

## Integrated Pest Management for Rodents: Agricultural Operations

Rodents are a common pest problem for agricultural operations, which typically provide plenty of food and nesting sites. Rodents can damage growing crops, stored materials, equipment and structures. They can also contaminate commodities or food and water supplies. Rodents can transmit diseases that may be harmful to humans or livestock.

The most effective and economical long-term solution to get rid of a rodent problem (and prevent it from happening again) is to use an integrated pest management (IPM) program. IPM is a decision-making process that includes six elements: Prevention, Identification, Monitoring, Thresholds, Treatment, and Evaluation. This document explains how to use these steps to manage rodent pests of agricultural operations.

### PREVENTION

#### Keep rodents from getting in

- Seal all openings that are bigger than 6 mm (1/4 in), including door and window cracks and areas where utilities enter buildings
- Cover and screen drains and pump out ports. Screen holes should be less than 6 mm (1/4 in)
- Seal all places where feed or grain are stored
- Fill potential nesting holes with mortar, concrete or metal flashing
- Use metal flashing on vertical building siding or any rough climbable surface
- Install sheet metal kick plates on door exteriors
- Build outbuildings on concrete pads
- Regularly inspect and repair entry points
- Place plastic or wire guards around tree bases

#### Get rid of food and water sources

- Store feed at least 0.5 m (20 in) from the walls and floor with 0.6 m (24 in) or more between pallets
- Keep feed in rodent-proof containers
- Keep garbage in hard-walled, sealable containers with tight-fitting lids
- Remove any food and attractants where practical, such as fallen fruit, old vegetable material in fields, leftover feed and animal waste

- Keep composters above ground or install mesh or concrete between the soil and the composter
- Don't put edible organics in open composts
- Where practical, remove water sources like leaky taps or irrigation, open water troughs, or pipes

#### Get rid of places where they can hide or live

- Keep all storage areas clean
- Remove unused clutter, junk and debris in and around buildings
- Trim vegetation around structures so that 15 to 20 cm (6 to 8 in) above ground is clear
- Keep grass or cover crops short between rows of plants, at tree bases, and around field perimeters
- Remove pruning and brush piles
- Store firewood and lumber away from buildings and at least 30 cm (1 ft) off the ground

#### Safely clean up areas where rodents have been

- Rodents are attracted to the smells left behind by other rodents
- Wear gloves and a mask to clean up safely
- Get rid of droppings, nesting material and damaged food
- Clean urine stains, rub marks, or tracks with a mild bleach solution

## IDENTIFICATION

### Structural rodent pests

- In B.C., the most common rodent pests in and around structures are the **Norway Rat**, **roof rat**, and **house mouse**
  - Norway rats usually live at ground level, while roof rats are agile climbers and prefer to live higher up
  - House mice nest in hidden, enclosed spaces using shredded, soft materials
- Different control methods will be required for rats compared to mice

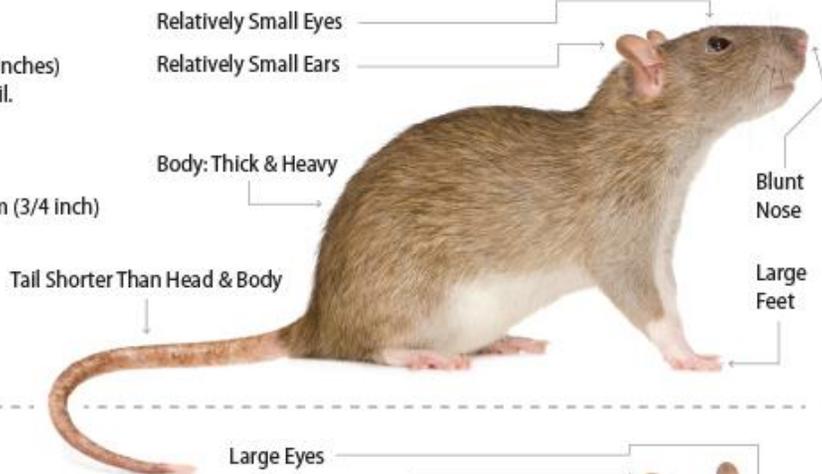
## Rat and Mouse: Comparison

### Norway Rat

Size: 30-45 cm (12-18 inches)  
from nose to end of tail.

