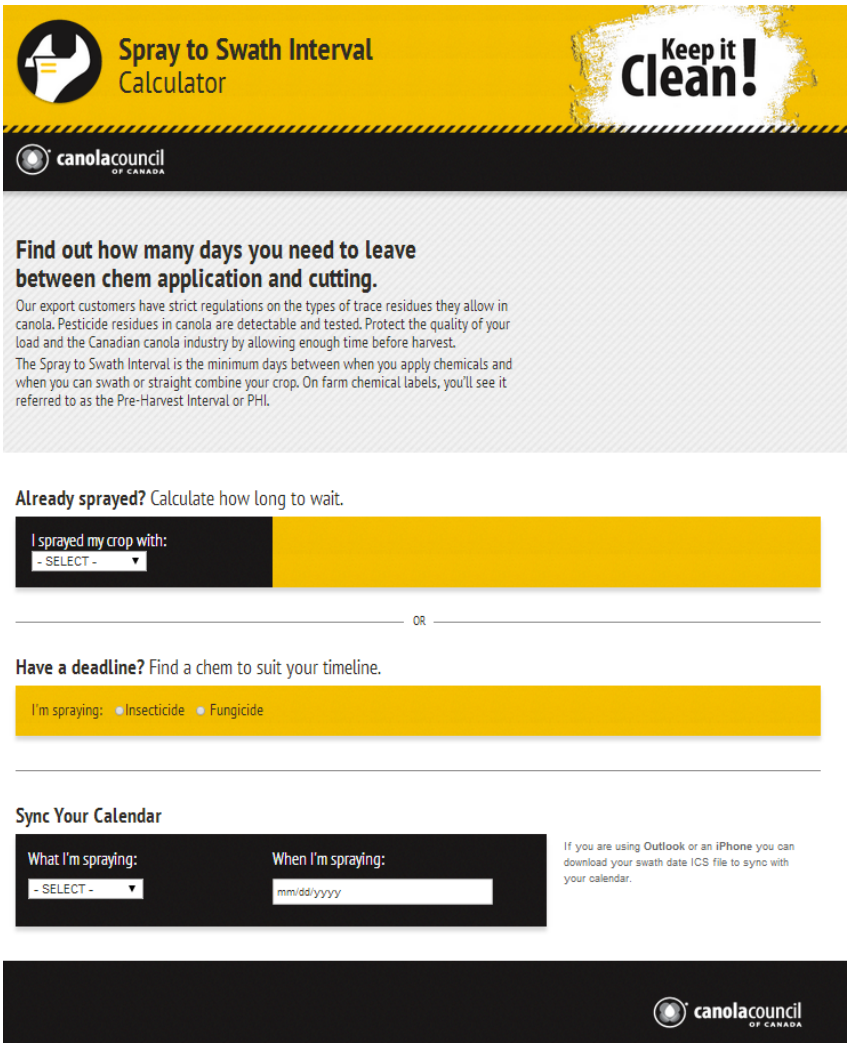
7. Crop Reports - The following provincial websites now have their Crop Reports posted so click the links to find their weekly updates:

- Manitoba's Crop Report: http://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-report-archive/index.html
- Saskatchewan's Crop Report: http://www.agriculture.gov.sk.ca/crop-report
- Alberta's Crop Report: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sdd4191

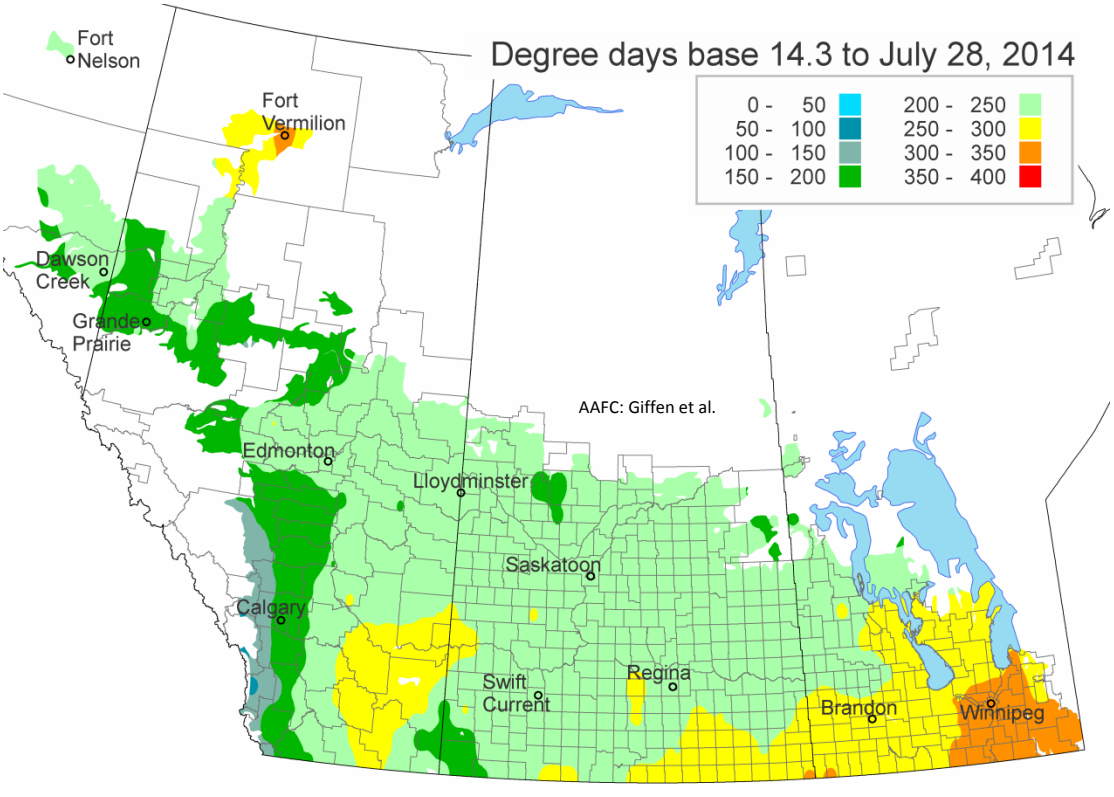
Link here to access the USDA's Weekly Weather and Crop Bulletin.

