Vertebrate Pest Management Basics

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With input from:
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Ontario Hazelnut Symposium March 2 2023

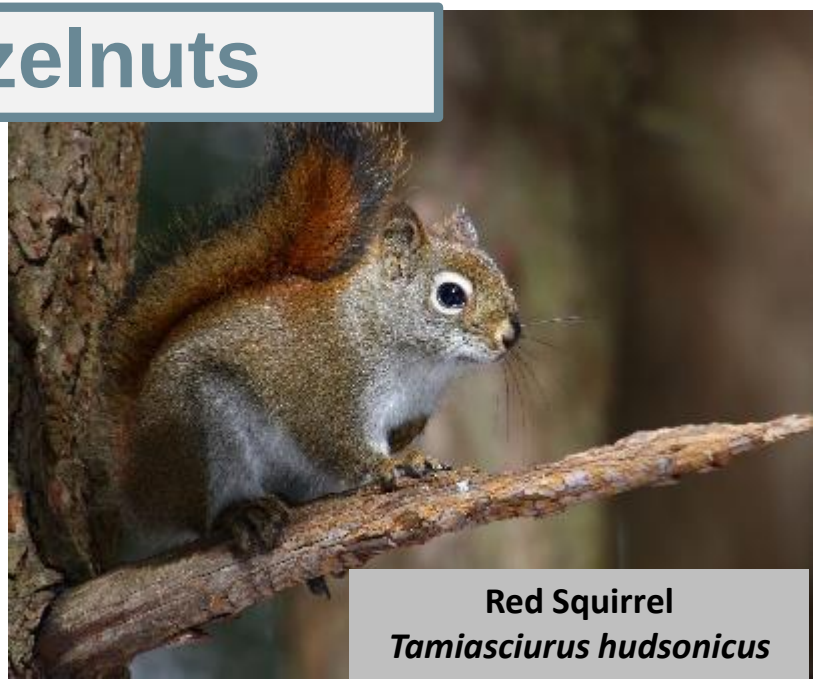
Main Vertebrate Pests of Hazelnuts

Eastern Chipmunk
Tamias striatus

Photo: Rhododendrites, creative commons.org

Eastern Gray Squirrel
Sciurus carolinensis

Photo: James Hart, tn.gov



Red Squirrel
Tamiasciurus hudsonicus

Photo: C.T. Cephas creative commons.org

Least Chipmunk
Tamias minimus

Photo: philarmitage.net

Blue Jay
Cyanocitta cristata

Photo: Scott Martin, allaboutbirds.org

American Crow
Corvus brachyrhynchos

Photo: Henry Burton, allaboutbirds.org

Squirrel Species

Ground Squirrels

- Nest underground in burrows
- Live in groups
- Retreat to burrows when startled
- Feed on nuts but also damage orchard floor
- Can climb but often not found high in trees
- Main pest on west coast

Photo: medicineriverwildlifecentre.ca

Tree Squirrels

- Nest in trees
- Often solitary
- Generally run up tree when startled
- Very agile in maneuvering through and between trees
- Caching and hoarding – involves learning and remembering landmarks
- Main pest in Ontario

Photo: James Hart, tn.gov

- **Squirrel management in Pacific Northwest generally focuses on ground squirrels**
- **Ground-based management methods (e.g. fencing) are less effective on tree squirrels**

WESTERN
FarmPress

Ground squirrel management important in tree nuts

Effective management depends on understanding the life cycle and behavior of the animal.