#### DROPPINGS:

Long, Rounded Ends  
Avg. Length: 15-20 mm (3/4 inch)

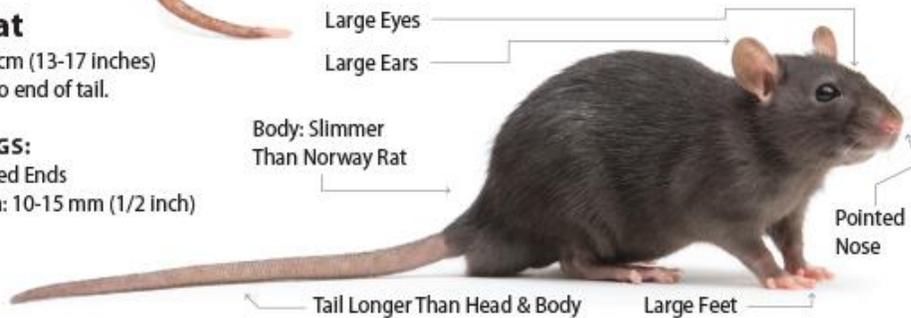


### Roof Rat

Size: 33-43 cm (13-17 inches)  
from nose to end of tail.

#### DROPPINGS:

Long, Pointed Ends  
Avg. Length: 10-15 mm (1/2 inch)

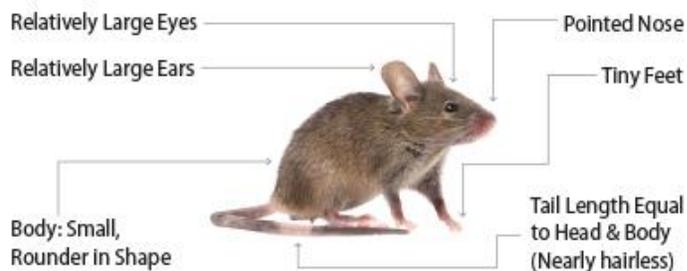


### House Mouse

Size: 15-17 cm (6-7 inches)  
from nose to end of tail.

#### DROPPINGS:

Small with Pointed Ends  
Avg. Length: 4-7 mm (1/4 inch)



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## Field rodent pests

- **Voles, Columbian ground squirrels and Northern pocket gophers** can cause problems in fields and orchards
  - Voles have brown and grey fur and are 4-18 cm (3-7 inches), smaller than house mice with small ears and a short tail
  - Columbian ground squirrels have a mixture of reddish-brown, gray and brown fur and are 25-30 cm (9-12 inches) long, with a long bushy tail
  - Northern pocket gophers have grey-brown fur, with some white fur on their chin and underside. They are large rodents (17-22 cm or 6-9 inches), with large yellow incisors, large clawed front paws and hairless tails half the length of their body
- Other small mammals (like shrews, deer mice, and moles) don't typically cause plant damage in the field

## MONITORING

### Check your property for problem areas

- Regularly check for entry points, food or water sources that may lead to rodent problems
- Watch out for signs of rats and mice to figure out where they may be
- Regularly monitor fields and perimeters for crop damage and new rodent tunnels, mounds or runways
- Traps can be used to monitor whether rodents have moved into an area
- The amount of fresh droppings is one of the best ways to estimate the size of the rodent population. A rat produces more than 4 droppings per day

### Look for signs of rodents

- Droppings and urine stains
- Musky odours
- Burrows, holes or nests
- Runs, tracks and rub marks
- Gnaw marks and chewed feed packages
- Food scraps near burrow entrances
- Noises (such as gnawing, scratching or running in the walls), especially at night when rodents are most active
- Runways or tunnel openings in grassy fields from rodents burrowing underground
- Fan-shaped gopher mounds
- Chewed or exposed root systems or stem girdling on young plants or trees

