Crop loss in horticulture due to birds is an on-going and increasing cost to growers. Estimates of damage vary but are generally reported in research literature as 30% to 35% of small berry production, 7% for wine and table grapes, 13% for apples and pears, 16% for stone fruits, and 22% in the nut crops. \(^1\) This includes whole fruit being consumed, fruit knocked off bushes or canes, and unsalable fruit (pecks, holes, slashes). These estimates are consistent with the OFVGA grower survey conducted in 2012 which reported 35% losses in berry crops, 10% loss for apples, 15% for tender fruit, and 7% for grapes. However, the OFVGA numbers include damage by all wildlife not just birds.

One of biggest mistakes growers make is waiting until damage becomes obvious before taking action. Discouraging bird feeding becomes difficult, if not impossible, once a feeding pattern has been established and birds recognize the crop as a food source.

The time when fruit matures appears to influence the amount of damage. Bird damage tends to be worse on early-maturing cultivars. Fruit that ripens early may be damaged more often because it matures when other food is not available or is less desirable. \(^2\)

Growers also tend to limit their control to a single method, like a banger or propane gun, and leave it operating without checking its effectiveness. Birds exposed to a frequently repeated stimulus will habituate quickly and the tool will lose its effectiveness at scaring them away.

Some bird species are sedentary and live within a small area; others actively move around within a region or seasonally migrate into a region. Seasonally migratory species are not strongly attached to a territory in later summer or fall as nesting is finished. This coincides with the time when fruit is vulnerable to attack. Hence, mobile and non-sedentary species (e.g. robins) should be easier to scare away than sedentary species (e.g. sparrows) which are strongly attached to their territory and will often have nowhere else to go if all neighbouring territories are occupied. When mobile bird species are involved it may be best for a group of neighbours to jointly address a problem or birds may simply be moved from one property to another. \(^3\)

Not all bird species present will damage fruit and no control techniques will be effective against all species. Similarly, different species may cause damage in different years depending on environmental factors such availability of alternate food sources because of drought, frost, etc. The abundance of insects and weather influence the number of birds and feeding behaviour and subsequently bird damage levels. Scaring will also be more successful when alternative appealing feeding sites are available.

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\(^1\) The literature did not specify whether these losses were industry wide averages, including both fields which used deterrents and those that were totally unprotected, or just losses in unprotected fields.

\(^2\) Brittingham, Margaret C., Falkor, Shannon T., Controlling Birds on Fruit Crops, College of Agricultural Sciences Agricultural Research and Cooperative Extension, Penn State, 2010.

\(^3\) Tracey, J., Bomford, M., Q., Saunders, G., Sinclair, R. Managing Bird Damage to Fruit and Other Horticultural Crops, Bureau of Rural Sciences, Canberra, 2007.
and insect pests, where we distinguish between species and adjust pest control actions accordingly.

**Birds usually feed in the early morning and late afternoon when they are most active although some species feed in late morning.**

### Site Characteristics and Management

The characteristics of the property and the surrounding area are perhaps the most important factors affecting levels of bird damage. Crops with adjacent suitable roosting habitat or perching sites, such as native vegetation, windbreaks or nearby power lines, are more likely to suffer greater damage.4

Planting alternative food sources to entice birds to leave the commercial crop alone has been used successfully with sunflower crops but is controversial and requires further research to determine effectiveness for fruit crops. A decoy crop needs to be at a stage of maturity where birds will feed on it just before the grower’s commercial crop becomes vulnerable to attack, so that the birds’ feeding patterns are established on the decoy food. The lure crop also has to be at least as palatable as the commercial crop. Scaring can be used in conjunction with decoy feeding but should be kept well away from the decoy site. It may take more than one season to develop established feeding patterns on a particular decoy site.

### Visual Devices

Visual deterrents rarely provide sufficient protection by themselves and birds do not react as much to them as to sound and noise. Visual deterrents generally fall into two categories: those that simulate predators and those that are shiny and reflect light. Predator simulators include models of predatory birds (some with moving parts), large hawk-shaped kites, predator bird drones (remote control birds with flapping wing movements), and inflatable balls with reflective predator eyes and markings. These devices are generally more effective if paired with an auditory deterrent such as a distress call.

The following list of best practices was compiled by Marsh et al. (1991, 1992) based on their review of world literature on scarecrow and predatory bird models. For best results, scarecrow and predatory bird models should:

- appear lifelike;
- have motion (for example, pop-up scarecrows and windblown predator models);
- be highly visible;
- be moved frequently to new locations in and around the crop to help prevent habituation;
- be supported by additional control methods, such as shooting to scare, or other acoustic scaring devices; and
- be started before birds develop a feeding habit in a crop.