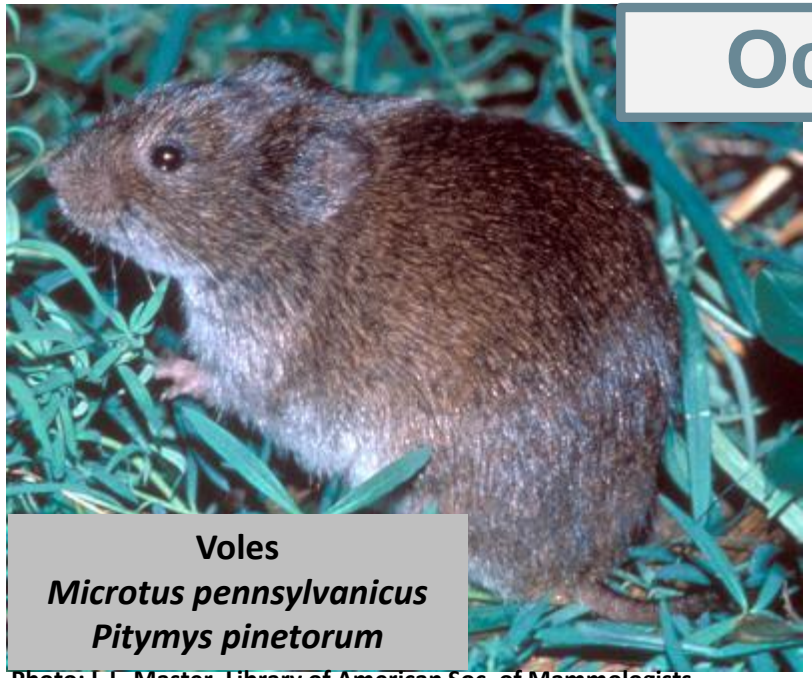
Lee Allen
December 16, 2020

3 Min Read

Ground squirrel burrowing can damage tree root systems as well as irrigation systems, resulting in major erosion problems. UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

It's somewhat like the obnoxious uncle in the family who shows up during holiday festivities; you know it's going to happen, but you definitely don't appreciate the appearance when it does.

Occasional Vertebrate Pests



Voles
Microtus pennsylvanicus
Pitymys pinetorum

Photo: L.L. Master, Library of American Soc. of Mammologists

Mice
***Peromyscus* spp.**

Photo: L. Weber, University of Guelph

Racoon
Procyon lotor

Photo: Rhododendrites, creative commons.org

Rabbits
Sylvilagus floridanus,
Lepus europaeus

Photo: D.G.E. Robertson, creative commons.org

White-tailed deer
Odocoileus virginanus

Photo: Ontario MNRF

Striped skunk**
Mephitis mephitis

Photo: D. Dzurisin, creative commons.org

Damage

- Consume ripening nuts or remove mature nuts
- Empty shells or partially consumed nuts may be found at base of trees
- Nut removal can happen rapidly!
- Feeding/gnawing on roots and bark at base of tree
- Bark damage can girdle young trees
- Deer and rabbits: Feeding on foliage, buds or twigs. Nibbling on soft tips and terminal growth in winter and early spring
- Raccoons may break branches when feeding on nuts

