65 WILDLIFE DAMAGE MAINTENANCE

Where: Grand Gallery Overlook Room C
MI Recertification Credits: 2 (COMM CORE, PRIV CORE)
OH Recertification Credits: 1.5 (presentations as marked)
CCA Credits: PM (1)
Moderator: Erin Lizotte, Michigan State University Extension

9:00 AM **Welcome - Erin Lizotte, MSU Extension**

9:05 AM **Regulation of, and Response to, Bird Damage in Michigan**
- Tim Wilson, USDA Wildlife Services

9:35 AM **Controlling Bird Damage in Sweet Corn and Other Vegetables (OH 7, 1 hr)**
- Marion Zuefle, Cornell University

10:05AM **Controlling Damage in Fruit Crops (OH 7, 0.5 hr)**
- Catherine Lindell, Michigan State University

10:35 AM **Q & A with Presenters**
11:00 AM **Session Ends**

CONTROLLING DAMAGE IN FRUIT CROPS

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Risk factors for crop damage by birds

When there is less fruit in a given area, there will be a higher proportion of bird damage to the crop that is available. One should expect higher proportions of damage in: 1) low-yield years, 2) early-ripening varieties, and 3) small blocks. Blocks near resources important to fruit-eating birds are at higher risk for damage. One should expect higher proportions of bird damage in the following contexts : 1) blocks under wires, 2) at edges of blocks, particularly those near non-fruit areas, 3) near night roosting sites, 4) isolated blocks with little human activity and 5) blocks near dairy farms. Each farm is unique and should be assessed for risk factors. For example, wooded edges of blocks can provide "staging areas" for fruit-eating species like American robins. The birds enter the blocks from the woods, eat, and then return to the woods. If a low-yield year is anticipated, or if your farm has some of these risk factors, it is recommended that you prepare to invest in bird management early in the year.

Bird management strategies

Bird management strategies can be grouped into several categories: 1) scaring, 2) barriers, 3) cultural management practices, for example encouraging natural predators, 4) deterrent sprays 5) lethal control and 6) more recently, interfering with birds' perception of their environments.

Scaring strategies. Birds habituate quickly to sounds and visual devices that are supposed to scare them. Simply placing decoys of predators or scare-eye balloons is not likely to deter birds for long. If one employs scaring devices, they should be deployed early in the season. Also, they are more likely to deter birds if there is some random component to their movement or sound. For example, inflatable tubemen should be moved within or around a block and, ideally, go on and off randomly (although one needs to be careful that they do not get caught in the crop). Propane cannons and devices that play recordings of distress calls or predator calls can be programmed to go on and off randomly. Some scaring strategies, like lasers, work in particular situations. For example, lasers deter Canada geese in low-light situations. Effigies (dead birds hung in the crop) may deter crows.

In recent preliminary work with drones in sweet cherry orchards, our results were inconclusive. On some days in some orchards, fruit-eating bird numbers were lower when drones were flying over a block. Other days this was not the case. Larger-scale trials to investigate this strategy are warranted.

Barriers. Many growers use netting to deter birds; it was considered the most effective bird deterrent in a survey of 1500 fruit-growers (Anderson et al. 2013). Netting requires considerable effort and materials and is generally only a reasonable strategy for low-stature, high-value crops. If one employs netting, it is important that the netting enclose the vulnerable fruit. Birds will easily get under the netting if there is a gap left between the bottom of the netting and the

ground. Also, ideally, the netting will be on a frame to maintain some distance between the fruit and the netting. If the netting lies on the fruit, birds will simply reach the fruit through the netting.

Increasing resources for predators of birds. American kestrels, small predatory birds, can be attracted to orchards with nest boxes. Kestrels prey on insects, small mammals, and birds and we have good evidence that they deter pest birds in Michigan sweet cherry orchards (Shave et al. 2018). Occupancy rates of kestrel boxes vary across the state. Eighty to 90% of nest boxes in Leelanau County sweet cherry orchards attract kestrels each year while in blueberry fields in Van Buren and Allegan Counties, occupancy rates are generally between 30-35%. The difference in occupancy may result from the more open nature of cherry orchards compared to blueberry fields and greater amounts of short, grassy areas in Leelanau County compared to western Michigan. At the end of this hand-out are links to plans for building nest boxes and points about the best locations and maintenance of boxes. An important consideration is that kestrels in orchards eat voles and mice, so rodenticides should not be used in orchards when kestrels are present. Kestrels migrate out of the northern lower peninsula of Michigan in August but some kestrels may stay in the southern lower peninsula year-round. As a final point, our research shows that consumers are enthusiastic about this type of bird management and so informing your customers about your use of predator nest boxes may be valuable in marketing (Herrnstadt et al. 2016).