Different pest bird species may have different responses to scaring devices. Blackbirds reportedly do not like the colour yellow so they will avoid areas immediately around yellow scare-eye balloons. Sparrows and finches are less frightened, while robins and cedar waxwings are hardly repelled at all. Scare-eye balloons must be suspended above the crop and must move freely with the wind to look more realistic. Flashing lights and mirrors seem to work well for starlings. However, flashing lights are only effective at dawn or dusk when the natural light

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4 Ibid.
is dim, and mirrors only work when the sun is shining so consider when the birds causing damage to your crop tend to feed, i.e. dawn, late morning or dusk. Some growers have mounted mirrors on top of rotating propane-fired cannons and, from above, the mirrors appear to be moving.

In Ohio, red-winged blackbirds and sparrows were scared from grain and sunflower crops by reflecting tape but American goldfinches and mourning doves were not. Reflecting tape was also found to be ineffective for frightening starlings, American robins, house finches, mockingbirds and grey catbirds feeding in blueberry plots. The researcher speculated that reflecting tape might be more successful against flock-feeding birds than those that feed solitarily or in small groups.\(^5\)

Despite long held beliefs, most bird species do not seem to be scared by bird carcasses unless they are lifelike or in a threatening pose, and even then habituation develops rapidly. Snake and cat models are equally ineffective.

Visual scaring devices are simply something new and unusual in the birds’ environment, and they soon learn to ignore them. Wind conditions are important, because wind creates motion and sometimes sound, which increases their effectiveness. In general, visual scarers offer only short-term protection, as birds quickly realise that they pose no real threat. For example, some birds habituate to predator kites after only five hours’ exposure.\(^6\)

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produce loud bangs. Shooting (if used and permitted) should always be initiated before other forms of auditory scaring so that birds make a connection between a loud bang and real danger. Other bird-control methods (bangers, crackers, poppers, bombers, sirens, etc.) rely on perceived danger for their effect. These tools are good for short-term control as scare devices that produce sounds, other than alarm or distress calls, have no persistent effect on food intake of birds. Pyrotechnic pistol cartridges are also available with delayed explosions and/or sustained whistles that disorient and frighten birds. None of these units should be set to go off at intervals of less than three minutes.

Taped bird warning calls tend to have a longer-term impact than loud noise makers but, as with the explosive noise devices, birds soon become comfortable with the sound. Alarm calls alert nearby birds to the presence of danger, and the usual response is immediate flight. Distress calls are typically loud ‘squawks’ given by birds held captive, either in a net or by a predator. The common response to a distress call is for surrounding birds to be attracted to the site, where they often fly around making a lot of noise in what is called mobbing behaviour. Generally, distress calls are likely to be less effective for scaring birds than alarm calls, but distress calls are sometimes used because they are easier to record.

The quality of the distress call recording is also important; the intricacies of bird calls must be replicated to a level where they will trick and scare a pest bird in order for it to be worthwhile. Birds have dialects that are specific to a certain area; using calls from the local bird dialect will be most effective.

Some farmers report that digital recordings also attract birds of prey, such as hawks, who misinterpret the electronic distress calls for the real thing. Hawks circling the farm will also scare away birds. Taped calls may be more effective when paired with a moving hawk or owl figure clutching a prey.

In summary, best results with auditory deterrents are obtained when:
- scaring devices are introduced when a crop is at the early stages of ripening, and before birds have established a habit of visiting the site;
- sounds are presented at random intervals;
- a range of different sounds and frequencies are used;
- the sound source is moved frequently and only used for the minimum time needed to get a response;
- sounds are supported by other methods, such as distress calls or visual deterrents; and,
- sounds are reinforced by real danger (e.g. shooting).

Some literature also suggests that it is possible that once birds habituate to a scaring device, it could then work as a cue indicating the presence of available food. Under these circumstances it would attract birds to the crop as they have learned that food is available when they hear that sound. As well, ineffective scaring may actually escalate damage levels. For example, if a grower uses a

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A scaring device that results in the birds flying out of an orchard or vineyard every time a device fires, only to return and continue feeding, then damage to the crop will likely be increased. This is because the birds drop the fruit they are eating when the device fires and pick another when they return, thereby increasing the amount of fruit affected. In addition, each time birds fly away and then fly back again they use extra energy and thus need more food to satisfy their energy needs.

Experiments conducted to date indicate that ultrasound probably cannot be heard by birds.

