



# Comparing Bird Management Tactics for Vineyards and Berry Crops

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Grapes and berry crops provide fruit-eating (frugivorous) birds with a buffet more appealing than most anything else around. Ten minutes in a vineyard can provide the same amount of food as an hour foraging in the wild.

Although bird control is expensive, the cost of ignoring birds is much higher. This is something all Midwest berry growers should factor into their management plan.

This article compares existing bird control tactics and emerging technologies for vineyards and berry crops.

## Where is this information coming from?

*This review is based on peer-reviewed research on bird management practices in vineyards and berry crops. While this remains a small area of research, these studies have included several strategies: Netting, lasers, distress calls, cannons, methyl anthranilate, visual deterrents, UAVs, and predatory birds.*

## When do birds flock to berry crops?

Bird activity varies from time to time and place to place. Farms with higher bird pressure must use more aggressive bird management strategies.

Bird pressure depends on several factors including: Surrounding habitat, weather, year, grape variety, bird species, migratory patterns, and time of day.



Photo: Birds have pecked these grapes, leaving damage that lets in bunch rot diseases.

**Surrounding Habitat:** Forest habitats are home to more fruit-eating species than grasslands. Because of this, farms adjacent to the forests of southeastern Minnesota may deal with more bird damage than farms on the plains of western Minnesota, where frugivorous bird populations are lower. On the other hand, fruit crops surrounded by grain crops may see more birds if they are the only fruit-based food source in the vicinity. Vineyards and berry fields bordering lakes may see more swallows, but swallows are insectivores and do not eat fruit.



The surrounding habitat (e.g. forest, plains, lakes) influences bird pressure on a fruit crop. Photo: Chankaska Creek Ranch and Winery.

**Weather and year:** A dry year will likely bring more birds to the vineyard because native sources of food are harder to find. Dry years may also mean lower yields for non-irrigated crops, making it even more important to protect the small crop from birds. In Minnesota, many baby birds begin flying and foraging for food starting in July and August, right as grapes and fall-bearing raspberries are ripening.

**Grape Variety:** Birds use the change of color in berries as their visual cue that the fruit are soft and ripe. Dark colored grapes are more likely to be targeted by birds for this reason.

**Bird species:** Not all bird species eat berries, but many will opportunistically eat fruit when it is available. If the dominant species surrounding your farm are insectivores, expect less bird damage than a farm surrounded by frugivorous species. American robins are the most frugivorous species in the Midwest, and sparrows, finches, and starlings often eat fruit. Although wrens sometimes eat fruit, they are more inclined toward insects.

In addition, birds are highly mobile and can travel considerable distances every day. A bird successfully controlled today, might be readily replaced tomorrow by an influx from the adjacent landscape. **Time of day:** Birds are day-time feeders and forage from sunrise to sunset.

## Bird Netting

Netting is still the most effective and reliable method of preventing bird damage in vineyards and berries, because it is a physical barrier. It is almost 100% effective when used properly. Bird netting is applied shortly before ripening and remains in place until harvest. In vineyards, it is applied after veraison over individual rows of grapevines. Over-row netting is applied and removed with a net applicator implement (for example, Netter Getter).



Photo: Using a Netter Getter to apply woven bird netting to a vineyard. Photo: Annelise Winery.

On small plots, net can also be applied as a canopy over multiple rows, supported by tall posts and wires. On grapevines trained to a Vertical Shoot Positioning trellis, side panel netting may be integrated into the trellis system and rolled/unrolled for application around the fruit zone.

As a physical barrier, netting excludes all bird species similarly; birds are unable to acclimate to it the way they do with other behavior-based deterrent tactics. Netting has the additional benefits of being noiseless, non-chemical, widely tested and available; and it may reduce hail damage.

Netting may have some negative attributes that require consideration. For example, small birds can, and do, get caught in nets resulting in injury or death. Netting can be used on vineyards that are mechanically harvested, but it must be removed prior to harvest.

In spite of several advantages, bird netting adds a significant upfront cost to production and it is time-consuming to apply and remove. Application and removal requires 2-3 people: one person driving the tractor and 1-2 behind the tractor draping the netting over the vines.

