

Chapter 19

Agriculture—Mitigating the Impact of Regulated Pests in Crops and Pastures

1.0 MAIN POINTS

Saskatchewan accounts for almost half of Canada’s total field crop acreage.

Laws make producers or landowners responsible for controlling identified regulated pests.¹

A regulated pest is an animal, insect, or disease that the Ministry of Agriculture declares as a pest. As of July 2020, the Ministry had declared six regulated pests. It is responsible for mitigating the impact of those pests in crops and pastures.

For the twelve-month period ending July 31, 2020, the Ministry of Agriculture had, other than in the areas noted below, effective processes to mitigate the impact of regulated pests in crops and pastures. The Ministry needs to:

- Proactively provide producers with guidance about detecting and reporting the presence of two pests—late blight and bacterial ring rot, and on developing response plans for four pests—grasshoppers, late blight, bacterial ring rot, and brown or Norway rat.

Early detection and timely, appropriate response plans are key to controlling regulated pests and reducing their impact on crops and pastures even when the pest has not been detected in the province for several years.

- Make sure laboratory results confirming presence of clubroot are communicated to producers promptly. Clubroot damages canola crops, and spreads quickly. Canola is Saskatchewan’s leading crop in 2020.
- Revisit how it will conduct surveillance to determine populations of Richardson’s ground squirrel (gophers) given the Federal Government’s 2020 decision to deregister the use of strychnine effective 2023, and its use of strychnine sales to estimate gopher populations. Strychnine is regularly used in Saskatchewan to control gopher populations.
- Periodically report to senior management on the sufficiency of its mitigation of regulated pests.

Effectively mitigating the impact of regulated pests helps avoid them having a significant adverse impact on the yields and quality of crops. In 2018, the value of provincial agriculture and food exports was almost \$13.5 billion with value-added revenue estimated at \$5.2 billion.^{2,3}

¹ *The Pest Control Act*, ss. 3, 5.

² pubsaskdev.blob.core.windows.net/pubsask-prod/83874/Agriculture%252BStatistics%252BPocket%252BReference.pdf (20 October 2020)

³ Ministry of Agriculture, *Annual Report for 2018–19*, p. 8.



2.0 INTRODUCTION

This chapter presents the results of our audit of the Ministry of Agriculture's processes to mitigate the impact of regulated pests in crops and pastures.

A pest is any animal, insect, or disease deemed to be destructive of or dangerous to any crop, grain, livestock, or other property.⁴

2.1 Background

The regulation and control of regulated pests is a shared responsibility between the Provincial and Federal governments.

Provincial laws make the Ministry of Agriculture responsible for promoting the agricultural or agri-food interests of the province.⁵ Under *The Pest Control Act*, the Minister of Agriculture may declare any animal, insect, or disease deemed as likely to be destructive or dangerous to any crop, grain, livestock or other property to be a pest.⁶

The Pest Control Act also makes the producer or landowner responsible for controlling identified regulated pests (see **Figure 1**).

Figure 1—Responsibility of Producers

Every person shall take measures to destroy any crop, vegetation, vegetable or other matter on any land or other premises owned, occupied or controlled by them that may contribute to the spread of any pest. By law, whenever a pest appears in a municipality or whenever the council of a municipality is of opinion that a pest is likely to appear in the municipality, the council may pass a bylaw providing for the purchase of materials required for the control or destruction of the pest within the municipality.

Source: *The Pest Control Act*, s.5.

The Ministry makes its Crops and Irrigation Branch primarily responsible for coordinating Ministry pest programs in conjunction with its other assigned duties. The Branch has about 42 staff, of which eight staff have a direct role in pest surveillance, extension or diagnostics. In 2019–20, the Ministry budgeted expenses of \$390 million (2019–20 actual: \$388 million), with about \$1.1 million budgeted for pest management under the Crops and Irrigation Branch.⁷

Federal laws make federal agencies responsible for regulating federally declared pests, and the availability and use of pest control products. For example, *The Seed Act* makes the Canadian Food Inspection Agency responsible for regulating bacterial ring rot among potato seed producers.^{8,9} *The Pest Control Products Act (Canada)* makes Health Canada responsible for regulating the use of pest control products with an aim to prevent unacceptable risks to individuals and the environment from the use of pest control products.¹⁰

⁴ *The Pest Control Act*, s. 3.

⁵ *The Agriculture Administration Act*, s. 6.

⁶ *The Pest Control Act*, s. 3 requires the Minister to use regulations to make declarations.

⁷ *Ministry of Agriculture Annual Report 2019-20*, pp. 16 and 17 for Ministry-budgeted expenses and information provided by the Crops and Irrigation Branch at the Ministry of Agriculture on the Pest management budgeted expenses (June 10, 2020).

⁸ The Canadian Food Inspection Agency is responsible for inspections (identification of potato lots or crops, sampling, testing and notification requirements) and documentation when the presence of bacterial ring rot is confirmed on a seed potato farm unit or when notification of an interception from foreign plant protection officials has been received. If found on a seed farm, the entire farm is decertified, and the crop must be sold as table or processing stock. The *Seed Act*, s.6 (1) (e) (Canada) provides authority to enter and remove seed or anything for the purpose of examination, conducting tests or taking samples of seeds.

⁹ The Ministry is responsible for regulating bacterial ring rot among table producers who grow potatoes primarily for consumption. Seed producers grow potatoes for other producers' use as seed.

¹⁰ laws-lois.justice.gc.ca/eng/acts/p-9_01/page-2.html#docCont (13 October 2020).

