

Using Propane-Fired Cannons for Bird Control in Vineyards

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INTRODUCTION

Crop damage caused by birds is a problem in all grape-growing areas of the world. The problem is worsening as more hectares of cultivars are grown. Damage begins when grapes start to colour (veraison), signifying change from growth to ripening and the accumulation of sugars. Damage continues until harvest in early fall or winter with grapes harvested for ice wine. A field trial ^[1] with no bird controls reported losses of 50% for Cabernet Franc and 100% for Cabernet Sauvignon by late October. Although birds prefer blue/red French hybrids and red Vinifera grapes, damage is reported in all cultivars.

Propane-fired cannons are a commonly used bird control strategy to address this issue. This factsheet outlines best management practices (BMPs) for using propane-fired cannons for bird control in vineyards. They are practical, researched actions to protect the environment, improve efficiency and support long-term sustainability of farm operations, while minimizing the risk of causing disturbance to neighbours.

BIRD CONTROL STRATEGIES

There are many bird control strategies: visual (streamers, balloons, lights, fake hawks), physical (nets), natural predators and acoustical deterrents

(electronic sound devices, pyrotechnic pistols, bird bangers). Experts agree that a combination of methods is required. Refer to the OMAFA factsheet, [Bird Control in Horticultural Crops](#), for more information on different bird control methods and devices.

One acoustical option is a propane-fired, bird-scaring cannon — also known as a bird banger — that emits cannon-like sounds (Figure 1). Several countries report using bird bangers to control crop damage. A 5-year Manitoba study ^[2] concluded that bird bangers were very effective for scaring birds away from field corn and sunflowers. Double-firing bird bangers were found to protect more than twice the area of a single-firing one. Today, most bird bangers are triple firing, which are even more effective at keeping birds away.

Some neighbours do not like the sound from bird bangers. Ironically, grapes are grown near many neighbours since people like living near vineyards. Neighbours should be tolerant of growers who use bird bangers as there are limited areas of Ontario with favourable growing conditions for grapes. Likewise, growers should be tolerant of neighbours' needs. Refer to the section *Dealing with Potential Nuisances and Normal Farm Practices* for more information.



Figure 1. Side view of a bird banger.

HOW BIRD BANGERS WORK

Typical bird banger configurations consist of a cylindrical barrel about 100 mm (4 in.) in diameter and 0.8 m (32 in.) in length that is open at one end and has a spark plug at the other end, a control system box, a 9-kg (20-lb) tank of propane gas and valves. When activated, a valve lets propane gas into the barrel that is ignited by the spark plug. An explosive sound is created, which is emitted through the barrel's open end.

To spin uniformly in all directions, most bird bangers are mounted on a tripod with one adjustable leg to level it. Triple-firing bird bangers produce a series of three shots over about 17 seconds — the first startles birds, the second drives them away and the third is intended to make sure they do not return. The momentum from the shots causes the barrel to recoil and spin away from the direction of emitted sound (Figure 2). Tests showed that bird bangers can spin up to 10 times before stopping due to recoil. It was also found that, if properly levelled, a bird banger will fire in all directions over time, although wind speed and direction can affect final pointing direction. If bird bangers are not level, they will fire more often in one direction than another, which causes a greater disturbance if it is in the direction of a neighbour's home.

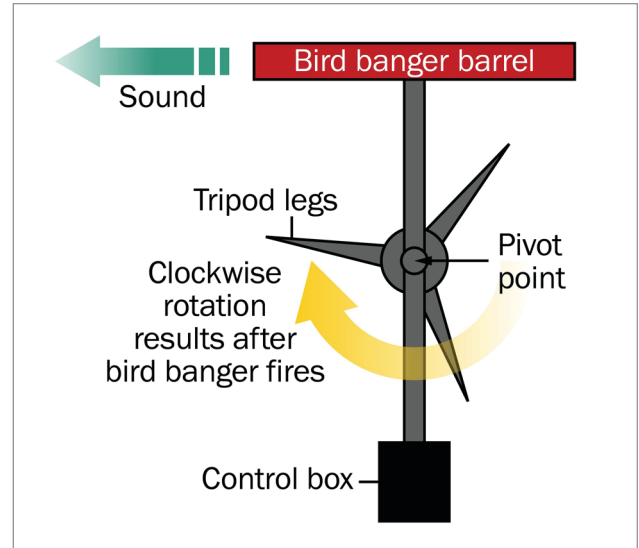


Figure 2. Overhead view of a bird banger showing the emitted sound path and resulting spin direction.

