Insect Pest Updates

Bertha Armyworm in Western Canada in 2021

M. Vankosky, O. Olfert, J. Gavloski, S. Barkley, J. Tansey, D. Giffen, J. Otani

Bertha armyworm (*Mamestra configurata*) is a generalist with multiple host plants but is particularly damaging to canola. The amount of damage associated with bertha armyworm larval feeding is dependent on several factors, including larval population density, larval stage, host plant type and stage, and temperature. To reduce the risk of damage, monitoring for bertha armyworm in canola should start within two weeks of peak trap catch in pheromone monitoring traps and continue until the crop is swathed or harvested. An economic threshold for bertha armyworm is available online from multiple sources and should be used to determine if and when fields need to be sprayed to prevent yield loss. Please refer to provincial Crop Production Guides for information about registered insecticides. In addition to insecticides, bertha armyworm populations can be controlled by abiotic factors (*e.g.*, unfavorable weather) and biotic factors (*e.g.*, parasitoids, predators, and disease). The effects of these natural factors result in cyclic outbreaks that have generally occurred on an 8 to 10 year cycle, on a regional basis. Localized outbreaks may also occur, where populations increase, peak, and decrease over a three year period. In the past, outbreaks in Alberta have followed outbreaks in Manitoba and Saskatchewan. The last extensive regional outbreak occurred in 1994-1996.

Populations of bertha armyworm are monitored annually across the prairie provinces using pheromone traps. The traps are maintained by volunteer growers and agronomists, and by provincial and federal entomologists. Provincial entomologists provide support and guidance to cooperators during the growing season and compile and share data within each province during the growing season (in near-real time). The protocol used to monitor bertha armyworm using pheromone traps was updated in spring 2019 and is available on the Prairie Pest Monitoring Network website (https://prairiepest.ca). The monitoring program is used as an early warning system to alert growers when regional population densities may be approaching economic thresholds. However, site-specific interpretation of trap counts is difficult because pheromone traps capture only male moths, while female moths decide where to lay eggs. In-field scouting for bertha armyworm larvae is required for accurate, local, population estimates (protocol available from https://prairiepest.ca).

Cumulative trap captures below 600 generally represent low risk to crop production. In 2021, the cumulative trap captures of male bertha armyworm were very low, with very few traps across the prairies capturing more than 600 moths (Figure 1). In Alberta, 337 traps were set up and only two trap locations recorded more than 300 total moths captured. One trap of 310 in Saskatchewan collected more than 400 moths and no traps (of 100 total) in Manitoba collected more than 300 moths. Overall, population densities of bertha armyworm were very low in 2021, and crop risk was also low as a result.

This survey is funded through the AgriScience Program as part of the Canadian Agricultural Partnership, a federal, provincial, territorial initiative. Funders include Agriculture & Agri-Food Canada, Western Grains Research Foundation, SaskWheat, Manitoba Crop Alliance, Alberta Wheat Commission, SaskPulse, Manitoba Canola Growers, Prairie Oat Growers Association, SaskCanola, and Manitoba Pulse & Soybean Growers. The network of pheromone traps was implemented and monitored by Alberta Agriculture, Forestry & Rural Economic Development, Saskatchewan Ministry of Agriculture, Manitoba Agriculture, and Agriculture & Agri-Food Canada (AAFC).