2.2 Regulated Pests in Saskatchewan

At July 2020, the Minister of Agriculture had declared the following as pests (regulated pests): brown or Norway rat, Richardson's ground squirrel (certain gophers), grasshoppers, clubroot, late blight, and bacterial ring rot.^{11,12} As described in **Figure 2**, these pests can cause significant damage or ruin crops including canola, cereal and pulse crops, potatoes, and stored grain leading to financial loss for the agricultural sector. They can also destroy the habitat of other organisms, including pastures (i.e. native grasses).

Figure 2—Summary of Regulated Pests in Saskatchewan

Regulated Pest	Potential Risk	Crops at Risk	Presence in Saskatchewan
Clubroot	A soil-borne disease that affects the roots of host plants, reduces the plants' ability to absorb water and nutrients, leading to stunting, wilting, yellowing, premature ripening, and shrivelling of seeds. ^A Clubroot can cause significant yield loss, up to 50% or greater, in canola and other susceptible crops, such as mustard and camelina, in the province.	Canola	Confirmed visible symptoms of clubroot in 51 canola fields in Saskatchewan as of January 2020, cumulative from 2008 to 2019. ^B Section 6.0 shows the 2020 updated clubroot distribution map of clubroot severity, and its spread by location in the province
Grasshoppers (adult)	Under ideal food and weather conditions, grasshoppers multiply quickly, and when present in large numbers cause severe crop damage. A moderate infestation of 10 grasshoppers per square metre can consume 16-60% of the available plants eaten by grazing livestock. ^C	Cereal crops, lentil, flax and pastures	Section 7.0 shows the 2020 grasshoppers forecast map including counts and infestation (risk levels) by location in the province
Richardson's Ground Squirrel (commonly known as gophers)	Each year, a single gopher can excavate about a ton of earth producing 30 to 50 mounds. Mounds damage vegetation and create rough terrain causing equipment damage to farm machinery. An average gopher population (of 50 gophers per hectare or 20 per acre) can consume about 1.8 kg (4 lbs) of vegetation per day. ^D	Pastures, native grasses, legumes, cereal, pulse, and canola crops	Infestations exists in Saskatchewan's south and west, and most severely in areas experiencing dry conditions each year
Late Blight	A fungus that infects and destroys the leaves, stems, fruits, and tubers of plants. If producers plant infected seed potatoes, late blight will likely be present on the emerging plants. Plants may die within days of being infected. ^E Late blight can become airborne, and spreads quickly potentially destroying entire fields in a short period if left unmanaged.	Potatoes and tomatoes	No known occurrences since 2010
Bacterial Ring Rot	A very infectious bacterial disease, symptoms include wilted stems, leaf rolling and early death of the plant. Tuber infection involves rotting of the vascular ring and rough skin cracks on the exterior of the tuber. At times, few or no symptoms are apparent. ^F	Potatoes	No known occurrences since 2012

¹¹ *The Pest Declaration Regulations, s. 2; The Bacterial Ring Rot Control Regulations; The Late Blight Control Regulations.*

¹² There are many species of gophers, Richardson's ground squirrel are one species and are commonly referred to as gophers.



Regulated Pest	Potential Risk	Crops at Risk	Presence in Saskatchewan
	Bacterial ring rot spreads primarily through use of contaminated tubers and storage and handling equipment.		
Brown or Norway Rat	Transmits diseases, contaminates grains with its urine and feces, and causes damage to building structures including crop storage facilities (insulation, electrical wires, pipes) through gnawing and tunneling. It eats about 10% of its weight per day (20 to 40 lbs per year). ^G	Stored crops, especially grains	Infestations exists throughout the province

^A Saskatchewan Clubroot Initiative. (July 2018), Clubroot Management Plan. Retrieved from: www.saskcanola.com/production/clubroot.php (08 October 2020).

^B pubsaskdev.blob.core.windows.net/pubsask-prod/116394/Agriview%252B-%252BApril%252B2020.pdf (08 October 2020).

^C www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/crops-and-irrigation/insects/grasshoppers (08 October 2020).

^D www.agr.gc.ca/eng/agriculture-and-climate/agricultural-practices/agroforestry/diseases-and-pests/pocket-gophers/?id=1198881854578 (08 October 2020).

^E www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/crops-and-irrigation/disease/late-blight-in-potato-and-tomato-gardens (22 October 2020).

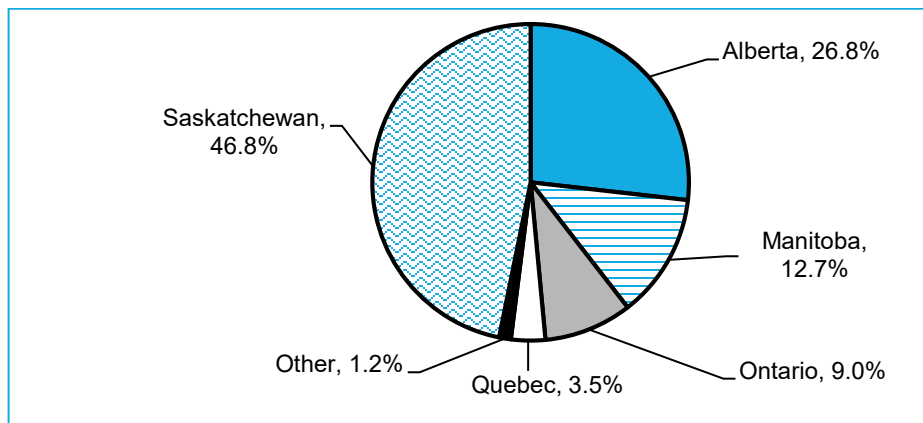
^F www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/crops-and-irrigation/horticultural-crops/potatoes (08 October 2020).

^G fieldcropnews.com/wp-content/uploads/2012/06/Rat-Control-revised-Sep-09_SASK_Gov.pdf (08 October 2020). *Saskatchewan Clubroot Surveillance Plan, 2018*, p.1.