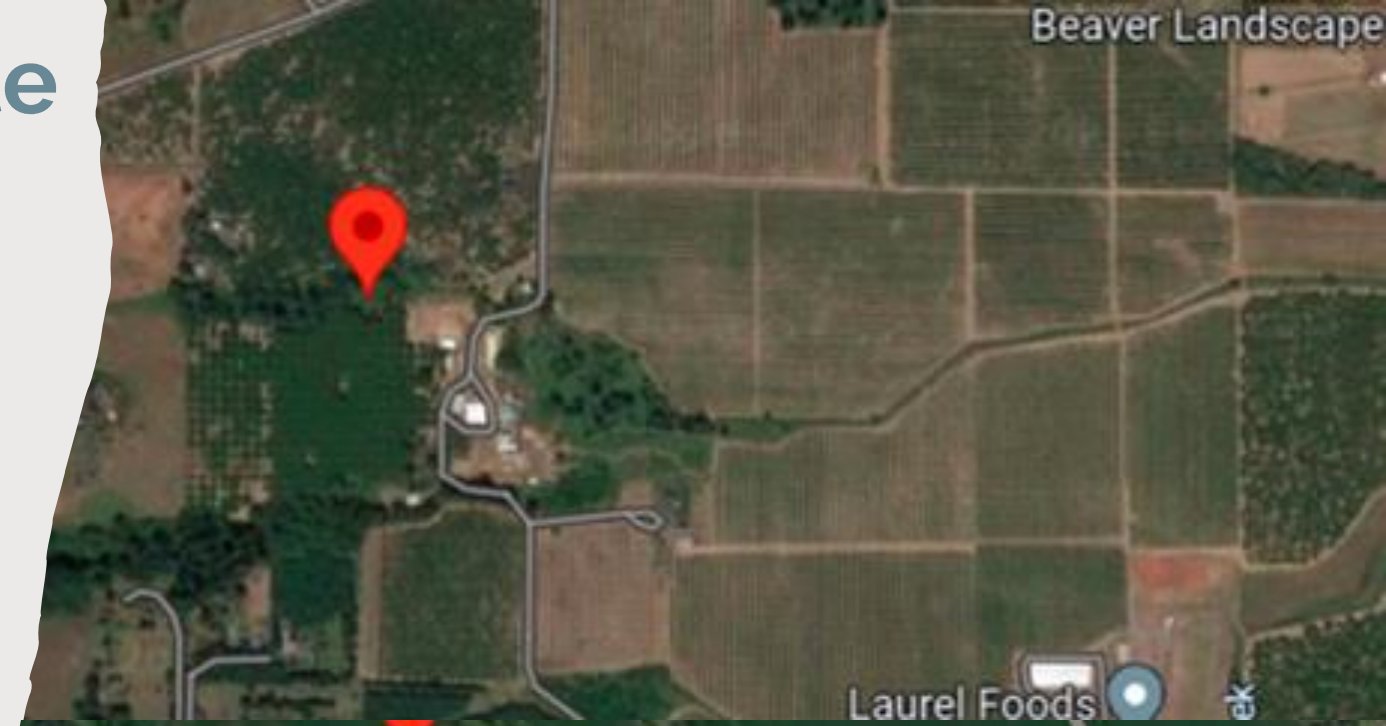
Vertebrate Management Challenges


Photo: P. Trimming, Croydon, England, creativecommons.org

- Damage can be highly variable between farms, regions and years due to:
  - Seasonal/weather impacts on wildlife behaviour, breeding success, food abundance, flocking behaviour, predation
  - Variability in landscapes influencing availability of ideal vertebrate habitat near crops
- Vertebrates can learn and remember, making it difficult to break the habit of feeding in an area once established
- Many people like vertebrates so some interventions may be unpopular
- Some management methods (e.g. noise-makers) can cause conflicts with neighbours
- Some species are beneficial
- Several different regulations affect the management of vertebrates in crops

Risk Factors for Vertebrate Damage

- Less crop = more damage and/or higher proportion of damage
  - Smaller acreage orchards = more of the orchard in close proximity to surrounding landscape habitat
  - Larger orchards = damage diluted over a large area
  - High yield years = bird management generally less critical (except in bird hotspots) and less effective
- Early ripening blocks have more bird activity and damage (hazelnuts: soft, developing nuts available earlier in season may be attractive)
- Isolated blocks surrounded by non-crops generally have more damage
- Block edges often have more damage than crop interiors



Farm/landscape resources that may attract vertebrates

- Vegetation cover from predators
- Roosting or perching sites (birds)
- Accessible grain or water
- Streamside vegetation
- Adjacent wooded areas or other habitat, especially if woodlot/windrow is close enough for jumping (3m or less)

Hazelnuts are a preferred food for squirrels!