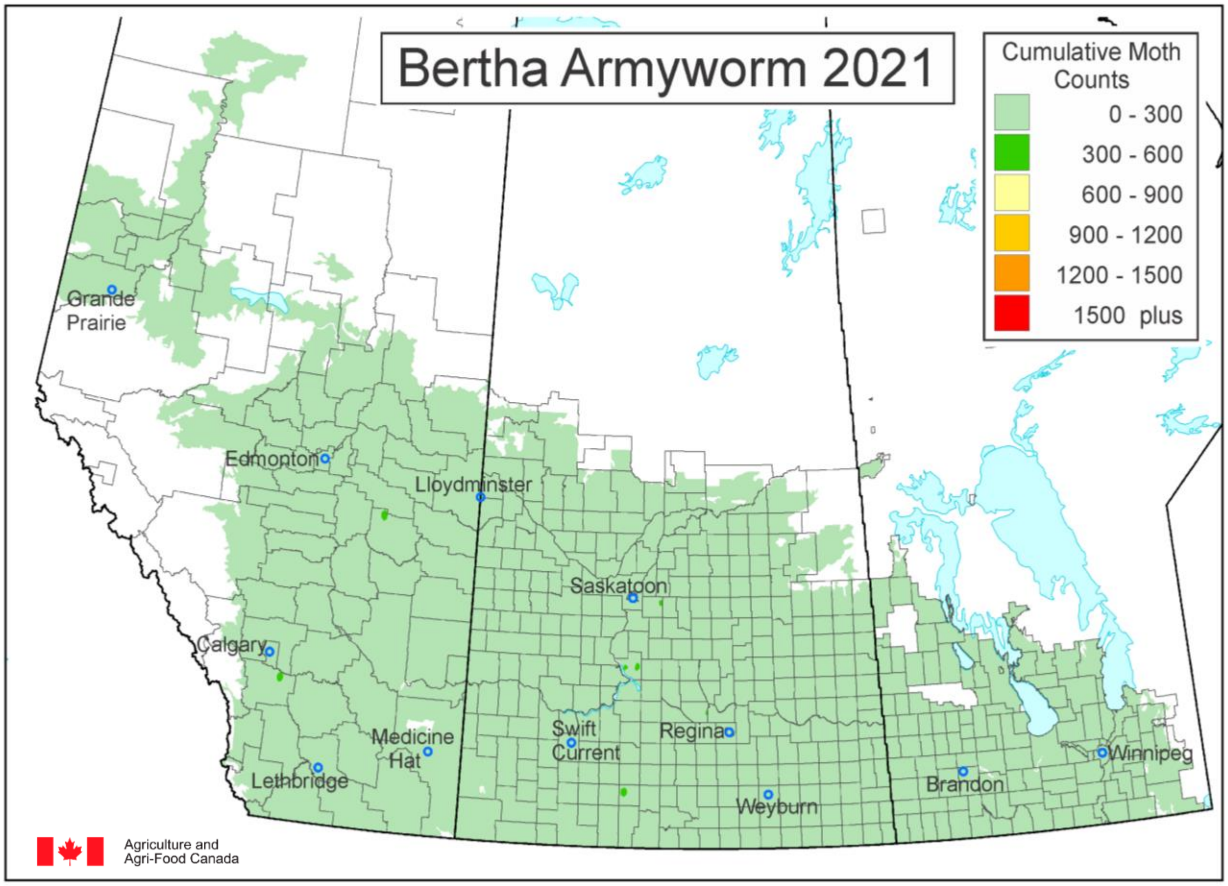

Figure 1. The cumulative trap catch of adult male bertha armyworm (*Mamestra configurata*) in pheromone-baited traps across the prairies in 2021 (map by David Giffen, AAFC-Saskatoon).

The 2021 Prairie Grasshopper Survey and 2022 Forecast

M. Vankosky, O. Olfert, J. Tansey, J. Gavloski, S. Barkley, D. Giffen, J. Otani

The grasshopper survey is conducted by estimating adult grasshopper densities in the late summer and early fall, usually in ditches alongside cereal fields. This survey estimates the number of adult grasshoppers capable of laying eggs before winter. The fall estimates can also predict future risk, where high densities in the fall predict higher levels of risk to crops in the next growing season. However, weather and biotic factors may increase or reduce risk during a given growing season. Factors that lead to increased grasshopper populations include warm and dry conditions in late summer and fall; these encourage mating, egg laying, and egg development. Warm and dry conditions in the spring increase the survival of grasshopper hatchlings and the risk of crop damage. Cool and wet growing conditions have negative effects on grasshopper development. Therefore, actual levels of infestation in field crops may differ from those predicted by the fall survey because of regional variation in weather conditions and the grasshopper species present.

Recent dry conditions across the southern prairies have been ideal for grasshoppers and localized population outbreaks were recorded in 2021 (Figure 2), associated with a few species of pest grasshoppers. Prairie farmers should be prepared to scout for grasshoppers in 2022, especially if weather conditions remain warmer and drier than normal.

Female grasshoppers tend to lay their eggs along field margins and in ditches. Thus, field margins, roadsides, and crops grown on cereal stubble should be watched closely when grasshopper hatching begins in the spring. The action threshold for most crops occurs when grasshopper populations reach 8-12 grasshoppers/m^2. The action threshold in lentils is much lower (>2 grasshoppers/m^2) at the flowering and pod stage, as grasshoppers cause direct yield loss at this plant stage. For example, two-striped grasshoppers feed preferentially on lentil pods, causing direct and significant yield loss at low population densities. If insecticides are applied to control grasshoppers (please refer to your provincial Crop Protection Guide for insecticide information), they should be applied to reduce their impact on beneficial insects (*e.g.*, pollinators, predatory beetles, and parasitoids of other insects) and on environmentally sensitive areas (*e.g.*, wetlands that provide other important ecosystem services).

A protocol for grasshopper scouting is available on the Prairie Pest Monitoring Network website (https://prairiepest.ca). The developmental and risk status of grasshopper populations across the Prairie region will be available from the provinces and from the Prairie Pest Monitoring Network as the 2022 growing season progresses.

This survey is funded through the AgriScience Program as part of the Canadian Agricultural Partnership, a federal, provincial, territorial initiative. Funders include Agriculture & Agri-Food Canada, Western Grains Research Foundation, SaskWheat, Manitoba Crop Alliance, Alberta Wheat Commission, SaskPulse, Manitoba Canola Growers, Prairie Oat Growers Association, SaskCanola, and Manitoba Pulse and Soybean Growers). The survey was implemented and conducted by Alberta Agriculture, Forestry & Rural Economic Development, Saskatchewan Ministry of Agriculture, Saskatchewan Crop Insurance Corporation, Manitoba Agriculture, and Agriculture & Agri-Food Canada (AAFC).