## THRESHOLD

### Know when to take action

- It's time to take action **as soon as you notice signs** of rodents from your monitoring
- Rodents reproduce quickly. Ignoring an occasional invader can result in a much more damaging infestation

### Rodents can:

- Damage property by chewing on materials like insulation, siding and wallboard
- Start electrical fires by gnawing on wiring
- Eat and contaminate stored feed, food and commodities
- Transmit diseases to people and livestock
- Damage young trees, field and orchard crops

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### TREATMENT

#### Select the best method

- Consider the rodent type, population numbers, and location
- Choose options that will avoid harming people, pets, livestock, birds and other wildlife

#### Traps

- **Snap traps or electronic traps are the best treatment option.** They are effective and kill rodents quickly and humanely
- Choose the right one. Rat traps and mouse traps are different sizes, and gopher traps are also available
- Set traps in dark corners, behind objects next to walls or wherever mice and rats are located
- Set traps at right angles along walls where rodents travel, with the trigger side on the rodent runway
- Protect domestic animals, children, pets and wildlife from getting injured by traps. Put them in trapping boxes or bait stations, or in inaccessible areas
- Place mouse traps about 2 to 4 meters (6 to 12 ft) apart, and rat traps at 5 to 6 meter (16 to 20 ft) intervals
- Use bait like dried fruit, peanut butter (mixed with oats), cheese, or any other food they've already been eating
- Leave the baited traps out for several nights before setting them, so the rodents get used to them
- Check traps daily
- Wear gloves to handle the trap and all dead rodents. Wrap the dead animal in plastic and put it in the garbage
- Re-use traps. They are more attractive to other rodents than new traps
- Reset traps in 2 to 3 weeks to catch maturing rodents. You won't get long-term control if you don't catch them all!

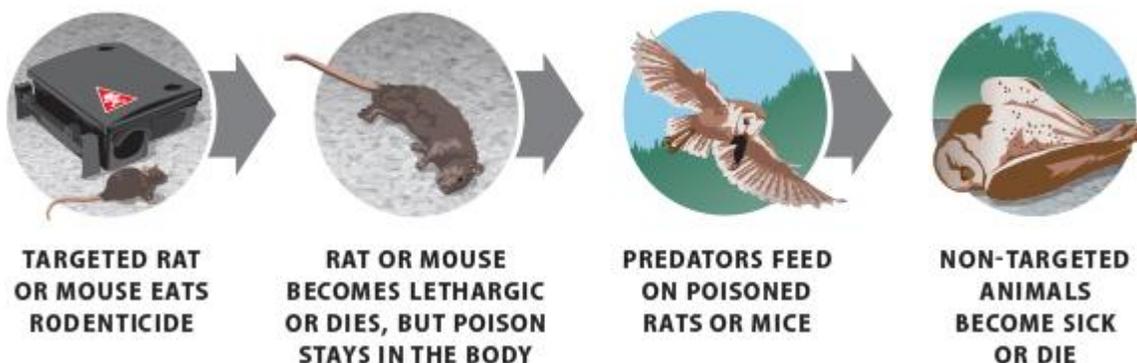
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### Rodenticides (rodent poisons)

- **Rodenticides are highly toxic and can pose a risk to people, pets and wildlife. Only consider using as a last resort**
- **Rodenticides have restrictions for sale and use in B.C.** Visit [www.gov.bc.ca/RodentIPM](http://www.gov.bc.ca/RodentIPM) to learn more

#### Know the risks of rodenticides

- **Direct poisoning:** people, domestic animals, and wildlife can die or be seriously hurt if they eat the poison bait
- **Secondary wildlife poisoning:** natural predators like hawks and owls can die or suffer long-term effects from eating poisoned rodents. Losing these natural rodent predators can make the pest problem even worse