NUTS FOR SQUIRRELS - RANKED

		RATIO
BAD	**Pine Nuts	1:36
	**Cashews	1:12.3
	Peanut Butter	1:8.3
	Peanuts Dry Roasted	1:6.2
	Hickory Nut	1:5.5
	Valencia Peanut Raw	1:5.4
	Chestnut CHIN. Roasted	1:5.4
	Chestnut, CHIN. Raw	1:5.3
	Chestnut, CHIN. Dry	1:5.3
	Pistachio Raw	1:4.7
	** Brazil Nut	1:4.5
	Pistachio Dry Roasted	1:4.4
	Pinon NUT(NOT Pine)	1:4.4
	Virginia Peanut RAW	1:4.3
	Pecan	1:4
	Chestnut, Eur. Roasted	1:3.7
	Walnuts	1:3.5
	Chestnut, Eur, Raw Unpeeled	1:3.4
	Macademia	1:2.8
	Chestnut, JPN Roasted	1:2.7
	Chestnut, Eur. Dry Unpeeled	1:2.6
	Chestnut, JPN, Dry	1:2.3
	Chestnut, JPN, Raw	1:2.3
	Chestnut, Eur. Dry Peeled	1:2.1
	Chestnut, Eur. Raw Peeled	1:2
	Acorn Dry	1:1.9
	Acorn Raw	1:1.9
	** Almonds Raw	1:1.8
BETTER	Hazelnuts	
	** Almonds Roasted	1:1.6