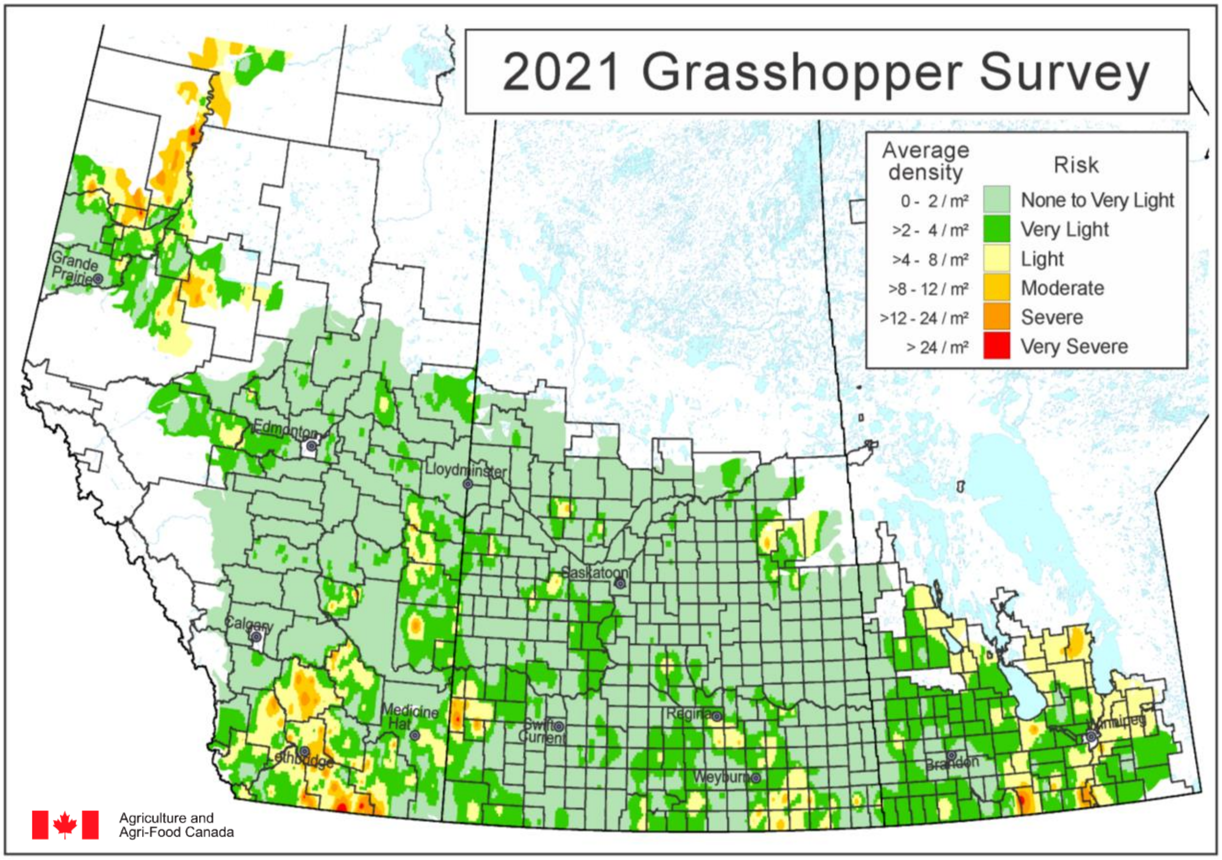

Figure 2. Estimated grasshopper population densities in fall 2021 and the risk associated with those densities in 2022, based on the life history of *Melanoplus sanguinipes* (migratory grasshopper) (map by David Giffen, AAFC-Saskatoon).

2021 Wheat Midge Survey in Saskatchewan and Alberta and Forecast for 2022

M. Vankosky, O. Olfert, S. Barkley, J. Tansey, D. Giffen, J. Otani

The risk of wheat midge (*Sitodiplosis mosellana*) infestation in 2022 was estimated based on the number of non-parasitized wheat midge larval cocoons in soil samples collected during the fall wheat midge survey conducted in 2021 (Figure 3). A number of factors in addition to parasitism influence the overwintering and developmental success of larval wheat midge. However, the forecast based on non-parasitized larvae provides a general picture of existing densities and the potential for damage in 2022. Weather conditions (especially precipitation levels) in spring 2022 will further influence the extent and timing of wheat midge emergence during the growing season. In spring 2022, the Prairie Pest Monitoring Network will use phenology models and weather conditions (precipitation and growing degree days) to model the expected emergence of wheat midge adults. Updates will be provided during the growing season in Weekly Updates (https://prairiepest.ca).

Based on the 2021 fall survey, relatively small areas are at risk of wheat midge infestation in 2022. At risk areas include portions of Beaver, Camrose, and Flagstaff counties in Alberta (Figure 3) and RMs 430, 464, and 494 (north and northeast of Saskatoon), and RMs 244 and 245 near Yorkton (Figure 3). These areas all had wheat midge cocoon densities of 600 midge/m^2 or greater during the survey in fall 2021, with some fields recording in excess of 1200 midge/m^2. In the majority of fields sampled, the density of wheat midge larval cocoons was less than 600 midge/m^2. The potential risk in 2022 is less than what was forecast in 2021, probably because of widespread hot, dry weather conditions during the 2021 growing season.