Agriculture remains a significant portion of Saskatchewan's economy. In 2018, the value of Saskatchewan agriculture and food exports was almost \$13.5 billion.¹³ Also in 2018, Saskatchewan's value-added revenue from food and beverage processing and biofuel manufacturing increased to an estimated \$5.2 billion (13% increase from 2016).¹⁴

Saskatchewan accounts for almost half of Canada's total field crop acreage. As shown in **Figure 3** in 2016, Saskatchewan accounted for more than two-fifths of Canada's total field crop acreage with 36.7 million acres, more than Alberta and Manitoba combined.¹⁵ Over the last six years, crop production averaged 35 million tonnes.

Figure 3—Provincial Distribution of Total Field Crop Area, 2016



Source: Statistics Canada (2017), Census of Agriculture (3438), *Saskatchewan Remains the Breadbasket for Canada*.
Note: Totals may not equal 100% due to rounding.

¹³ pubsaskdev.blob.core.windows.net/pubsask-prod/83874/Agriculture%252BStatistics%252BPocket%252BReference.pdf (09 October 2020)

¹⁴ Ministry of Agriculture, *Annual Report for 2018–19*, p. 8.

¹⁵ Statistics Canada (May 2017). Saskatchewan Remains the Breadbasket of Canada, p. 3. www150.statcan.gc.ca/n1/pub/95-640-x/2016001/article/14807-eng.pdf (8 January 2020). **Figure 3** data is based on the 2016 Census of Agriculture conducted every five years (next census in 2021). Largest field crops by acreage covered in 2016 Census included canola, spring wheat, barley, soy beans, and durum wheat (www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2017012-eng.htm) (09 October 2020). Total field crop area in **Figure 3** covers total cropland under field crops (in millions of acres).

Saskatchewan producers typically seed almost all of Saskatchewan’s cropland into field crops with the majority of acreage seeded with canola and spring wheat. For example, field crops made up almost 91% of the total cropland seeded in Saskatchewan in 2016. Canola was Saskatchewan’s leading field crop in 2020. Farmers reported planting 11.3 million acres in 2020, down 1.8% from 2019.

Ineffective processes to mitigate the impact of regulated pests increases the likelihood of these pests having a significant adverse impact on the yields and quality of crops. Lower crop production and lower quality crops result in lost revenues to producers, and others reliant on the agricultural sector (e.g., grain buyers, farm equipment dealers and suppliers). This in turn can result in possible loss of jobs—both directly and indirectly—reduction of tax revenue, and increased costs for agricultural risk management programs (e.g., Crop Insurance programs).

3.0 AUDIT CONCLUSION

The Ministry of Agriculture had, other than the following areas, effective processes to mitigate the impact of regulated pests in crops and pastures in Saskatchewan for the 12-month period ended July 31, 2020.

The Ministry needs to:

- **Proactively provide producers with written guidance about detecting and reporting the presence of late blight and bacterial ring rot**
- **Make sure laboratory results confirming clubroot presence are communicated to producers promptly**
- **Provide producers with written guidance on developing response plans for regulated pests including grasshoppers, late blight, bacterial ring rot, and brown or Norway rat**
- **Periodically report to senior management on the sufficiency of mitigation of regulated pests including Richardson’s ground squirrel, late blight, bacterial ring rot, and brown or Norway rat**
- **Revisit how it will conduct surveillance to determine populations of Richardson’s ground squirrel**

Figure 4—Audit Objective, Criteria, and Approach

Audit Objective: The objective of this audit is to assess whether the Ministry of Agriculture had, for the 12 month period ending July 31, 2020, effective processes to mitigate the impact of regulated pests in crops and pastures in Saskatchewan.

Audit Criteria:

Processes to:

1. **Systematically prevent and detect the risk of pests in crops and pastures**
 - 1.1 Prioritize threats of occurrence of new or existing regulated pests in crops and pastures
 - 1.2 Develop action plans with key parties (Health, Environment, Saskatchewan Association of Rural Municipalities (SARM) and other parties [e.g., farmers, land owners]) for prevention and early detection of regulated pests
 - 1.3 Increase awareness on pest prevention and detection techniques, response, and pest reporting responsibilities



2. **Promptly respond to incidents of regulated pests in crops and pastures**
 - 2.1 Use appropriate tactics (e.g., pest surveillance, field inspections, annual surveys [e.g., detection]) to investigate presence of pests in crops and pastures
 - 2.2 Structure prompt response to minimize the risk of pest spread
 - 2.3 Assess if actions taken minimize risk of pests and resulting damage

Audit Approach:

To conduct this audit, we followed the standards for assurance engagements published in the *CPA Canada Handbook—Assurance* (CSAE 3001). To evaluate the Ministry's processes, we used the above criteria based on our related work, reviews of literature including reports of other auditors, and consultation with management. The Ministry agreed with the above criteria.

We examined the Ministry's policies, procedures, IT systems, reports, and other records relating to mitigating the impact of regulated pests in crops and pastures located in Saskatchewan. We interviewed key staff responsible for oversight of the six regulated pests. We also tested samples of Clubroot results and agreements (response plans). We assessed the Ministry's tactics (e.g., annual surveys, field inspections) to mitigate clubroot, grasshoppers, Richardson's ground squirrel, late blight, bacterial ring rot, and brown or Norway rat against good practices. In addition, we used an objective consultant with applicable subject matter expertise to help us identify good practice, and assess Ministry practices.

4.0 KEY FINDINGS AND RECOMMENDATIONS

4.1 Collaborates with Stakeholders on Mitigating Regulated Pests

The Ministry of Agriculture routinely collaborates with key stakeholders on pest prevention and management through creating plans, education, awareness and good practices for regulated pests.