The firing time duration can be adjusted using the control box in the bird banger. Use Table 1 to determine the appropriate time duration setting based on provided geographic locations. Figure 3 shows a drawing of a timer mechanism inside a control box set to start and stop the bird banger in the morning and evening of September 26 in Harrow, Ontario.

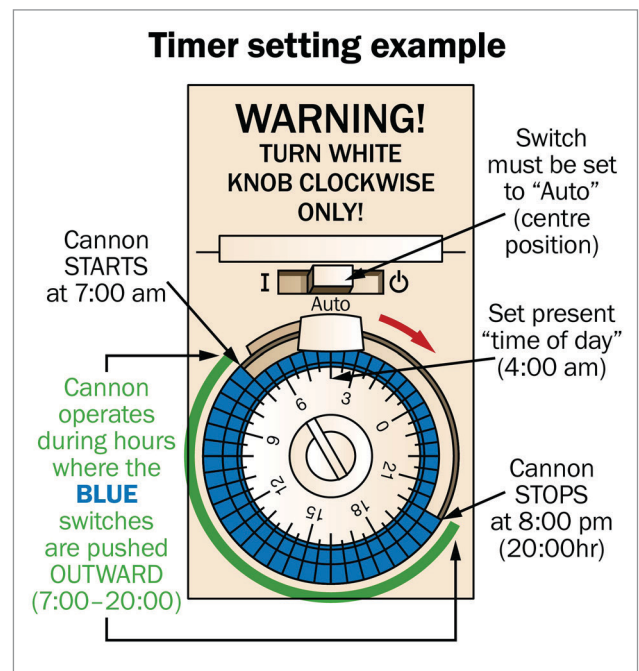


Figure 3. Example setting of a bird banger control system box timer.

Table 1. Start/Stop Times for Operating Bird Bangers
Earliest start times (30 min. before sunrise) and latest stop times (30 min. past sunset) for bird bangers through typical veraison to regular or ice wine harvest dates.

Dates	Vineland W79°24', N43°09'		Harrow W82°52', N42°02'		Wellington W77°14', N44°00'	
	a.m. Start	p.m. Stop	a.m. Start	p.m. Stop	a.m. Start	p.m. Stop
1 Aug	5:39	9:09	5:55	9:20	5:28	9:02
8 Aug	5:46	9:00	6:02	9:11	5:35	8:53
15 Aug	5:54	8:49	6:10	9:01	5:43	8:42
22 Aug	6:01	8:38	6:17	8:51	5:51	8:31
29 Aug	6:09	8:27	6:24	8:39	5:59	8:19
5 Sep	6:17	8:15	6:32	8:28	6:07	8:07
12 Sep	6:24	8:02	6:39	8:15	6:15	7:54
19 Sep	6:32	7:50	6:46	8:03	6:23	7:41
26 Sep	6:40	7:37	6:54	7:51	6:31	7:28
3 Oct	6:48	7:24	7:01	7:39	6:39	7:15
10 Oct	6:56	7:12	7:09	7:27	6:48	7:03
17 Oct	7:04	7:01	7:17	7:16	6:57	6:51
24 Oct	7:13	6:50	7:25	7:06	7:06	6:40
31 Oct	7:22	6:40	7:34	6:56	7:15	6:30
Daylight savings time changes first Sunday in November						
7 Nov	6:31	5:31	6:42	5:48	6:24	5:21
14 Nov	6:40	5:24	6:51	5:41	6:33	5:13
21 Nov	6:48	5:18	6:59	5:35	6:42	5:07
28 Nov	6:57	5:15	7:07	5:32	6:51	5:03
5 Dec	7:04	5:13	7:15	5:30	6:58	5:01
12 Dec	7:11	5:13	7:21	5:30	7:05	5:01
19 Dec	7:15	5:15	7:26	5:32	7:10	5:03
26 Dec	7:18	5:19	7:29	5:36	7:13	5:07

The frequency of random firing during the set time duration and the loudness of firing can also be adjusted within the control box. Figure 4 shows the inside of a control box where these settings are adjusted. Settings “1” through “4” correspond to random firing frequency settings, and settings “A” and “B” correspond to quiet and loud firing volume settings.

One set of 3 firings can be set based as follows:

- 1 = Frequency 1 (2–4 min.)
- 2 = Frequency 2 (4–8 min.)
- 3 = Frequency 3 (8–16 min.)
- 4 = Frequency 4 (16–32 min.)

For example, on setting “2,” expect sequences to average about every 6 min. The randomness in the timing of the firing is intended to prevent the birds from becoming used to the propane ignition events.