The risk of crop damage associated with wheat midge is expected to be relatively low in the Peace River Region in 2021, but care should be taken when interpreting the forecast for this part of Alberta because of developmental differences between Peace River wheat midge populations and populations in other parts of the prairies.

All areas where wheat midge are active during the growing season are susceptible to crop damage because wheat midge larval feeding affects grain yield and quality. Growers in all areas where wheat midge have occurred in the past should monitor their fields during the susceptible crop stage (*i.e.*, emergence of the wheat head from the boot until flowering) and when adult midge are active.

If adult midge density is equal to one midge per four or five wheat heads between emergence of the wheat heads and flowering (anthesis stage), insecticide application may be warranted. Please refer to provincial crop production guides for information about application and registered products. By the anthesis stage insecticides will not be cost effective as any larvae present will have already caused damage. Larvae that hatch from eggs laid late in or after the anthesis stage will not cause significant damage as the more mature wheat kernels are resistant to larval damage. Avoiding insecticide application after the anthesis stage will help protect populations of natural enemies in field crops, including parasitoids of wheat midge, and of other pests. Parasitism by a small parasitoid wasp (*Macroglenes penetrans*) can keep wheat midge populations from exceeding the economic threshold.

Surveys of wheat midge larval cocoons were conducted by Sharon Nowlan (SK) and by Alberta Agriculture, Forestry & Rural Economic Development. The survey was funded by Saskatchewan Crop Insurance Corporation, Saskatchewan Wheat Development Commission, and Alberta Agriculture, Forestry and Rural Economic Development. Prairie Pest Monitoring Network activity related to this survey was funded by the Canadian Agricultural Partnership.

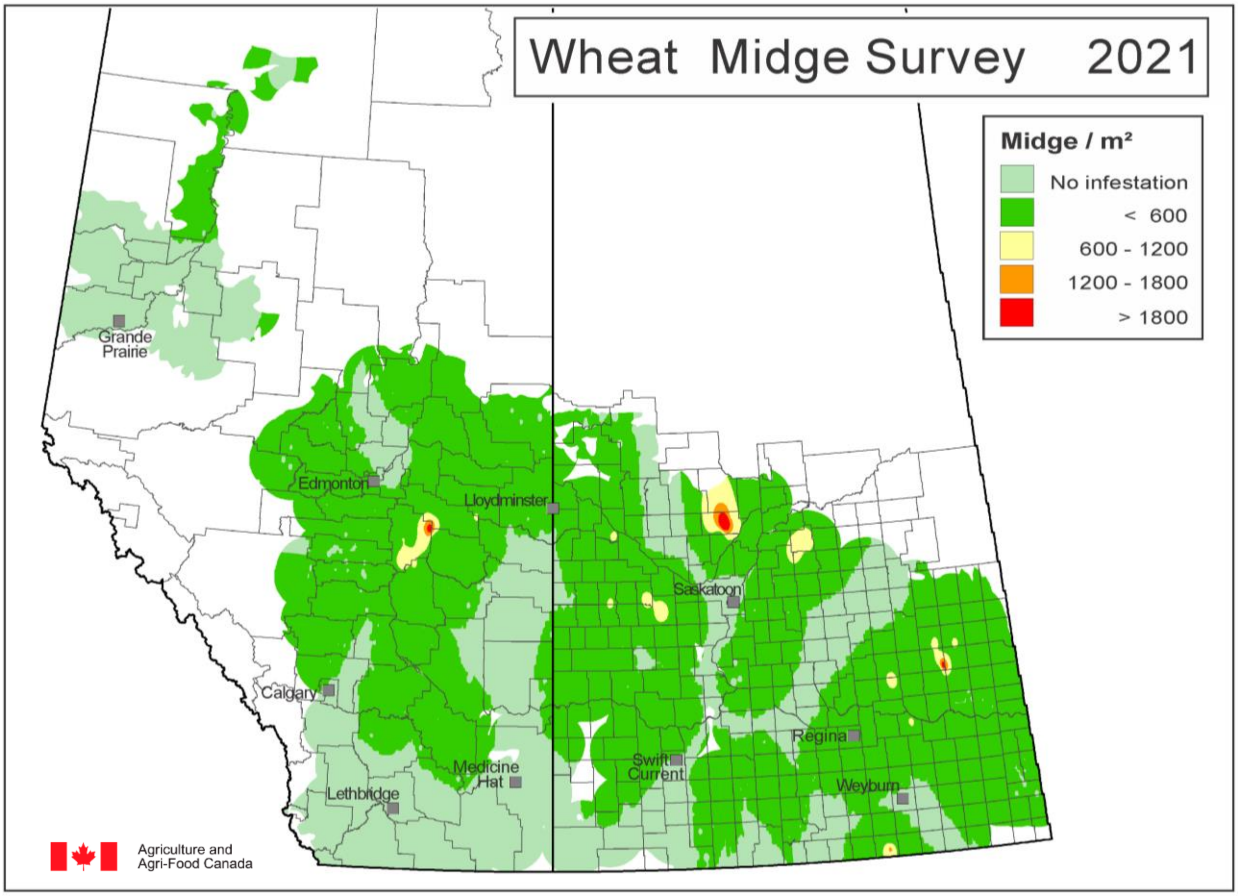

Figure 3. The densities of unparasitized wheat midge (*Sitodiplosis mosellana*) cocoons in soil samples collected in fall 2021 during the annual wheat midge survey. Risk of wheat midge infestation in 2022 is greatest in regions where wheat midge larval cocoon densities exceeded 600 midge/m^2 during the fall 2021 survey (map by David Giffen, AAFC-Saskatoon).