Key stakeholders include federal and provincial counterparts as well as SARM, Saskatchewan Crop Insurance Corporation, Agri-Food Canada, SaskCanola, Saskatchewan Vegetable Growers Association, Saskatchewan Seed Potato Growers Association, producers, and landowners.

To keep abreast of best practices, the Ministry participates in inter-jurisdictional meetings on pest prevention and control through the Canadian Plant Health Council.¹⁶ Key members include: federal agencies like the Canadian Food Inspection Agency and Agri-Food Canada, provincial representatives like Manitoba Ministry of Agriculture, and industry associations like Association of Canadian Faculties of Agriculture and Veterinary Medicine.¹⁷

The Council's subcommittee meets twice a year (i.e., spring and fall).

We found the last meeting took place on December 6, 2019. The subcommittee discussed best practices, prevention strategies, and protocol harmonization of pest surveillance across Canada. The spring 2020 meeting did not take place due to the declaration of the COVID-19 pandemic in March 2020. The Ministry expects the next meeting to take place in October 2020.

¹⁶ The Canadian Plant Health Council mandate includes enabling cooperation across government, industry, academia and other stakeholders. The Council uses subcommittees (e.g., Pest Surveillance Community of Practice) to assist in achieving this goal.

¹⁷ Members of the Inter-Jurisdiction (Canadian Plant Health Council) meetings include; the Canadian Food Inspection Agency, Canadian Forest Service, Agri-Food Canada, Ontario Ministry of Agriculture, Food and Rural Affairs, Manitoba Ministry of Agriculture, Alberta Ministry of Agriculture and Forestry, Association of Canadian Faculties of Agriculture and Veterinary Medicine, Canadian Horticultural Council, Canada Wood Group, CropLife Canada and Canada Grains Council.

The Ministry also uses formal agreements with key stakeholders to support various programs and initiatives to prevent, detect and control regulated pests. At July 2020, the following agreements were in effect:

- The *Canadian Agriculture Partnership Bilateral Agreement* with Government of Canada. The Agreement gives Saskatchewan access to federal funding for activities related to the agricultural sector including those related to mitigating and controlling plant pests. It is a five-year agreement in effect until March 31, 2023.
- An agreement with SARM. The Agreement gives SARM responsibility for administering several Saskatchewan Pest Biosecurity Programs in return for funding from the Ministry of about \$9 million over three years.

Programs under this Agreement related to regulated pests include the Rat Control Program and the Plant Health Network.

Key activities include educating and training producers and rural municipalities on managing and controlling pests, and using qualified personnel to support regular pest surveillance activities like inspections. This agreement falls under the *Canada-Saskatchewan Agriculture Partnership Bilateral Agreement* and is in effect from April 4, 2020 to March 31, 2023.

- An information-sharing agreement with the Saskatchewan Crop Insurance Corporation. The agreement gives the Ministry annual access to legal land descriptions for land planted with specific crops (e.g., canola, lentils) to assist in pest surveillance activities such as annual surveys for clubroot and grasshoppers. The agreement came into effect July 4, 2019 for an indefinite term.

Our assessment of each agreement found each set out clear roles and responsibilities of each party including reporting responsibilities. In addition, each of the agreements are current.

Collaborating with key stakeholders helps the Ministry to keep up-to-date on good practices, leverage their resources and expertise, and provide opportunities for increasing awareness of good practices.

4.2 Pest Awareness Activities Undertaken

The Ministry of Agriculture regularly undertakes activities designed to increase producer and public awareness of regulated pests. It does so either directly or in conjunction with its key stakeholders.

The Ministry educates producers through various means. For example, it publishes factsheets, annual maps, and the Crop Production News monthly magazine on its website. It conducts annual training for individuals that participate in clubroot and grasshopper management (e.g., surveyors, plant health officers, municipal pest control officers). It publishes various control measures for regulated pests on its website as part of the



Integrated Pest Management Program.¹⁸ In addition, its staff participate in radio interviews about good practices for identifying and controlling regulated pests.

In addition, it uses its key stakeholders such as rural municipalities to help educate producers. For example, rural municipalities place information posters in their offices, and SARM posts pest management tips on its website. We found the Ministry provides key stakeholders with its materials, or works with them on developing additional materials.

Our review of the materials (e.g., factsheets, magazine articles) for all six regulated pests found they contain understandable information. They include good practice information on detecting the existence or presence of regulated pests, preventing and managing their occurrence (e.g., farming and planting practices), and on responsibilities for reporting and controlling their existence. Specific examples of good practice information communicated include:

- Equipment cleaning and sanitation to minimize movement of contaminated or potentially contaminated soil to non-contaminated regions
- Restrict entry of vehicles into fields unless they have been properly cleaned
- Creation of a separate exit as far as possible from the field entrance
- Crop rotation (e.g., minimum of three year rotation with two-year break) between host crops such as canola, mustard and vegetables
- Economic thresholds for grasshoppers—the population level and extent of crop damage at which the value of the crop destroyed exceeds the cost of controlling the pest
- Annual monitoring (i.e., inspections for rats and squirrel)
- Disease monitoring by producers for early outbreak detection of late blight and bacterial ring rot

Awareness and education activities decreases the risk of producers not knowing how to prevent, detect and manage regulated pests.

4.3 Support for Appropriate Pest Surveillance Activities in Place

The Ministry of Agriculture supports the use of various pest surveillance activities that align with good practice for four regulated pests. Surveillance activities assist in detecting the presence of regulated pests in crops and pastures.