In summary, despite its labor requirements and cost, bird netting is the most reliable method of bird control for berry crops. Since many grape growers find the benefits to outweigh the costs, it also remains the most popular method for Midwest vineyards.

#### **Tips for effective and efficient netting in vineyards:**

- Finish any necessary hedging or skirting operations prior to applying net.
- For high cordon trellis systems, netting should be draped loosely onto the vines, not pulled tightly. Pulling it too tightly over the vines stretches and expands the holes, making it easier for birds to peck through them. Tightly pulling the net may also put it in close contact with the fruit, making it easier for birds to access it. There should be space between the net and fruit.
- On a high cordon trellis, the sheets of netting should be wide enough that they reach the ground on both sides of the row when draped loosely.
- If wind is causing the netting to fly off the rows and expose fruit, use zip ties to

attach the two edges of the netting underneath the vines.

- Use a netting applicator on a tractor or skid loader to apply and remove netting. Attempting to apply by hand drastically increases the labor requirement.
- Removing the netting prior to harvest is not necessarily required. To save time, some growers roll it up and rest it on top of the vines, or place it on the ground to one side of the rows, to access the fruit for hand harvesting.
- Avoid wearing rings, earrings, or shirts with buttons, especially when applying and removing the net; they will get caught in the nets.

#### **Bird distress call and predator recordings**

Many berry growers play artificial bird distress calls and predator calls from automated loudspeakers to repel birds from the field. The sounds confuse the birds into thinking that danger is near.



A wireless distress call speaker in a vineyard, mounted to a weather station. Photo: Davy DeKrey.

The speakers are fastened onto posts in the field and powered by batteries or solar panels.

This strategy is popular on blueberry farms. It involves relatively low-maintenance equipment and can be easily managed by one person. The main expense is the upfront cost of equipment purchase.

Studies have found distress calls to be moderately to highly effective but less consistently reliable than netting. They are often accompanied by cannons or visual deterrents.

This technique works best for bird species that respond to distress calls by dispersing. Robins tend to disperse in response to distress calls, but finches and crows tend to mob, and may flock to the vineyard when they hear the sound.

Depending on the species, distress call speaker systems can remain effective for 2-6 weeks. Over time, birds acclimate to the calls and learn that they are not actually in harm's way.

Neighbors and visitors may complain about the recordings, which are quite loud.

**Recommended applications:** Since the effectiveness of distress calls is less consistent than bird netting, growers may decide to supplement them with other tools. Distress calls are best suited for berry crops that are frequently harvested over a short period of time (2-4 weeks), or small vineyards that do not bring in enough revenue to recoup the costs of netting. The vineyard manager should develop knowledge about the bird species around the vineyard and how they respond to distress calls, to decide if this method is right for them.

Refer to the Minnesota Ornithologists Union (<https://moumn.org/>) and the Cornell

Laboratory of Ornithology ([www.allaboutbirds.org](http://www.allaboutbirds.org)) for bird ID help and tips.

## Propane Scare Cannons

Similar to bird distress calls, propane scare cannons can be placed in the vineyard as an audio deterrent for birds. They shoot off a loud “shotgun” sound every few minutes throughout the course of the day. They are often used in combination with distress calls and visual deterrents.



Propane scare cannons have long, cylindrical metal barrels and are elevated into the vineyard canopy on tripods or posts. Photo: Jamieson Lindquist.

Propane cannons are moderately or highly effective when used properly but are not as reliable as netting due to the ability of birds to acclimate to them over time. They are often used in conjunction with distress calls.

OMAFRA **recommends** running cannons from 30 minutes before sunrise to 30 minutes after sunset.

Cannons work best if the location and time interval of the blasts changes frequently. Changing the cannon placement at least

weekly, and varying the time interval between each blast, decreases birds' ability to acclimate to them and increases the likelihood they will stay away from the vineyard. The time interval should fluctuate between 3-10 minutes.

Keeping the cannons stationary in the field limits their effectiveness. A cannon placed in a given location will scare birds the first day, but they will acclimate to it by the second or third day. Likewise, if the cannon always goes off at the same time interval (e.g., every 8 minutes) the birds can get used to it and stop reacting.