Photo: whatsquirrelsdo.com/best-worst-squirrel-nuts/

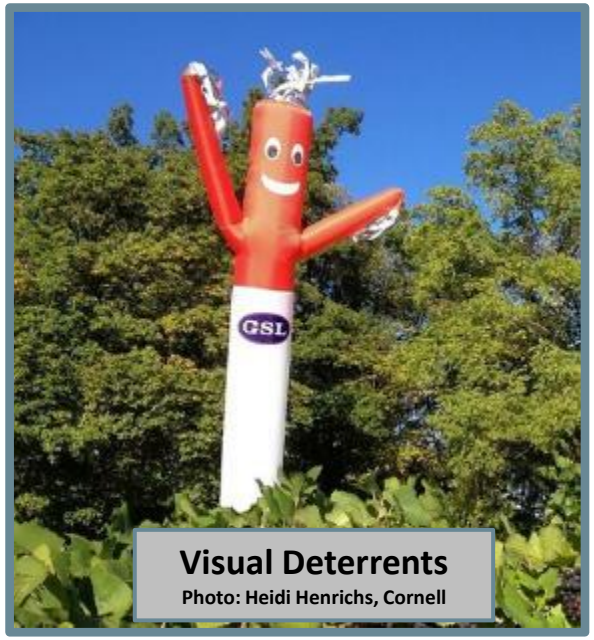
Photo: fererorocher.com

Methods for Vertebrate Management

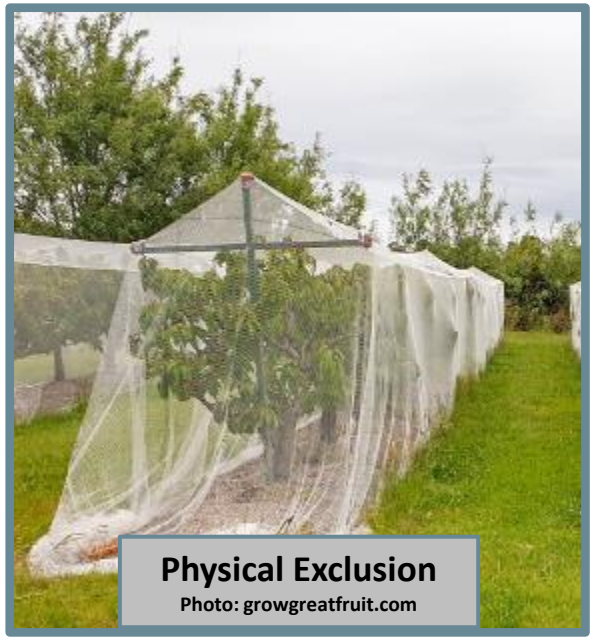
Habitat Modification

Trapping (Capturing)
Photo: wildlifecontrolsupplies.com

Baits/Repellants
Photo: njaes.rutgers.edu/fs1293/



Visual Deterrents
Photo: Heidi Henrichs, Cornell

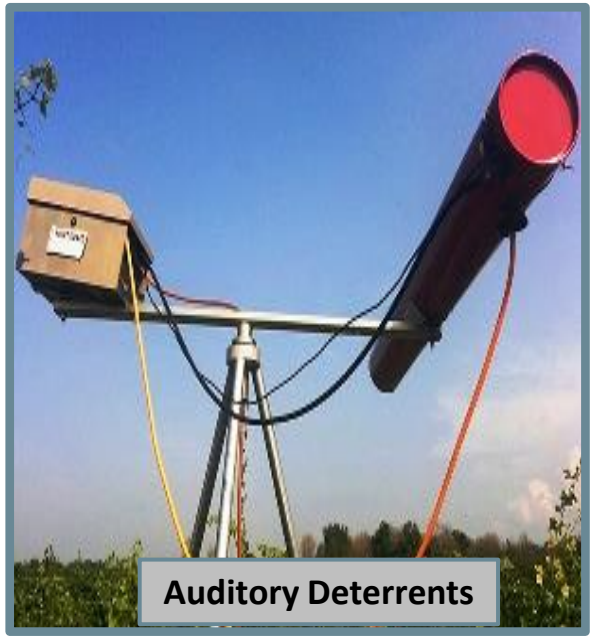


Physical Exclusion
Photo: growgreatfruit.com

Dogs
Photo: mooseyscountrygarden.com

Hunting (Killing)
Photo: decathlon.mt

Encourage Predators



Auditory Deterrents

Legislation: Fish and Wildlife Conservation Act

- Ontario Ministry of Natural Resources and Forestry (MNRF)
- Allows property owners or their agents to protect their property from wildlife damage. You are allowed to:
  - Harass ("scare away"), capture (trap) or kill (hunt) wildlife on your own land, if you believe on reasonable grounds wildlife is damaging or about to damage property. Not applicable to endangered species/migratory birds.
  - Use an agent to do the above
  - Protection of property is not considered hunting. Can occur at any time (during or outside of hunting season)
  - In most cases, no authorization is required from MNRF and there are no reporting requirements (except deer)

FWCA - Limitations


Photo: C. Bishop, wildlifehelp.org


Photo: squirrelenthusiast.com

FWCA - Limitations

- You cannot cause unnecessary suffering or kill more animals than necessary
- Protection of property activities may only occur on the property owner's land
- Wildlife agents must fit the criteria defined in the act
- Wildlife captured but not killed must be released or handed over within 24 hrs. Release in close proximity (~ 1 km) to point of capture
- Firearms may be used - follow federal, provincial and municipal firearms laws/bylaws
- Live traps are permitted for protection of property. Body-gripping traps are prohibited except for specific circumstances (e.g. you are a farmer as defined under Act)

Legislation: Pesticides Act

- Ontario Ministry of Environment, Conservation and Parks (MECP)
- Regulates use of pesticides/rodenticides in Ontario. Permits use of registered rodenticides and poisons in certain situations.
- The FWCA prohibits use o n of property. However, where conflict appears, th
- Any pest control product th Canada's (federal) Pest Control Products Act

Various other federal, provincial or municipal legislation may also apply, depending on the situation!

Farming and Food Production and Protection Act

- Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)
- Protects farmers from nuisance complaints (noise, light odour, etc.) made by neighbours, provided they are following "normal farm practices"
- No municipal bylaw applies to restrict a "normal farm practice" carried on as part of an agricultural operation
- **Does not mean a farmer can do whatever they wish on their property**
- In the case of a conflict, there may be a hearing by the Normal Farm Practices Protection Board to determine if (1) you are an agricultural operation and (2) the practice is normal or can be made normal
- **Decisions are made on a case by case basis**

Habitat Modification

- Where possible, locate new orchards away from woodlots, fencerows or other habitat
- Expose rodents to predators by:
  - Mowing long grass/cover regularly
  - Remove mulch and debris 60 cm from base of trees
- Manage tree architecture to discourage mouse nesting
- Appropriate cover crop management (e.g legumes encourage some voles)