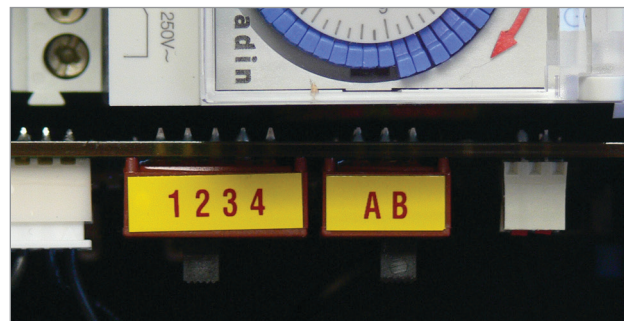


Figure 4. Bird banger firing frequency and loudness settings (in control box).

BEST MANAGEMENT PRACTICES (BMPS)

The principle for best management practices for bird bangers is that they are only used to protect fruit bearing, marketable grapes from bird predation. The number of bird bangers operated should be appropriate for the bird pressure present. **Malicious use for any other purpose must not be tolerated.**

- Follow recommended setbacks for bird bangers to neighbours’ homes based on the ring-graph method (Figure 5 and refer to the section *Determining Minimum Setbacks to Neighbours’ Homes*).
- Tell neighbours living within 175 m (575 ft) of bird bangers when and how they will be operated and who to call if there is a problem.
- Start operating bird bangers no earlier than 3–4 weeks prior to veraison and stop right after harvest. **Do not operate outside this season.**
- Operate bird bangers during daylight hours, between 30 min. before sunrise and 30 min. after sunset (Table 1). **Do not operate bird bangers at night in your vineyard.**
- Place adjacent bird bangers no closer than 125 m (410 ft) from each other, unless the area of crop being protected is less than 4 ha (9.9 acres), in which case place them no closer than 100 m (328 ft), as smaller properties are often awkwardly shaped. To calculate hectares of grapes needing protection, include the area of land currently of crop-bearing age that is marketable in the current year.

- Adjust timers to account for changes in sunrise and sunset times throughout the season especially at Daylight Savings Time if bird bangers are still necessary beyond this date until harvest (Table 1).
- Where practical, move bird bangers weekly so birds do not get used to their location.
- Do not place bird bangers within a grape row directly in line with a neighbour's house, as the row canopy can channel the sound towards the house.
- Monitor bird bangers regularly so they operate properly (check at least once a week), especially those not on or near the home farm.
- Consider local topography. For example, placing bird bangers along the Niagara Escarpment can result in echoing.
- Use light sensor override devices to ensure bird bangers cannot operate at night, even if timers are adjusted improperly, especially on properties where the vineyard manager lives off-site.

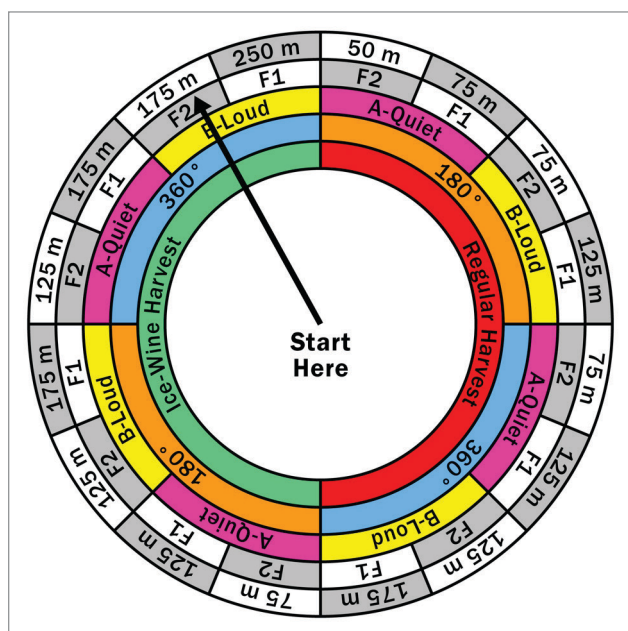


Figure 5. Ring-graph used to determine bird banger setbacks to neighbours based on management strategies.

DETERMINING MINIMUM SETBACKS TO NEIGHBOURS' HOMES

It is impractical to create setbacks based on site-specific measured sound levels in decibels (dBA) from every bird banger. The emitted sound level is the same as it leaves the barrel of a bird banger, but it varies greatly after release depending on local weather conditions, wind speed and direction, topography, ground cover, direction of firing, obstructions such as buildings, etc.