8. Pre-Harvest Intervals (PHI) – As our crops start to ripen, please remember to factor in the **PHI which is the minimum number of days between a pesticide application and swathing or straight combining of a crop**. The PHI recommends sufficient time for a pesticide to break down and a PHI-value is both crop- and pesticide-specific. Adhering to the PHI is important for a number of health-related reasons but also because Canada's export customers of canola strictly regulate and test for the presence of trace residues of pesticides.

In 2013, the Canola Council of Canada created and circulated their "Spray to Swath Interval Calculator" intended to help canola growers accurately estimate their PHI. Other PHI are described in your provincial crop protection guides and remember that crop x pesticide combinations will mean different PHIs. A screen shot of the webpage is included below for your reference.



9. West Nile Mosquito (*Culex tarsalis*) - The Public Health Agency of Canada posts information related to West Nile Virus in Canada and their website is located here. As of this week, zero birds have test positive for West Nile-related deaths based on birds submitted from British Columbia, Alberta, Saskatchewan or Manitoba (click here to view their reports). The regions most advanced in degree-day accumulations for *Culex tarsalis* are shown in the map below. Areas highlighted in red on the map below will have accumulated sufficient heat for *C. tarsalis* to fly. Late-July to mid-August is the time for DEET!



10. Questions or problems accessing the contents of this Weekly Update? Please e-mail or call either Owen.Olfert@agr.gc.ca (tel. 306-385-9355) or Jennifer.Otani@agr.gc.ca (tel. 780-354-5132). Past and present "Weekly Updates" are kindly posted to the Western Forum website by webmaster, Dr. Kelly Turkington. Please click here to link to that webpage.

11. Previous topics:

a. **Flea Beetles** (Chrysomelidae: *Phyllotreta* species) – Fact sheets for flea beetles in canola are posted by Manitoba Agriculture, Food and Rural Development, and Saskatchewan Agriculture. Helpful images produced by Dr. Julie Soroka (AAFC-Saskatoon) exemplifying percent of cotyledon leaf area consumed by flea beetles are posted at Canola Watch.

b. **Cutworms** (Noctuidae) – **Cutworm reports came out of central Alberta and Manitoba this past week**. Cutworm biology, species information, plus monitoring recommendations are available at the Prairie Pest Monitoring Network's Cutworm Monitoring Protocol. Also refer to these cutworm-specific fact sheets (Manitoba Agriculture, Food and Rural Initiatives, Alberta Agriculture, Food and Rural Development). Please also consider using the Alberta Pest Surveillance Network's "2014 Cutworm Reporting Tool" for online reporting located by clicking here. Data entered at that website uploads to a live online "Cutworm Map".

c. **Wind trajectories Related to Diamondback Moth (DBM) and Aster Leafhopper Introductions –** Completed for the season. Please refer to earlier Weekly Updates for details related to backward and forward trajectories associated with air parcels moving over western Canadian locations.

d. **Diamondback Moth (*Plutella xylostella*) –** Producers in Manitoba can find weekly DBM pheromone reports within Manitoba Agriculture and Rural Development's "Insect and Disease Updates" which can be accessed by linking here. Producers in Alberta can access Alberta Agriculture and Rural Development's DBM pheromone monitoring map which can be accessed by linking here.

e. **Pea Leaf Weevil (*Sitona lineatus*) –**Link here for the Pea leaf weevil monitoring protocol with photos of related weevils).

f. **Swede Midge (*Contarinia nasturtii*) –** Link here for the PPMN's swede midge monitoring protocol. The Ontario Canola Growers post swede midge information here and canola management recommendations for swede midge in Ontario are posted by Rebecca Hallett and Brian Hall.

g. **Cabbage seedpod weevil (*Ceutorhynchus obstrictus*)** – **Reminder:** Correct sampling methods by clicking here or you can link to either the Alberta or Saskatchewan fact sheets for detailed biological and pest management information including the economic threshold.

h. **Cereal Leaf Beetles (*Oulema melanopus*)** – Fact sheets for CLB are posted by Alberta Agriculture, Food and Rural Development, and BC Ministry of Agriculture, and the Prairie Pest Monitoring Network.

i. **Cereal leaf beetle biological control agent (*Tetrastichus julis*) -** The arthropod biological control agent **attacking the cereal leaf beetle**, is described in a **NEW Agriculture and Agri-Food fact sheet** which can be accessed by linking **here**. The fact sheet includes photos of the biological control agent with a CLB larva plus a parasitized CLB larva. If your scouting program finds the cereal leaf beetle in your field, contact provincial entomologists or Agriculture and Agri-Food Canada's Dr. Héctor Carcamo (hector.carcamo@agr.gc.ca), based at the Lethbridge Research Centre, to assess the need for establishing a *T. julis* biological control program.