Cabbage Seedpod Weevil in Alberta and Saskatchewan in 2021

M. Vankosky, O. Olfert, S. Barkley, J. Tansey, D. Giffen, J. Otani

Populations of cabbage seedpod weevil (*Ceutorhynchus obstrictus*) were quite low north of Calgary in Alberta and Swift Current and Regina in Saskatchewan in 2021 (Figure 4), similar to past years. No cabbage seedpod weevils were found in sweep samples collected in the Peace River Region of Alberta or British Columbia, but populations are becoming established in north-central Alberta that could be source populations. The annual survey is important to document the geographic expansion of this pest. South of Highway 1, some fields had densities greater than 4 weevils per sweep (>90 weevils per 25 sweeps), especially in areas south of Lethbridge.

In 2021, Agriculture & Agri-Food Canada and the Saskatchewan Ministry of Agriculture surveyed fewer than normal fields, the survey was initiated later than normal, and crop development was ahead of schedule due to hot and dry growing conditions. Thus, there are some gaps in the area covered by the survey in 2021 as compared to previous years and the 2021 survey in Saskatchewan may have underestimated cabbage seedpod weevil densities.

Cabbage seedpod weevil is present in Manitoba, but in very low numbers.

Cabbage seedpod weevil damage their host crops when adult weevils feed on leaves, flowers, and buds (resulting in bud-blasting). Later in the growing season, adult feeding by new generation weevils can cause damage to the pods, which may cause pods to shatter during harvest. Larvae directly reduce yield by feeding on developing seeds inside pods. Once larval development is complete, the larvae chew exit holes in the pods before dropping to the soil to pupate. The exit holes are a source of indirect damage, as these increase the incidence of pod shatter and can facilitate secondary fungal infection of the pods. During the survey, fields of *Brassica napus*, *B. alba*, and *B. juncea* may have been surveyed, as all are suitable host crops.

To protect crops from cabbage seedpod weevil damage, monitor canola and brown mustard fields on a regular basis from the bud stage until the end of flowering. The protocol for monitoring cabbage seedpod weevil is available on the Prairie Pest Monitoring Network website (https://prairiepest.ca). Accurate monitoring requires that sweep samples be collected from multiple locations within a field, with accuracy increasing as the sample size increases. To avoid overestimation of weevil populations, sweep samples should be taken from the interior of the field. The nominal economic threshold for cabbage seedpod weevil is 2.5 to 4 adult weevils per sweep. Insecticides are registered for cabbage seedpod weevil; please refer to the most recent Crop Protection Guide for your province.

Surveys were conducted by Alberta Agriculture, Forestry & Rural Economic Development, Saskatchewan Ministry of Agriculture, and Agriculture & Agri-Food Canada (AAFC). This survey is funded through the AgriScience Program as part of the Canadian Agricultural Partnership, a federal, provincial, territorial initiative. Funders include Agriculture & Agri-Food Canada, Western Grains Research Foundation, SaskWheat, Manitoba Crop Alliance, Alberta Wheat Commission, SaskPulse, Manitoba Canola Growers, Prairie Oat Growers Association, SaskCanola, and Manitoba Pulse & Soybean Growers).