Under most circumstances, the BMP setback is 125 m (410 ft) from neighbours for normal operation of a bird banger when it is operated:

- during the regular grape season, ceasing about the end of October (**not** the extended season for ice wine, which could go well into winter some years)
- with proper levelling of the bird banger so it spins uniformly 360° in all directions (**not** when set to fire only in a 180° plane away from a neighbour's home)
- with the "B-loud volume" setting (**not** the "A-quiet volume" setting, available on some bird bangers)
- on Frequency 2 setting (4–8 min. sequence interval, **not** Frequency 1, 2–4 min. interval)

The 125-m (410-ft) setback is based upon field sound level measurements at varying distances from a bird banger and under different bird banger settings. Other setbacks also make sense if practices are used that increase sound levels (requiring greater setbacks) or decrease sound levels (requiring lesser setbacks). A ring-graph (Figure 5) is used to determine appropriate bird banger setbacks based on management strategies.

Example

A grower with ice-wine grapes fires a bird banger in all directions on “B–loud volume” setting, with a Frequency 2 (4–8 min.) firing sequence. Using Figure 5, determine what setback from neighbours’ homes is recommended.

Enter Figure 5 from centre, moving through the layers:

- Ice-Wine Harvest
- 360° (meaning bird banger fires in all directions)
- B–Loud
- F2 (4–8 min.)
- 175-m setback

To reduce the setback to 125 m, set the bird banger on “A–Quiet” or restrict it to fire only in the 180° plane away from a neighbouring home.

Field tests explored setbacks based on different settings than those outlined in Figure 5. Sound levels and annoyance for neighbours are:

- **increased** if the harvest season is extended for ice wine, as no vegetation is present to muffle sounds, and the long season extends the annoyance period. This effectively adds 5 dBA compared to regular-season use.
- **increased** if bird bangers are set on the faster Frequency 1 (2–4 min.) sequence interval, which effectively adds 5 dBA compared to the Frequency 2 sequence interval (4–8 min.) (Figure 4). Note, few grape growers operate bird bangers on Frequency 3 (8–16 min.) or Frequency 4 (16–32 min.) because the firing interval is too long to effectively keep birds away.
- **reduced** if a bird banger is physically prevented from firing directly at or within the 180° plane of home(s). This can be accomplished using springs or stops. This effectively drops sound levels 5 dBA compared to bird bangers that can fire in all directions, including sometimes in the direction of home(s).
- **reduced** if the bird bangers are set on the “A–quiet volume” setting, which effectively drops sound levels 5 dBA compared to the “B–loud volume” setting (Figure 4)

DEALING WITH POTENTIAL NUISANCES & NORMAL FARM PRACTICES

Respect and tolerance between farmers (including greenhouse operators) and their neighbours are essential for maintaining good community relations. Explaining to neighbours the importance of certain activities or devices required for farming operations that are prone to creating a nuisance can help build a better rapport with neighbours.

To help prevent nuisance complaints, farmers are encouraged to be proactive in communicating any activities or devices they are using as part of their agricultural operation that could result in a nuisance caused by a disturbance that is covered under the [Farming and Food Production Protection Act, 1998 \(FFPPA\)](#). Explaining the necessity of these activities for successful farming operations can help foster goodwill and reduce the likelihood of complaints. Similarly, neighbours of farming operations (including greenhouses) are encouraged to communicate with the farmers if they experience disturbances. Addressing concerns collaboratively before involving local authorities or the Ontario Ministry of Agriculture, Food and Agribusiness can lead to more effective and amicable resolutions.

Refer to the Resources section for more information on dealing with nuisance complaints.

SUMMARY

Propane-fired cannons are the most common devices used to prevent bird activity in vineyards. However, regular use from fixed locations can lead to habituation, reducing their effectiveness over time. To maintain their deterrent impact and minimize nuisance complaints from neighbours, it is recommended to regularly reposition the devices, adjust the sound levels (within the permissible range) and adhere to minimum set-back requirements.

REFERENCES

- [1] Fraser, H.W. 2005. *Presentation at Ontario Fruit and Vegetable Conference*, February 2005.
- [2] Harris, H.A.G. 1983. *Blackbird Predation on Field Crops in Southern Manitoba*.
Summary from Annual progress report on the AGRO-MAN (Central Plains Special Crops Protection Association) Blackbird Control Project.

RESOURCES

OMAFa Factsheet *Bird Control in Horticultural Crops*

OMAFa Factsheet *The Farming and Food Production Protection Act, 1998 (FFPPA) and Nuisance Complaints*

OMAFa Factsheet *Responding to Agricultural Nuisance Complaints*

OMAFa Video *Bird Bangers — How They Work*

OMAFa Video *Bird Bangers — How to Set the Controls*

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