The impact of cannons on neighbors and guests must be considered. The loud blasts can scare or irritate humans and dogs within a half mile of the farm. Noise concerns and complaints are commonly filed against vineyards using cannons ([example](#)). Understand your local noise ordinances as well as assess your relationship with your neighbors and their tolerance to cannons before investing heavily in this option.

### **Human Activity**

Simply being in the field will help deter birds. Maybe this is why some Minnesota U-pick blueberry farms, which have frequent daily human activity during harvest season, are able to sufficiently mitigate birds without using netting.

This is more difficult in vineyards, where all of the fruit is harvested at once and there are few other hands-on vineyard tasks from August onward.

### **Visual Deterrents**

Balloons, kites, reflective ribbons, inflatable tube-men, and artificial predatory birds are sometimes used in an attempt to help deter birds from vineyards and berry crops. They

are low cost and can easily be managed by one person.

Studies comparing bird control methods show that they are less effective than netting, distress calls, or cannons, and can be helpful in some, but not all, cases.

In a study in Michigan (Lindell et al. 2018), inflatable tube-men did not consistently reduce bird damage in vineyards or blueberries across sites and years, even though they had some effect in certain instances. This study recommends that if growers wish to try this technique, use several tube-men per five acres, place them on the field edges, set them before ripening, and change their position every few days.

**Recommended applications:** Based on peer-reviewed research and on-farm experiences, we only recommend using visuals in conjunction with other tactics, not as a stand-alone solution. As with distress calls and cannons, visuals should be moved around the field daily in order to confuse the birds. In terms of how many to use per acre, the more the better.

### **Methyl anthranilate foliar spray**

Methyl anthranilate, which is used for artificial grape flavoring, has also been marketed as a chemical bird repellent in vineyards since the 1990s. There are multiple products with this active ingredient. The intended use of methyl anthranilate is that it functions as bird lung irritant that causes non-lethal gastrointestinal disturbance.

However, it has not been found effective in fruit crops. Three out of the four published, peer-reviewed studies we found on methyl anthranilate for fruit crop bird control found it ineffective. Only one study found that it

had some effect on certain bird species, but not overall.

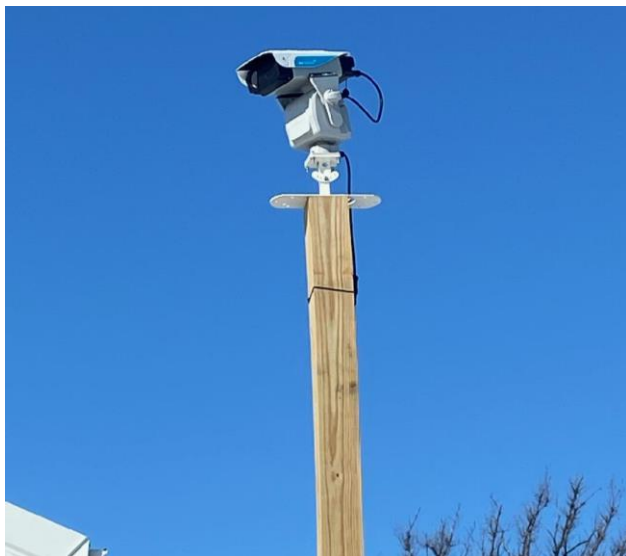
Regarding why this chemical does not work for fruit crop bird control, Lindell et al. (2018) suggest that the irritation from methyl anthranilate is short-term, and birds do not learn to avoid it.

**Recommended applications:** Since it lacks efficacy, UMN Extension does not recommend methyl anthranilate for bird control.

## Emerging Technologies

### Laser Scarecrows

Lasers have been used to deter birds around airports for many years. More recently, laser technology has been adopted and used experimentally for bird control in berry crops. This is an emerging technology; as of 2018, there were 6000 agricultural users worldwide.



A laser scarecrow in a vineyard. Photo: Jamieson Lindquist

As the automated laser moves across the field in a random or pre-programmed pattern, birds perceive it as an approaching predator and retreat from the area. The range

per laser depends on the terrain and the laser power, but some lasers can cover up to 20 acres on flat ground.