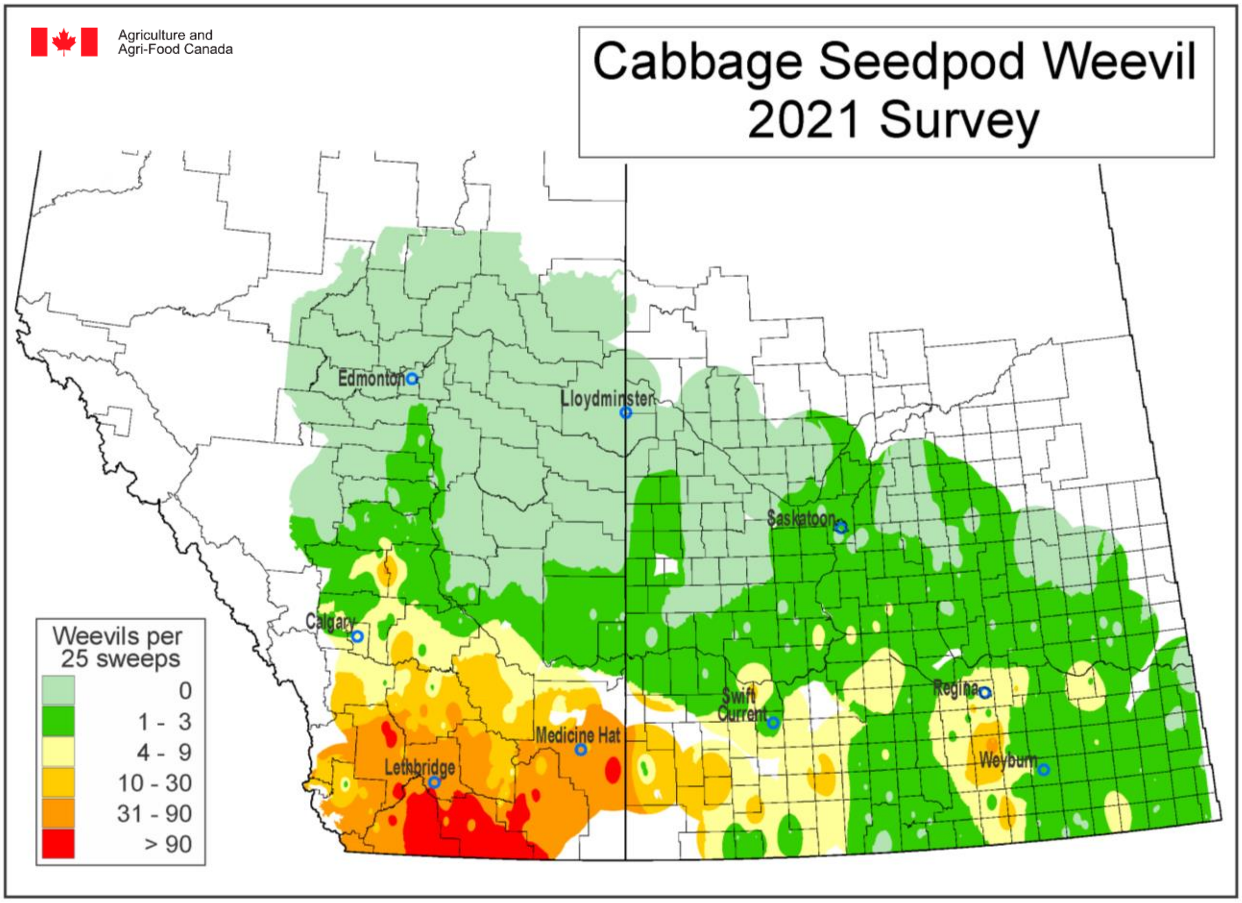

Figure 4. Cabbage seedpod weevil (*Ceutorhynchus obstrictus*) distribution in Saskatchewan and Alberta based on a sweep net survey conducted in randomly selected *Brassica* sp. fields in 2021. Note that the survey in Saskatchewan was initiated at least a week later than the survey in Alberta. Because the survey was initiated later than normal and canola development was ahead of schedule due to the weather, cabbage seedpod weevil densities in Saskatchewan may have been underestimated. (Map by David Giffen, AAFC-Saskatoon).

Distribution of Wheat Stem Sawfly in Alberta in 2021

M. Vankosky, S. Barkely, D. Giffen, O. Olfert

Wheat stem sawfly (*Cephus cinctus*) was surveyed in southern Alberta in 2021 by counting the number of stems cut by wheat stem sawfly larvae along the edges of wheat fields (Figure 5). Fields ranged in damage severity levels from very low to high. Many field sampled had 2-10% of stems cut (low damage severity), especially in the counties of Vulcan, Willow Creek, and Cypress. Some fields with high damage severity were surveyed in the counties of Warner and Forty Mile and Special Area No. 3 (>25% of stems cut; Figure 5). Although the areas with the highest population densities have shifted slightly between years, sawfly populations continue to increase compared to population densities observed between 2011 and 2017. Hot and dry weather conditions may contribute to decreased parasitism rates and sawfly population growth. *Bracon cephi* is the primary parasitoid of wheat stem sawfly. In hot and dry years, wheat plants mature early, limiting *B. cephi* to one generation, which results in reduced parasitism rates. In normal growing seasons, *B. cephi* can have two generations per year and parasitism rates are higher, allowing *B. cephi* to exert more control over wheat stem sawfly populations.

Wheat stem sawfly is native to the prairies, but is considered a pest when it attacks cereal crops such as wheat. Populations of wheat stem sawfly increased quickly as wheat gained in popularity; solid stem wheat varieties have been integral in maintaining wheat as a profitable crop and reducing wheat stem sawfly pest pressure. Adult wheat stem sawflies are weak fliers; their dispersal improves in warm, calm, sunny weather conditions following spring rains. Very wet conditions hinder population growth, as does parasitism. Cultivated cereals including spring wheat and durum wheat are preferred hosts of wheat stem sawfly. They can also utilize other cereal grasses as developmental hosts, but pose no threat to broadleaf crops.

Damage resulting from sawfly feeding and development inside the stem contributes to economic losses via reduced yield, reduced quality, and reduced ability to harvest the crop when plants lodge before they can be swathed or combined. Because sawflies tend to be weak fliers, damage levels are often highest along the field margins. However, studies have shown that adult sawflies are not confined to the crop edges and may be more prevalent within 20 m of the crop edge. When entire fields are affected, damage levels greater than 50% have been recorded. No insecticides are registered for management of wheat stem sawfly. Management tactics rely on cultural and agronomic practices, as well as biological control. Resistant cultivars with solid stems are the most effective management option in areas where wheat stem sawfly occur consistently. Producers are generally advised to consider alternative crops or preventative strategies when damage levels in the previous year’s crop range from 10 to 15%.