Physical Exclusion

Netting

- Highly effective against birds. Other pests?
- Probably not practical or cost effective for orchards and large trees

Electric Fence

- Not effective against tree squirrels due to ability to jump
- May help against racoons
- For ground squirrels and chipmunks, would need to be buried deeply and have small openings

Deer Fence

- Effective against deer if properly constructed and at least 7-8 ft high
- Probably only cost effective in areas where deer populations are high

Tree Guards

- Effective for protecting young trees from mice and rabbits
- Bury 5 cm deep
- Must be removed after 1-2 years and for spraying, sucker control


Photo: squirrelenthusiast.com

Hunting/Killing

- Follow all relevant regulations (permit required for deer)
- Time consuming and costly
- For rodents and birds, generally not effective at eliminating all pests from the orchard, especially when orchards are located close to woodlots

Trapping


Photo: wildlifehelp.org

- Trapping has been successful for squirrels in Oregon
- Time consuming for grower, can be costly to use trapper
- Traps most effective when attached to a post (~ 2 ft high) along the outer row of orchards
- Use multiple traps
- Bait with a hazelnut
- Follow all MNRF regulations for traps and disposal of animals

Dogs


Source: thestar.com

- Trained working dogs, especially with a handler, can be good deterrents for birds and rodents
- Contain in orchard with fence
- FWCA – dogs cannot run at large in areas with big game (e.g. deer)
- With no big game, can be used in protection of property


Source: mooseyscountrygarden.com

Falconry


Source: wildlife.utah.gov

- Effective – consider costs
- Licenced falconers who qualify as a wildlife agent under the FWCA may assist in protection of property
- Note: only some classes of wildlife agents are permitted to kill, others are only permitted to harass or capture