The Ministry's Plan for 2019-20, sets out a strategy to implement effective evidence-based assurance systems to improve the agriculture sector's long-term resiliency and competitiveness. It also outlines key actions including efforts to monitor and improve crop disease surveillance.¹⁹

¹⁸ Integrated Pest Management is a strategy used to attain sustainable, long-term, pest control. It uses all viable options (chemical and non-chemical). www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/livestock/pastures-grazing-hay-silage/integrated-pest-management-for-richardson-ground-squirrels (14 October 2020).

¹⁹ Ministry of Agriculture, *Plan for 2019-20*, p. 6.

As shown in **Figure 5**, other than for late blight and bacterial ring rot, the Ministry supports surveillance of each regulated pest either directly (i.e., its staff are involved to some extent in the planning or conducting of the surveillance activity) or indirectly (i.e., provides funding). Surveys are the most common surveillance activity.²⁰

We assessed the annual surveys used for the four regulated pests receiving Ministry support (see **Figure 5**) and found they align with good practices. For example, survey protocols (specific procedures) use biosecurity standards, which set out guidance on entering agricultural land to reduce spread of pests.

Figure 5—Surveillance Activities Used to Identify Regulated Pests in Saskatchewan

Regulated Pest	Key Surveillance Activities	Collaborates With	Ministry Role
Clubroot	Participates in annual general disease surveys Submits soil samples of potential disease to lab Assists producers with confirmed clubroot in developing response plan as part of Plant Health Network Encourages producers to self-monitor and submit soil samples to lab	Saskatchewan Clubroot Initiative Initiative membership includes SaskCanola, Saskatchewan Association of Rural Municipalities (SARM), Agriculture and Agri-Food Canada Industry	Chairs Saskatchewan Clubroot Initiative Participated in the development of the Clubroot Management Plan which sets out key surveillance activities, and survey protocols Uses survey results to develop annual distribution map (see Section 6.0) May participate in the development of producer response plan
	Conducts laboratory testing of soil samples for disease pathogens	SaskCanola through Discovery Seeds Lab	Crop Protection Laboratory conducts testing for clubroot Ministry receives results then shares them with SARM plant health officers who inform producers Must ensure producer is informed of confirmed detection of clubroot
Grasshoppers	Conducts annual roadside surveys	Saskatchewan Crop Insurance Corporation	Provides guidance about conducting survey (protocol) Annually analyzes data from surveys and produces map reports (see Section 7.0).
Richardson's Ground Squirrel (gopher)	Coordinates, as part of the Richardson's Ground Squirrel Stewardship Program, municipal annual inspections (distributes annual information forms for completion and submission to the Ministry)	SARM	Participates in the Richardson's Ground Squirrel Stewardship Program along with Ministry of Environment over use of strychnine (a federally regulated pest control product) to control gopher populations. Annually monitors, analyzes data about sales of strychnine to rural municipalities and produces reports.
Late Blight	Self-monitoring by producers who submit plant/tuber samples to lab	Vegetable Growers and Seed Potato Growers Associations	Communicates with producers and associations on monitoring. Crop Protection Laboratory testing as needed.

²⁰ Surveys involve physical inspections and collection of data to determine the presence of pests (i.e., clubroot, grasshoppers).



Regulated Pest	Key Surveillance Activities	Collaborates With	Ministry Role
Bacterial Ring Rot	Annual inspections of seed producers Tests soil samples for disease pathogens and informs producers	Canadian Food Inspection Agency Canadian Food Inspection Agency certified lab	Communicates with producers and associations on monitoring.
Brown or Norway Rat	Conducts annual inspections as part of the Rat Control Program	SARM	Receives annual report on Rat Control Program as expected under agreement with SARM Provides funding (along with the Federal Government) to SARM for Rat Control Program

Having Ministry support for surveillance activities that are systematic and reflective of good practice helps it have adequate information to determine whether sufficient activities occur to prevent the occurrence of and mitigate the impact of pests.

4.4 More Involvement in Surveillance of a Few Regulated Pests Needed

The Ministry of Agriculture does not sufficiently plan or conduct surveillance activities for two regulated pests (late blight, bacterial ring rot). This does not align with its decision to declare these as pests.

For **clubroot**, the Ministry has placed priority on being actively involved in the mitigation of clubroot given the extent of canola planted in the province. It chairs the Saskatchewan Clubroot Initiative.²¹ The Initiative has a documented Clubroot Management Plan, which the Ministry is actively delivering. The Ministry provides rural municipalities with sample bylaws about making producers responsible for identifying and reporting clubroot. At July 2020, 50% of Saskatchewan municipalities have adopted these bylaws.

We found members of the Initiative include key parties potentially impacted by clubroot, or essential to help prevent and control it.

We found the Clubroot Management Plan sufficiently robust and reflective of good practice. It includes good management practices to help producers prevent and early detect clubroot (e.g., crop rotation, minimizing spread of contaminated soil to non-contaminated areas). It clearly sets out each parties' responsibilities for awareness, control, and surveillance activities.

We found the 2020 survey protocol for clubroot provided sufficient guidance for surveyors on field selection (i.e., how to select samples and when to collect samples), sanitation practices (e.g., equipment cleaning), soil sampling from the field entrance, and assessing plants for visible symptoms while in the field.

²¹ Members of the Saskatchewan Clubroot Initiative include; Saskatchewan Ministry of Agriculture, Producers and producer groups, Saskatchewan Association of Rural Municipalities (SARM), Agriculture Retail Industry, Agriculture and Agri-Food Canada, Saskatchewan Canola Development Commission (SaskCanola), Agricultural Producers Association of Saskatchewan (APAS), Canola Council of Canada, SaskEnergy, SaskPower, SaskTel, Saskatchewan Crop Insurance Corporation, Discovery Seed Labs, Enbridge Pipelines Inc.