The survey was coordinated and conducted by Alberta Agriculture, Forestry & Rural Economic Development and their partners.

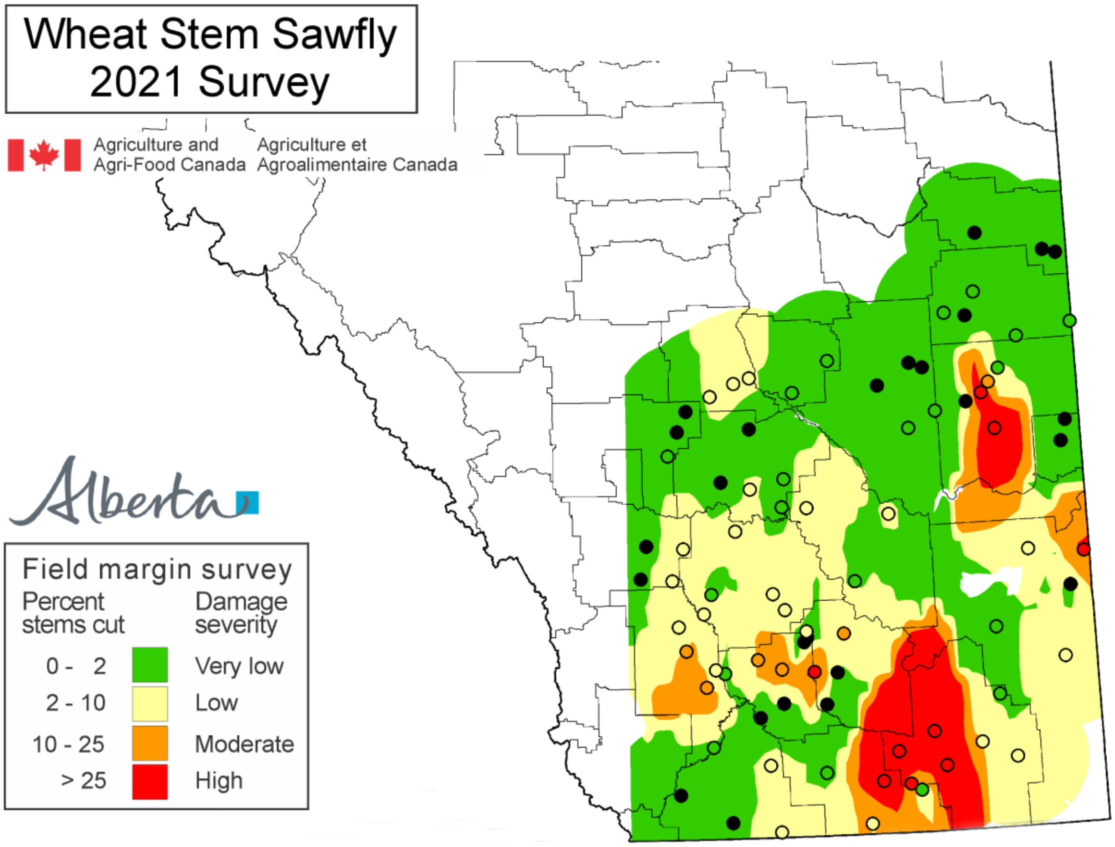

Figure 5. Wheat stem sawfly (*Cephus cinctus*) distribution in Alberta in 2021 based on results of a survey of cut stems in wheat fields counted after harvest (map by David Giffen, AAFC-Saskatoon).

Distribution of Pea Leaf Weevil in Saskatchewan and Alberta in 2020

M. Vankosky, J. Tansey, S. Barkley, D. Giffen, O. Olfert

The pea leaf weevil (*Sitona lineatus*) is an invasive insect. Its primary hosts are field pea and faba bean, which can be damaged by adults feeding on foliage and by larvae feeding on the root nodules. Secondary hosts of pea leaf weevil include alfalfa, clover, and chickpea, but these plants are only affected by adult foliage feeding. The pea leaf weevil was first detected on the prairies near Lethbridge in the late 1990s, in southern Saskatchewan in 2007, and in Manitoba in 2019. Adult pea leaf weevils consume the foliage of field pea and faba bean plants, beginning in the spring, resulting in ‘u’ shaped notches along the margins of the leaves. The survey is conducted annually in the spring when field pea plants range in size between two and six pairs of leaves by counting the number of feeding notches. The number of notches is used to estimate population density, based on the expectation that increasing levels of damage are indicative of increasing population density. The monitoring protocol is available online from https://prairiepest.ca.

Since becoming established, the range of pea leaf weevil in western Canada has expanded east and north. The pea leaf weevil was confirmed in the Peace River Region a few years ago, and evidence of its presence (in low densities) was observed throughout the region in 2021 (Figure 6). After detection in Manitoba in 2019, some pheromone traps were set up in the Swan River Valley in 2021, but a survey of spring damage to pea seedlings was not conducted.

Pea leaf weevil populations in Saskatchewan were quite low again in 2021 (Figure 6), similar to observations from the survey in 2019 and 2020. Some fields in southwestern and eastern Saskatchewan had an average of one to nine notches per plant.