- Only use rodenticides as a targeted short-term treatment. Never use as a long-term or preventative control method
- Always read and follow the pesticide label directions. Only use products labeled for the right rodent species and check the locations that they are allowed to be used (for example: indoors, outdoors in farm yards, or in the field)
- Get a **B.C. Pesticide Applicator Certificate** to learn more about pesticide safety and IPM, use certain restricted pesticides, supervise assistant pesticide applicators, and meet training requirements for occupational safety or third-party accreditation programs
- Store commercial rodenticides in a locked, vented and signed area, separate from food or animal feed
- Bait must either be placed in tamper-resistant bait stations or in locations not accessible to children, pets, livestock, or wildlife. Fasten bait stations down to prevent tipping or removal
- The baiting method will be different depending on the rodent species (for example, ground squirrels compared to pocket gophers). Follow the label directions
- Replenish bait as necessary. Some baits require multiple feedings to work. Failure to do this could lead to rodent resistance in the future
- Wear gloves when handling rodenticides or dead rodents
- Properly dispose of any leftover bait. See the “Disposal of Rodenticides” guidance available on the ministry’s website.
- Remove any dead rodents. Check bait sites frequently (every 2-3 days) to remove carcasses
- Dispose of dead rodents by burying, or wrap in plastic and put in the garbage
- Be aware rodenticides can cause rodents to die and decompose in hard-to-reach places, which can lead to odours, insect infestations, or contamination of goods

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- Consider which rodenticide active ingredient to use and use least-toxic formulations first

	Active ingredient(s)	Use Sites <sup>1</sup>			How it works	Risk
		Indoors	Outdoors - around buildings <sup>2</sup>	Outdoors – fields		
<b>Non-anticoagulants</b>	Cellulose (from powdered corn cobs)	✓			Dehydration	Very low risk to people, domestic animals or wildlife
	Bromethalin	✓			Affects central nervous system	<ul style="list-style-type: none"> <li>Highly toxic</li> <li>Risk of direct poisoning</li> </ul>
	Zinc phosphide	✓	✓		Affects central nervous system	<ul style="list-style-type: none"> <li>Highly toxic</li> <li>Risk of direct poisoning, including to the applicator</li> </ul>
<b>First-generation anticoagulants</b>	Chlorophacinone	✓	✓	✓	Internal bleeding (lethal dose after several feedings)	<ul style="list-style-type: none"> <li>Highly toxic</li> <li>Risk of direct poisoning</li> <li>Risk of secondary wildlife poisoning</li> </ul>
	Diphacinone (liquid)	✓				
	Diphacinone (solid)	✓	✓	✓		
	Warfarin	✓	✓			
<b>Second-generation anticoagulants</b>	Brodifacoum	✓			Internal bleeding (lethal dose after one feeding, and retained longer in body tissues)	<ul style="list-style-type: none"> <li>Highly toxic (more than 1<sup>st</sup> generation)</li> <li>Risk of direct poisoning</li> <li>Highest risk of secondary wildlife poisoning</li> </ul>
	Bromadiolone	✓	✓			
	Difethialone	✓				

<sup>1</sup>always refer to the product label for the specific use sites. For any active ingredient, use areas may vary among product labels and have different use restrictions

<sup>2</sup>within 15 m (50 ft) of buildings/structures, or up to 100 m (330 ft) from buildings/structures if bait is placed along fence lines in a secured, tamper-resistant bait station

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### Other treatment methods

- **Birds of prey (raptors), like owls and hawks, are natural predators of rats and mice.** Encourage raptors in your area by protecting and enhancing natural habitat
- Glue boards and live traps are available but may cause significant stress and suffering to the caught rodents. Consider how you will humanely dispose of them
- Sound or ultrasonic repellents may initially work, but eventually rodents get used to them
- Some cats will kill mice or rats, but are typically not an effective way of controlling an infestation. Cats may also introduce disease into your facility if they bring in caught rodents. Cats will also catch birds and other wildlife
- Do **not** use rodenticides if you are trying to attract birds of prey or using cats to manage rodents