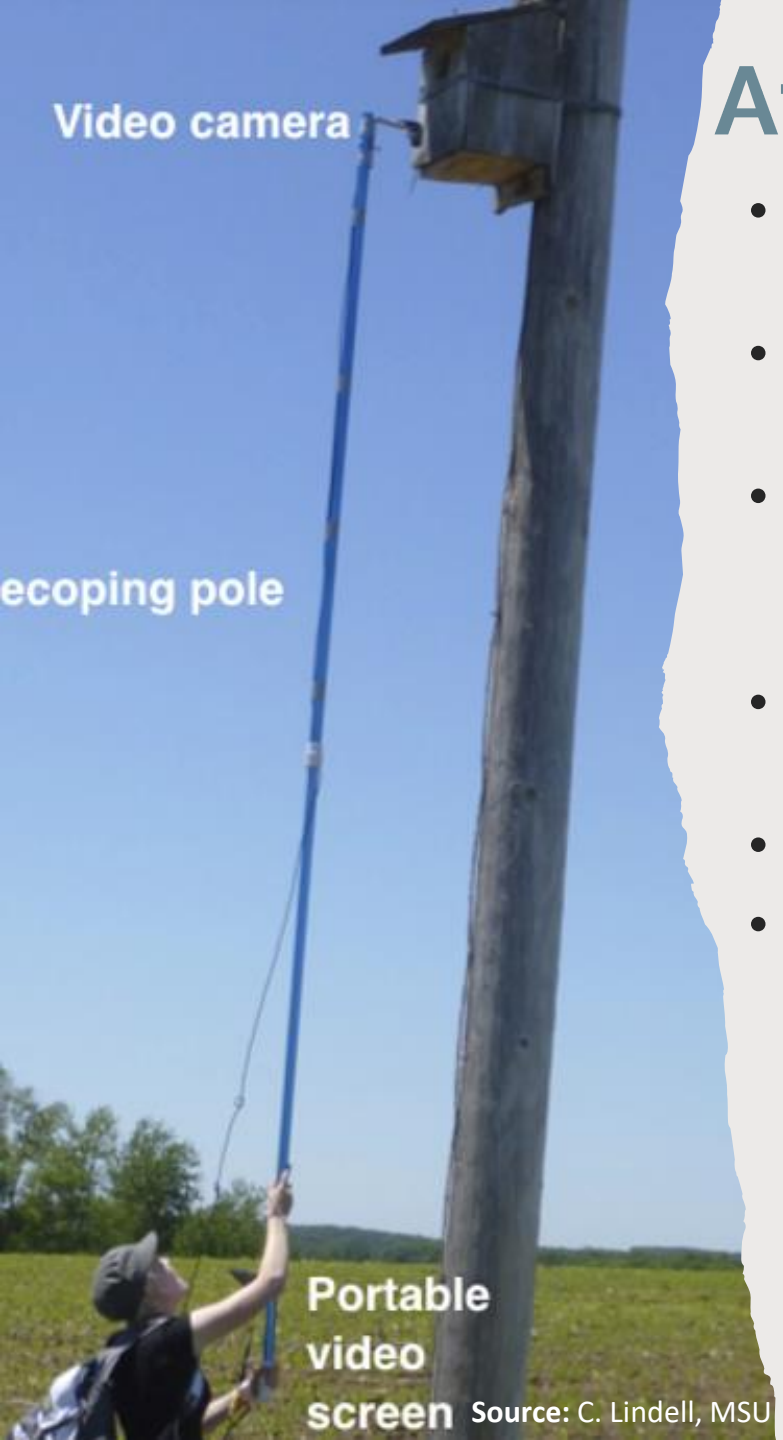
Baits/Repellents

- No poison baits registered for use on hazelnut for any vertebrate pest except mice (including tree squirrels)
- Some poison baits registered for certain species of mice and vole in orchards
- Closely follow label instructions
- Must limit access to non-target organisms (bait stations)

- Repellents are also pesticides. No commercial products registered on hazelnut.
- Homemade repellents (e.g. soap)
  - A grey area… technically must be registered

Attract Beneficial Birds

- Provide nest boxes or perches to attract predatory birds (kestrel, owls, hawks)
- Mount 6 m or higher, away from wooded areas
- Effective at reducing pest bird numbers/activity in several studies from MI and ON
- Used in Oregon to reduce squirrel numbers
- Kestrel activity greatest from May-July
- Do not use rodenticides



Source: C. Lindell, MSU


Source: M. Hamilton

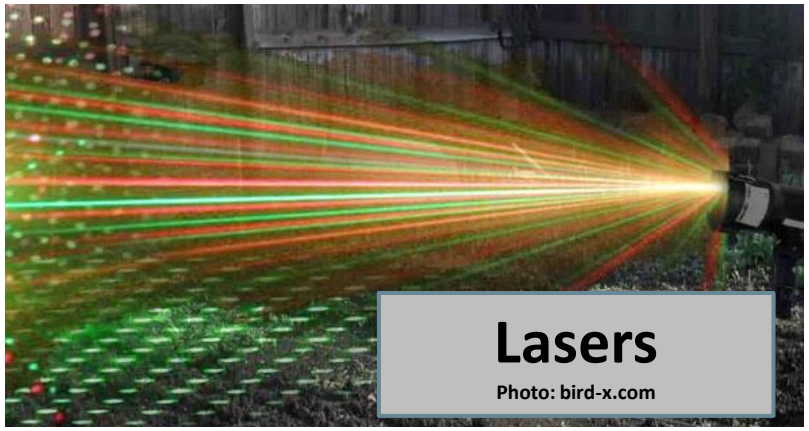

Source: Clover Mountain Dairy

Electronic Sound Devices (Squawkers)