In Alberta, weevil populations were concentrated around Lethbridge in the south and Edmonton in the central part of the province in 2021 (Figure 6). Populations in both areas were fairly low, with the damage in surveyed fields ranging from 1-27 notches per plant. The Edmonton area has been wetter than other parts of the prairies in the past few years, which could contribute to the health of weevil populations in that area.

Insecticides (foliar and systemic) have been registered for management of the pea leaf weevil; growers should consult Crop Production Guides for up-to-date information about registered products. Results of insecticide trials indicate that systemic insecticides are more effective than foliar insecticides for managing pea leaf weevil damage in field pea crops. The use of systemic insecticides could be made more efficient with an accurate forecast of pea leaf weevil densities between growing seasons. This is a focus of ongoing research.

The pea leaf weevil survey was conducted by Alberta Agriculture, Forestry & Rural Economic Development, the Saskatchewan Ministry of Agriculture, and Agriculture & Agri-Food Canada (AAFC). This survey is funded through the AgriScience Program as part of the Canadian Agricultural Partnership, a federal, provincial, territorial initiative. Funders include AAFC, Western Grains Research Foundation, SaskWheat, Manitoba Crop Alliance, Alberta Wheat Commission, SaskPulse, Manitoba Canola Growers, Prairie Oat Growers Association, SaskCanola, and Manitoba Pulse & Soybean Growers.

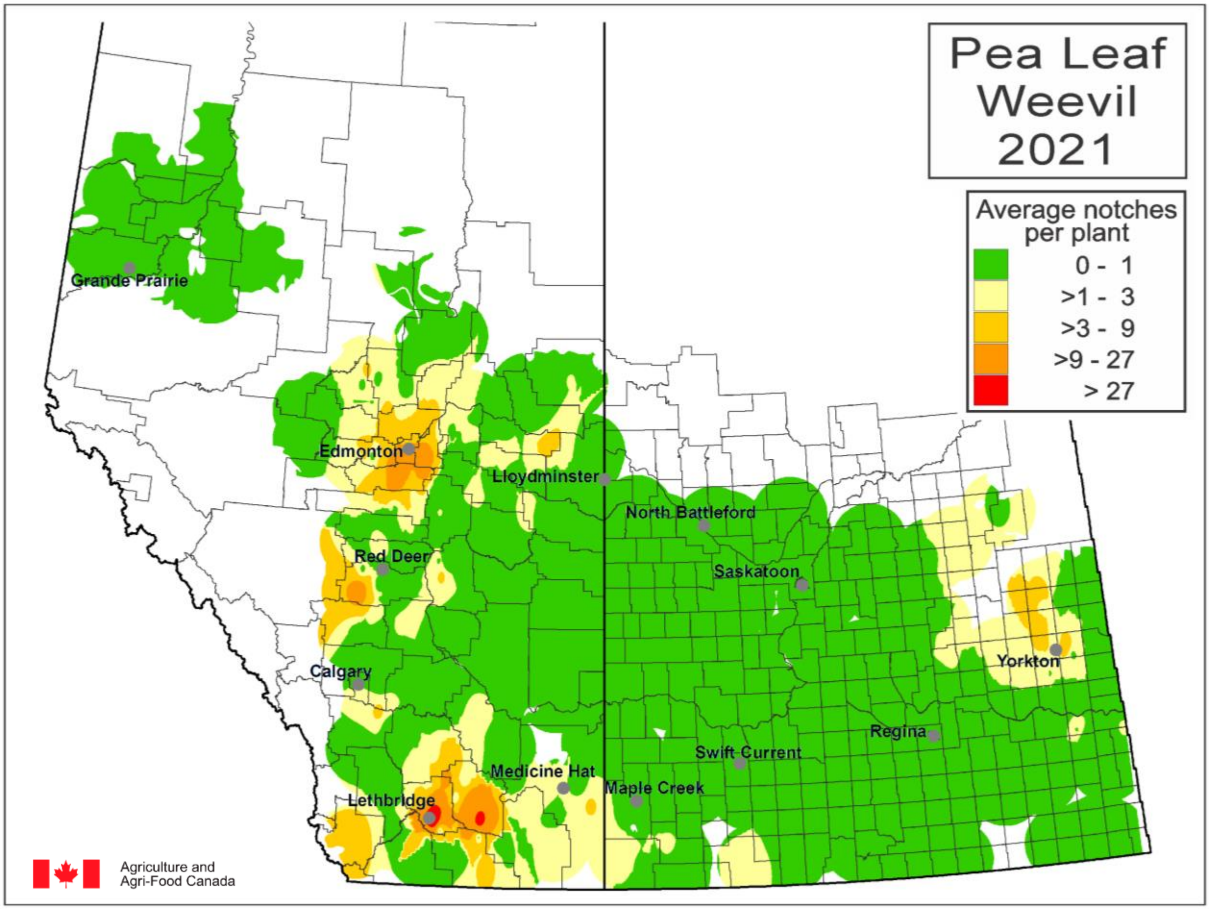

Figure 6. The distribution of pea leaf weevil (*Sitona lineatus*) in Alberta and Saskatchewan in 2021, based on a plant damage survey conducted in the spring in randomly selected field pea crops (map by David Giffen, AAFC-Saskatoon).