## EVALUATE

### How well is your rodent IPM program going?

- Evaluate how well it's working and if any improvements can be made, such as different trap baits, moving trap placements, or using more preventative measures
- Make sure you get them all – rodents take 2 to 3 weeks to mature, so put traps out every 2 to 3 weeks until you don't catch any more
- Once your rodent problem is under control, re-visit prevention tips to stop it from happening again
- Producers with an Environmental Farm Plan may apply for cost-shared incentives through the Canadian Agricultural Partnership **Beneficial Management Practices (BMP) Program** to further improve your rodent IPM program. These include actions like enhancing habitat for natural predators like raptors, hiring a consultant to design an IPM plan, or improving waste management practices. See the appendix at the end of this document or visit <https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/programs/beneficial-management-practices> to learn more

## For More Information

- **For more information about IPM and the regulation of pesticides in British Columbia, please visit [www.gov.bc.ca/PestManagement](http://www.gov.bc.ca/PestManagement) or email [BC.IPM@gov.bc.ca](mailto:BC.IPM@gov.bc.ca).**
- B.C. Ministry of Environment and Climate Change Strategy: Disposal of Rodenticides. [https://www2.gov.bc.ca/assets/gov/environment/pesticides-and-pest-management/pesticide-use/guidelines/rodenticide\\_factsheet\\_web\\_2020.pdf](https://www2.gov.bc.ca/assets/gov/environment/pesticides-and-pest-management/pesticide-use/guidelines/rodenticide_factsheet_web_2020.pdf)
- B.C. Ministry of Environment and Climate Change Strategy: Pesticide certification and training. <https://www2.gov.bc.ca/gov/content/environment/pesticides-pest-management/certification-training>
- Stewardship Centre for British Columbia: Best Practices for Rodent Control in Urban and Agricultural Environments. <https://stewardshipcentrebc.ca/programs/wildlife-species-risk/best-practices-to-control-rodents/>
- B.C. Ministry of Agriculture, Food and Fisheries: Control of Rats and Mice on Poultry Barns. [https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/farm-management/structures-and-mechanization/300-series/384200-6\\_control\\_of\\_rats\\_and\\_mice\\_on\\_poultry\\_farms.pdf](https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/farm-management/structures-and-mechanization/300-series/384200-6_control_of_rats_and_mice_on_poultry_farms.pdf)

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- Health Canada: New Use Restrictions for Commercial Class Rodenticides in Agricultural Settings.  
<https://www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/fact-sheets-other-resources/rodenticides-agricultural-settings.html>
- Health Canada: Questions and Answers – Additional Mitigation Measures for Rodenticides.  
<https://www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/fact-sheets-other-resources/rodenticides-agricultural-settings/questions-answers.html>

### Appendix

Selection of Beneficial Management Practices Cost-Share Funding Opportunities that may be applied to rodent management. For the full cost-sharing list for 2021, visit <https://ardcorp.ca/wp-content/uploads/2021/04/BMP-List-2021-APR-22-Regen-Symbols.pdf>.

1901 - Establishment of vegetative shelterbelts, buffers or hedgerows
1002 - Riparian Habitat Establishment
1003 - Fencing to Manage Grazing and Improve Riparian Condition and Function
2204 (A) - Habitat Structures and Enhancement
2208 – Creation of Corridors for Connecting Habitat
0801 (C) - Improved on-farm pesticide storage
0802 - Improved on-farm storage, handling, and disposal of agricultural waste
0802 - Improved on-farm storage, handling, and disposal of agricultural waste
0803 - Composting of agricultural waste
0805 - Wood residue management
1602 - Information Collection & Monitoring
3501 - Creative Environmental Regenerative Agriculture Solutions
2501 - Integrated Pest Management Planning
3401 - Vegetative Buffer Planning