Bird Banger

Auditory Deterrents

Streamers, Mirrors, etc



Lasers

Photo: bird-x.com

Air dancers

Photo: Heidi Henrichs, Cornell

Scare-eye balloon

Predator Kites

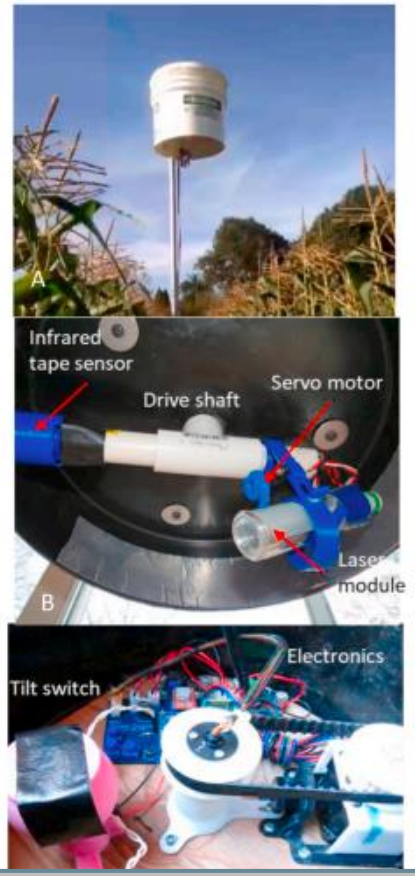
Visual Deterrents

Source: Egan et al. 2020

Raptor-shaped drones

Not available yet

R.N. Brown and D.H. Brown



Laser scarecrows

https://youtu.be/L7MkDlT-1Sk

Mixed effectiveness, depending on bird species

Photo: Rebecca Brown, University of Rhode Island

Visual Deterrents New Technologies

Deterrents – Rules of Thumb

- Moderately effective against birds. Other vertebrates?
- Use several tactics in combination
- Birds can become habituated
- Set up *before* crop becomes attractive to birds
- More useful if they are moved around and noises/lights go off randomly
- Can lead to neighbour complaints – communicate with neighbours
- Power source may be required
- Issues using with rain/dogs (air dancers)

Source: Heidi Henrichs, Cornell

Summary

- Know which species are causing issues
- Smaller, isolated crops surrounded by woodlots have more damage
- Damage varies with farm and year
- Trapping, encouraging predators, air dancers, among others, have shown promise (not alone)
- Multiple tactics are required to manage vertebrates
- Must be in place **prior** to pest finding the ripening crop!
- Avoid predictable control patterns
- Follow all relevant regulations pertaining to management
- Efficacy depends on farm location and bird species

For more information:

- *Harass, capture or kill a wild animal damaging private property*

https://www.ontario.ca/page/harass-capture-or-kill-wild-animal-damaging-private-property

- OFA Fact Sheet: *Nuisance Wildlife, What can you do?*

https://ofa.on.ca/resources/nuisance-wildlife/

- *MNRF's Strategy for Managing and Preventing Human-Wildlife Conflict (2008)*

https://www.ontario.ca/page/strategy-preventing-and-managing-human-wildlife-conflicts-ontario

- Information for preventing and managing conflicts with wildlife:

https://www.ontario.ca/page/prevent-conflicts-wildlife

- *The Farming and Food Protection Act and Nuisance Complaints*

https://www.ontario.ca/page/farming-and-food-production-protection-act-1998-and-nuisance-complaints

- *Attracting Birds of Prey for Rodent Control* https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/ec1641.pdf
- *Bird control in horticultural crops* https://www.ontario.ca/page/bird-control-horticultural-crops#section-3
- Contact your local office of MNRF

Photo: P. Trimming, Croydon, England, creativecommons.org

Questions?

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HAZELNUT RESEARCH PROJECT ANNOUNCEMENT

HAZELNUT RESEARCH PROJECT

In collaboration with the Ontario Ministry of Agriculture and Rural Affairs, the Gordon S. Lang School of Business Economics is researching the Ontario hazelnut sector, addressing the following areas of interest.

Supply Chain Configuration

Opportunities for Market Growth

Process Efficiency

THE UNIVERSITY OF GUELPH RESEARCH TEAM WOULD LIKE TO HEAR FROM YOU!

Jonathan Parkes, Ph.D. Student

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