We found the Ministry used the survey results to update the distribution map each year. At July 2020, it had developed and published on its website the 2020 map. See **Section 6.0** Clubroot Distribution in Saskatchewan (cumulative testing 2008 to 2019).

For **grasshoppers**, the Ministry engages Saskatchewan Crop Insurance to conduct surveys of grasshoppers each year. The Ministry maintains a survey protocol that it gives Saskatchewan Crop Insurance each year.

We found the 2020 survey protocol for grasshoppers provided surveyors with sufficient guidance on site selection (i.e., sampling four sites per rural municipality).

In addition, it also gave sufficient guidance on:

- When to conduct the survey—when the majority of grasshoppers are in the adult stage
- How to conduct the survey—by estimating the average number of grasshoppers encountered while walking along the roadside
- How to calculate average grasshopper counts from visual observations

We found the Ministry used survey results to develop a forecast map of the location and severity of grasshoppers. At July 2020, it had developed and published on its website the 2020 forecast. See **Section 7.0**.

For **Richardson's ground squirrel**, the Ministry is not involved in planning for or conducting surveillance activities. Rather, the Ministry's involvement focuses on population control measures—primarily the use of strychnine through the Richardson's Ground Squirrel Stewardship Program.

Rural municipalities participate in the Program on a voluntary basis. Participating municipalities receive information about integrated pest management methods, and the use of chemicals such as strychnine and non-chemical methods such as hunting and trapping to attain long-term sustainable pest control and economic thresholds.²² Participating municipalities agree to submit information to the Ministry each year using standard forms (i.e., product evaluation and purchase agreement forms).

We found these forms include information primarily about the use of strychnine in rural municipalities (e.g., amounts purchased, location of use, gopher population density at time of use, effectiveness of use, impact on other species). The Ministry uses information on the volume of strychnine sales as a way to estimate gopher populations. Good practice

Good practices suggests a survey protocol includes:

- A comprehensive set of instructions for conducting a count of or monitoring an item such as a regulated pest.
- Enough detail about what, why, where, by whom, when, and how to conduct a survey. Clearly defined roles and responsibilities for response actions and monitoring
- Instructions and considerations for data collection (e.g., information about identifying the pest, and stage of infestation), data management, analysis, and reporting of results.

²² Economic threshold is the population size of a colony of gophers that will require immediate management because the size is known to exceed the point where it will cause unacceptable economic loss to the producer. Economic thresholds for Richardson's ground squirrel—one hole per four meters or 20 per cent crop damage over 100 meters is an economically damaging level and a concern for possible control measures. A 100-metre transect equals approximately (25 X 25 meters) 625 burrows per hectare equivalent to a 20% loss in the crop in a 100-metre strip/area adjacent to a field margin, pasture or road allowance.



suggests this method of monitoring may provide inaccurate estimates of gopher populations.

We found the Ministry does not actively use the data about gopher density to identify areas in Saskatchewan with higher numbers of gopher infestations. Good practice suggests estimating populations based on thresholds—one gopher hole per four metres.

At July 2020, the last analysis the Ministry had completed about gophers related to the 2018 calendar year. At July 2020, the Ministry had not received the results of 2019 from all participating municipalities nor started its 2019 analysis. We did not see evidence of its actively seeking the information from municipalities that had not submitted the information.

In addition, Health Canada has announced that it plans to deregister strychnine effective March 2023 and it will not be available to purchase after March 2022.

At July 2020, the Ministry does not have plan to obtain data about the number of gophers once strychnine is deregistered. Not having a surveillance plan increases the risk that the Ministry will not have good information to estimate gopher populations.

1. We recommend the Ministry of Agriculture revisit how it will conduct surveillance to determine populations of Richardson's ground squirrel.

For **brown or Norway rat**, the Ministry provides SARM with funding to administer the Rat Control Program. The agreement with SARM sets out terms and conditions (e.g., rural municipalities must appoint a pest control officer). In addition, it requires SARM to report to the Ministry on key Program activities each year.

As of July 2020, the Ministry had received the 2019-20 Annual Rat Control Program report. However, we found it does not actively use this report to determine whether sufficient surveillance occurs. See **Recommendation 5** about reporting to senior management.

For **late blight**, the Ministry does not plan for and is not involved in any surveillance activities beyond paying for the costs of testing plant/tuber samples. It expects producers to self-monitor for late blight and submit soil samples to the lab for testing. The Ministry maintains adequate protocols on lab testing plant/tuber samples for late blight.

However, the Ministry has not provided producers with good practices for taking samples for late blight (e.g., a survey protocol). In addition, it does not summarize the extent of lab tests done each year, or analyze where samples are taken to determine whether sufficient surveillance occurs.

For **bacterial ring rot**, the Ministry does not plan for and is not involved in any surveillance activities given the Federal Government's responsibilities for regulating bacterial ring rot in seed potato producers. The Ministry is only responsible to regulate table potato producers.

As noted in **Figure 5**, the Ministry does not receive information about the nature and extent of surveys of the Canadian Food Inspection Agency. The Agency notifies the Ministry of confirmed instances of bacterial ring rot, if any.

No confirmed instances of late blight have been detected in the province since 2010, and of bacterial ring rot since 2012. At July 2020, Saskatchewan has only a modest amount of potato and tomato production—the key crops at risk of late blight. Only potatoes are at high risk of bacterial ring rot.

Late blight and bacterial ring rot both pose a significant risk to potato and tomato production in Saskatchewan. One incident of either late blight or bacterial ring rot can wipe out an entire crop leading to extreme economic loss for the producer.