Initial reports are promising, but published research on their effectiveness in fruit crops is still minimal. One [study](#) from the University of Rhode Island tested laser scarecrows in blueberries. Although observations were promising, the authors note that the efficacy of lasers for blueberries is still an open question. Quantifying the effect of lasers is challenging, due to high variability in bird pressure from farm to farm.

Automated laser systems are expensive compared to most other strategies described above. They are probably less labor intensive than netting, and may be more cost effective, but only if they actually work. Future research efforts should be focused on helping growers determine if the benefits outweigh the cost, and how many years are needed to recover up-front expenses.

**Recommended applications:** Lasers may have potential for bird control in Minnesota vineyards and berry crops. However, there is not enough research to make sound recommendations at this time. Growers are welcome to try it experimentally, but should compare it against established methods like netting in order to test how well it works. We hope to see more research in this area in coming years, and this article will be updated if further research becomes available.

### Unmanned Aerial Vehicles (UAVs, drones)

A small handful of studies have examined the use of drones for fruit crop bird control. These studies tell us valuable and interesting things about bird behavior in response to disturbances in fruit crops, but they are not yet a practical solution for farm bird control.

One [study](#) from 2015 introduced a complex automated UAV system that combined visual, audio, and chemical bird deterrents, with ground sensors to detect and target birds. Upon sensing a flock of birds in the field, the UAV would be deployed to fly over the field to irritate and deter those birds. In [Another study](#) in 2019, researchers fastened a taxidermied predatory bird onto a UAV and played distress calls while flying it over the field.

Wang et al. (2019) points out that birds can become accustomed to less advanced UAV systems. Current research is focused on incorporating bird psychology to improve UAV-based strategies.

However, the practicality of UAVs for bird control is currently hindered by the labor requirements to operate them. According to current [FAA regulations](#), an operator has to be within eyesight of the UAV, actively monitoring it the entire flight time, even if it is on auto-pilot. It would be impractical to operate a drone all day, every day during the harvest season. At this time, drones have stronger potential in other shorter term vineyard tasks like pesticide application, rather than daily bird control.

### **Predatory Birds**

The practice of supporting predatory birds in fruit crops to scare away fruit-eating birds, has been tested and implemented in other regions such as California and Australia. However, it has limited relevance for Minnesota, as a grower would be unlikely to attract enough predatory birds to significantly deter fruit-eating birds from a farm. That is not to say that naturally occurring predatory birds near a farm or vineyard couldn't impact frugivorous bird pressure to some degree.

Although Minnesota has plenty of owls, owls hunt at night and interact very little with frugivorous birds. Robotic owls operating during the day would not deter frugivorous birds, because the birds know that owls eat at night and would not fear artificial owls in the daytime.

### **Summary:**

- Since birds are one of the biggest threats to a fruit crop during ripening, investment in deterrent methods is a critical part of the sustainability strategy each grower must consider.
- A farmer should budget and plan for initial costs for buying, maintaining, and replacing this equipment, especially the more expensive options like netting.
- Having crop protections in place brings a peace of mind to the grower. There may be other side benefits too, such as reduced raccoon and turkey feeding, hail damage reduction, and uniformity across the vineyard which aids in harvest planning and crop yield estimates.
- Netting still remains the most effective bird deterrent for fruit crops. However, several other strategies are available for farms that are unable to, or choose not to, use netting. The most viable options after netting include auditory deterrents and human activity. Laser systems may also hold promise, pending further research.

## References:

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Wang, Z, A.S. Griffin, A.L. Lucas, and K.C. Wong. 2019. Psychological warfare in vineyard: Using drones and bird psychology to control bird damage to wine grapes. *Crop Protection* 120: 163-170.

## For more information on cold climate viticulture and enology:

University of Minnesota Grape Breeding and Enology: [enology.umn.edu](http://enology.umn.edu)

University of Minnesota Extension Fruit and Vegetable Newsletter: <https://blog-fruit-vegetable-ipm.extension.umn.edu/>

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