Chemical Deterrents

In Ontario, there are currently no chemicals registered for use to control birds in fruit crops; it is illegal to use unregistered chemicals.

A number of non-lethal bird repellents are advertised that contain chilli or compounds that taste bitter to humans. Because birds have very different taste receptors to humans and are insensitive to many compounds that humans find distasteful, these repellents are unlikely to work. For example, a chilli extract with a heat strength claimed to be over 80 times that of the strongest chillies used by humans was tested on sparrows, and they ate it without any adverse reaction. Naphthalene (used in moth balls) and capsaicin (ingredient that makes peppers hot), although marketed in the U.S. as bird repellents, have not been shown to be effective in deterring birds in several research trials. Mint derivatives and caffeine are two other repellents that have undergone preliminary testing however further field investigation is required before these can be recommended for application to horticultural crops.

Applications of sucrose syrups have been demonstrated to repel birds from blueberry plantings (see text box). The exact method of repellency is not well documented, but it is thought birds such as European Starlings and American Robins are unable to digest the disaccharides in sugar. Most birds are able to digest simple monosaccharide sugars found in fruits.

Netting

Netting continues to be the most complete and effective way to reduce bird damage in small fruit crops. It is relatively expensive compared to other methods and probably the most labour intensive but it is also the most durable. Bird netting costs vary considerably with type, manufacturer, and quality. The initial installation costs may be quite high but, with proper care, the netting may last three to 10 years so costs may be pro-rated over the life of the material.

Nylon, polyethylene, cotton, plastic-coated wire and other netting materials are available. Some reports suggest ¼” mesh to exclude small birds but others go as large as ¾” mesh; knowing the pest species should guide the choice of netting material.

Support posts that are pounded rather than augured give stronger support. Augered posts should be set in concrete for additional stability. Pounded anchor posts need to be set outside netted areas to serve as additional support for outside posts. Tops of poles are generally covered with some type of smooth covering (rubber inner tubes, plastic bottles etc.) to protect netting as it is applied and removed, and as it moves in the wind.

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Even if crops are protected with netting, birds may perch on the nets and feed through them. If nets are used on crops with a history of bird damage, a temporary scaring program should also be used when the nets are first introduced to break the birds’ habit of feeding on the crop. Otherwise birds may peck or tear at the netting to try to get inside.

Where bird damage is worst around the edges of a crop, it may be worthwhile netting just the edges of a large crop. Scaring devices can then be used to keep birds away from the crop centre. If birds are forced to feed in the centre of a crop, well away from shelter, they may feel less comfortable and scaring may be more effective. Alternatively, it may be more beneficial to leave a couple of outside rows uncovered and net crop rows further into the field. The outside rows act a sacrificial decoy crop.¹²

Permanent total exclusion system in a nectarine orchard in Australia

Source: Managing Bird Damage to Fruit and Other Horticultural Crops, Bureau of Rural Sciences, Canberra, 2007.

Shooting

In Ontario, there are basically three acts which protect wildlife: the Fish and Wildlife Conservation Act (1998), The Endangered Species Act and the federal Migratory Birds Convention Act. Generally, a landowner may capture, kill or harass wildlife protected under the Fish and Wildlife Conservation Act in protection of their property. This includes, but is not limited to, raccoon, skunk, weasel, fox, coyote and beaver (including their dams); small game such as rabbits and squirrels; and birds such as crows, cowbirds, starlings, grackles, blackbirds and wild turkey.

Canada geese fall under the Migratory Birds Convention Act. There are provisions for obtaining a scare or kill permit out of season through the Canadian Wildlife Service but it may be difficult for the grower to document severe crop damage and receive the permit in a timely manner.

Normally, shooting does not significantly reduce bird populations but it does frighten them out of the orchard or field. Laws protect robins and northern orioles but special permits may be obtained to kill them if the grower can demonstrate they are causing significant damage to the crop. These permits are also obtained from the Canadian Wildlife Service, Environment Canada.

Some municipalities have no-discharge of firearm bylaws to promote safety within more built-up areas. Many of these bylaws have exemptions allowing rural landowners to discharge firearms to control wildlife causing damage to their property. Growers should check the bylaws with their local municipal office and, if necessary, ensure that they understand the need for rural landowners to have this exemption.

Additional References:


Ministry of Natural Resources - Look under the Wildlife Management, Living with Wildlife, and related links pages www.mnr.gov.on.ca

Ontario Federation of Anglers and Hunters can advise on hunting regulations or how to locate a hunter in your area. 705-748-6324, ofah@ofah.org www.ofah.org

S. Fitzgerald for Ontario Fruit and Vegetable Growers Association, May 2013.