The Ministry needs to do more to assess if producers actively look for the presence of late blight and bacterial ring rot. Proactively equipping producers with clear guidance on how best to detect the presence of these regulated pests, and giving them clear direction on where and how to report potential infestations would help the Ministry determine whether the sufficient surveillance occurs. It would also help keep the risk of the occurrence of these regulated pests low.

Systematic and sufficient use of surveillance activities help detect the presence of regulated pests (both current and newly identified). Early detection is key to controlling spread and mitigating their impact on crops and pastures.

2. We recommend the Ministry of Agriculture proactively provide producers with written guidance about detecting and reporting the presence of late blight and bacterial ring rot.

4.5 Prompt Reporting of Clubroot Lab Results Needed

The Ministry does not always communicate results of confirmed clubroot testing to producers promptly (e.g., a few business days).

Under *The Pest Control Act*, and guided by the Saskatchewan Clubroot Management Plan, the Ministry assumes the responsibility for making sure producers are informed of the presence of visible symptoms of clubroot. It also assumes the responsibility of informing producers of the presence of clubroot confirmed through lab testing.

The Ministry directly receives all of the results of lab testing of soil samples for clubroot. The Ministry shares test results with SARM plant health officers (who are part of the Plant Health Network). The Ministry expects the plant health officers to advise the producer of the test results. The Ministry has not set expectation on the timing of each step of this process.

For each of three of seven clubroot soil-sample test results we tested, the Ministry took 13 days to inform SARM's plant health officers of positive clubroot results; it called them. The Ministry did not keep documentation about the timing of those calls, or confirm when or whether the plant health officers informed the producers.

The Ministry expects producers to submit a response plan to a SARM plant health officer within 30 days once visible symptoms or lab testing confirms the presence of clubroot in a crop. However, some producers may await test results before starting to develop a response plan. Faster responses help contain the disease, and control its spread.



Timely dissemination of lab results enables producers to implement appropriate measures promptly to control the disease and reduce its impact on crops and pastures.

3. We recommend the Ministry of Agriculture make sure laboratory results confirming clubroot presence are communicated to producers promptly.

4.6 Guidance on Preparing Response Plans for Regulated Pests Needed

Guidance for preparing response plans is not readily available for four of the six regulated pests. Guidance exists for clubroot and Richardson's ground squirrel.

The Pest Control Act provides authority to municipalities to make producers responsible for responding to identified instances of regulated pests (see **Figure 1**).

A good response plan provides a set of written procedures for dealing with infestations of regulated pests. Procedures are designed to contain and control the spread, and minimize the impact.

For clubroot, an agrologist approves response plans. The Saskatchewan Clubroot Initiative provides clear and sufficient guidance about responsibilities and methods for developing response plans.

The Ministry gives producers a template (referred to as a clubroot management agreement). It expects them to submit the completed agreement to a SARM plant health officer within 30 days of seeing visible symptoms of clubroot or receipt of test results confirming its presence. It expects SARM plant health officers to review and approve the agreement, and provide producers with support, as necessary, in implementing it.²³ Each clubroot management agreement is valid for two years—the period for a producer to implement the response plan.

Our review of the template found it included all eight items considered as good practice for response plans for clubroot (see **Figure 6**).

Figure 6—Key Content of Clubroot Management Agreement

- Crop rotation—three-year rotation with a two-year break between host crops
- Use of only clubroot-resistant varieties
- Control canola volunteers and related weeds
- Biosecurity measures (e.g., cleaning of equipment, restricting entry of vehicles into fields unless properly cleaned)
- Use of soil conservation practices (e.g. direct seeding or zero-tillage)
- Notification once clubroot is detected/confirmed
- Intent to disclose that clubroot has been confirmed if land is sold or rented
- Signatures of the producer and/or landowner and the pest control officer on the clubroot agreement

Source: Adapted from the Ministry's Clubroot Management Agreement.

We tested five samples where clubroot was detected with visible symptoms in the field to determine if the clubroot agreements were prepared timely, and found the following. For three of five, producers submitted two agreements later than 30 days (i.e., seven days late, 33 days late) and the plant health officer did not sign one agreement.

²³ Municipalities who have adopted the agreement template as law have similar expectations.

The Ministry uses its interactions with SARM plant health officers along with its annual analysis of results of surveys for clubroot to determine if appropriate responses occurred.

For **Richardson's ground squirrel**, the Ministry provides municipalities with guidance on the use of Integrated Pest Management measures including non-chemical (e.g., shooting, trapping) and chemical options (e.g., strychnine—a federally regulated pest control product).

In 2020, Health Canada has announced it will no longer allow producers to use strychnine as of March 4, 2023.²⁴

As of July 2020, the Ministry does not have plans to develop additional guidance on alternate measures effective in response and management of gopher populations. See **Recommendation 1**.

As noted in **Section 4.4**, the Ministry is not carrying out timely analysis of information about gopher infestations. Without such analysis, it does not know whether sufficient responses occur to minimize the risk of damage to crops and pastures.

For **other regulated pests**, the Ministry does not provide producers with guidance on developing response plans. Other regulated pests include grasshoppers, late blight, bacterial ring rot and brown or Norway rat. Nor did we see evidence that it works with its key stakeholders to have them provide such guidance.

The Ministry notes producers remain responsible, by law, for responding to detected regulated pests. Where they do not respond properly, *The Pest Control Act* gives municipalities the right to take action.²⁵ Furthermore, the Minister can also, under the Act, order actions such as the destruction of crops. As of July 2020, the Ministry has not issued any such orders.

Response planning provides a structured and prompt response for producers to minimize the risk of pest spread. Early pest detection and planning response for both current and newly identified pests, allow producers to minimize the risk of crop losses from pest infestations, and unnecessary pest management, which may lead to increases in production costs.

4. We recommend the Ministry of Agriculture, working with its key stakeholders, provide producers with written guidance on developing response plans for grasshoppers, late blight, bacterial ring rot, and brown or Norway rat.

²⁴ On March 4, 2020, the Pest Management Regulatory Agency of Health Canada announced its final decision to de-register the use of strychnine for gophers. Manufacturers will not be allowed to produce strychnine after March 4, 2021. Strychnine cannot be sold after March 4, 2022. Producers will no longer be able to use it after March 4, 2023. www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/decisions-updates/reevaluation-decision/2020/strychnine.html (22 October 2020).

²⁵ *Pest Control Act* s. 8(1): Any municipality may enter into an agreement or agreements with any other municipality or municipalities for joint action in controlling or destroying pests, including the appointment of a joint committee to control, supervise and manage the program of control or destruction undertaken pursuant to the agreement, and including the purchase of equipment and hiring of operators thereof.



4.7 Reporting Needed for Regulated Pests

Senior management does not receive the results of pest mitigation strategies for all regulated pests (i.e., Richardson’s ground squirrel, late blight, bacterial ring rot, brown or Norway rat).

For **clubroot and grasshoppers**, senior management receives the annual maps the Ministry prepares using the annual survey results (see **Sections 6.0** and **7.0**). Also, it periodically shares these results with its Minister. For example, it gave the Minister a clubroot briefing note in December 2019 summarizing new findings of clubroot from the 2019 survey.

Our test of the 2020 clubroot distribution map and the 2020 grasshoppers forecast map against the information collected from the annual surveys found the maps complete and accurate. We found the surveys for clubroot and grasshoppers provide reasonable coverage; they typically cover over 200 rural municipalities each year. The majority of Saskatchewan’s 775 municipalities are typically seeded with crops.

We also found the annual clubroot map contains sufficient information on clubroot detected. For example, as summarized in Figure 7, the map shows clubroot detection in four rural municipalities in 2019.

Figure 7—Summary of Clubroot Distribution by Location in 2019

Rural Municipality #	# of Locations Tested	# Locations with Visible Symptoms	# Locations Detected from Lab Testing
271	7	0	1
442	13	1	2
466	5	3	3
501	10	1	1
Total	35	5	7

Source: 2020 Clubroot Distribution Map (September 28, 2020).

In addition, we found the grasshopper forecast map clearly shows, as summarized in **Figure 8**, severe and moderate grasshopper infestations were detected based on economic thresholds in eight rural municipalities.²⁶

Figure 8—Examples of Grasshopper Infestation and Risk levels to Cereals (severe and moderate) in 2020

Rural Municipality #	Infestation Levels ^A	Risk levels based on economic thresholds
259	15.9	Severe
260	10.9	Moderate
261	17.0	Severe
290	18.0	Severe
292	10.7	Moderate
319	12.0	Moderate
320	12.0	Moderate
322	10.4	Moderate

Source: 2020 Grasshopper Distribution Map (September 28, 2020).

^A – Infestation levels are the number of grasshoppers per square meter.

²⁶ Economic thresholds set for number of grasshoppers per square metre for cereals—8-12, for flax and lentil—2, and for canola—14.

For **brown or Norway rat**, each year, the Ministry receives annual rat reports from SARM under the Rat Control Program. The Ministry's agreement with SARM expects the report to include actual and forecasted costs of program delivery, performance indicators, targets, and actual outcomes. We found the required information sufficiently comprehensive to show the program's effectiveness and success. The 2019-20 Rat Control Program report included provincial brown or Norway rat infestation rates (i.e., 2.42 percent in 2018, 1.89 percent in 2019), and financial information on actual and forecasted expenses for rat control activities as expected.²⁷

However, our comparison of the 2019-20 Rat Control Program report against the Agreement's reporting requirements found it did not contain all of the information expected. We found the report did not include trends of rat infestation counts or targets for provincial rat infestation rates (economic thresholds).

We suggest the Ministry ask SARM to supply the missing information. Without receiving the complete information, the Ministry cannot assess if the Program is working as intended and sufficient mitigation occurs. For **other regulated pests**, senior management does not receive regular reports about the results of mitigation strategies. Other regulated pests include late blight, bacterial ring rot, and Richardson's ground squirrel.

Absence of formal regular reporting to senior management on regulated pests—both current and newly identified—increases the risk of ineffective decision making about sufficiency of resources provided and success of mitigation activities. Regular reporting assists in assessing whether appropriate measures are taken to control confirmed instances of regulated pests, and to prevent or minimize the risk of future instances.

5. We recommend the Ministry of Agriculture periodically report to senior management on the sufficiency of mitigation of regulated pests including Richardson's ground squirrel, late blight, bacterial ring rot, and brown or Norway rat.

5.0 SELECTED REFERENCES

- Auditor General of Queensland. (2017). *2016-17 Report of the Auditor General of Queensland to the Legislative Assembly*, Report 12, Biosecurity Queensland's management of agricultural pests and diseases. Brisbane: Author.
- Provincial Auditor of Saskatchewan. (2017). *2017 Report – Volume 2, Chapter 20, Ministry of Agriculture—Mitigating Risk of Livestock Diseases*. Regina: Author.
- Provincial Auditor of Saskatchewan. (2016). *2016 Report – Volume 1, Chapter 7, Ministry of Environment—Preventing Aquatic Invasive Species in Saskatchewan*. Regina: Author.

²⁷ Rat infestation rate is measured as a percentage of rat activity (presence of rats) in rural municipalities identified by inspections undertaken. Under the Rat Control Program, rural municipalities typically conduct approximately 60 thousand to 80 thousand inspections per year.

7.0 2020 GRASSHOPPER FORECAST MAP