Deterrent sprays. Bird deterrent sprays (there are several on the market) contain methyl anthranilate because it is the only chemical currently allowed for use on fruit. Methyl anthranilate is also a food additive that imparts a fruity odor to products. The method of action of methyl anthranilate is that it irritates the trigeminal nerve in the bill of birds. Generally, tests of the efficacy of methyl anthranilate products have not produced strong evidence that it deters birds in field situations. If sprays containing methyl anthranilate are used, they should be applied following the label as closely as possible to increase the likelihood of effectiveness. For example, bird deterrence may be improved if they are applied with foggers, which produce smaller droplets, than typical sprayers. Also, the sprays need to be reapplied after it rains.

Lethal control. Although potentially appealing, lethal control doesn't have a strong track record for reducing bird damage although it may be warranted in specific contexts. Whether or not one needs a permit to kill pest birds depends on the bird species and the context. Please see the following MSU extension article for regulations concerning permits: https://www.canr.msu.edu/news/do_i_need_a_permit_to_control_wildlife_on_my_farm.

Interfering with birds' perception of their environments. Recent developments in bird management impair birds' abilities to perceive their environment and may have applicability in fruit-production systems. "Sonic nets", for example, broadcast noise at the same frequencies at which birds communicate, so potentially interfering with birds' ability to warn each other about danger. One test showed that the nets deterred birds from an airfield. Preliminary studies of "laser scarecrows", where a laser beam sweeps over a field, show some promise in reducing

bird activity in sweet corn. By reducing birds' abilities to communicate and perceive predators, these techniques may be less susceptible to habituation than scare techniques.

Anderson, A., C. Lindell, K.M. Moxcey, B. Siemer, P. Curtis, J. Carroll, C. Burrows, J. Boulanger, K. Steensma and S. A. Shwiff. 2013. Bird Damage to Select Fruit Crops: The Costs of damage and the benefits of control in Five States. *Crop Protection* 52:103-109.

Herrnstadt, Z., Howard, P.H., Oh, C.-O. Lindell, C.A. 2016. Consumer Preferences for 'Natural' Agricultural Practices: Assessing Methods to Manage Bird Pests. *Renewable Agriculture and Food Systems.* 6(1):516-523

Shave, M.E., S.A. Shwiff, J.L. Elser and C.A. Lindell. 2018. Falcons using orchard nest boxes reduce fruit-eating bird abundances and provide economic benefits for a fruit-growing region. *Journal of Applied Ecology* 55:2451-2460. DOI: 10.1111/1365-2664.13172

Building, Installing and Monitoring American Kestrel Nest Boxes* Plans for the "Spartan" kestrel nest box and mounting tower (designed by Tom Comfort) can be found here: http://www.nestboxbuilder.com/nestbox-article-spartan.html. Additional plans for a simple kestrel nest box can be found here: 1) https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_063830.pdf 2) https://nestwatch.org/learn/all-about-birdhouses/birds/american-kestrel/. Boxes should be installed away from wooded areas to reduce the risk of occupancy by European starlings. Open habitat with sparse trees/shrubs is desirable. Boxes mounted on their own poles/towers can be installed within the orchard itself, either at the end of a row or within a row in an open spot if there is a missing plant. Boxes should be installed at least one-half mile apart to allow for kestrel territoriality. Boxes should be installed 10 – 20 feet from the ground. The box entrance should face the southeast; kestrel nests are more likely to produce young from boxes facing southeast. Kestrels do not build nests, so the bottom of nest boxes should be lined with wood shavings or animal bedding. Boxes that were occupied during the summer should have the wood shavings replaced during the following fall/winter or early spring in preparation for the next breeding season. If a European starling occupies a box, it will add grass and other materials to the box and lay 5 – 7 pale blue eggs. An identified starling nest should be removed from the box, and new wood shaving should be added to the box if needed. European starlings are not native to North American so no permits are needed to remove their nests. Please consider contributing to the nationwide kestrel nest box monitoring effort by registering your boxes with the American Kestrel Partnership. You can get started here: http://kestrel.peregrinefund.org/begin-obs

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Cornell Cooperative Extension | Cornell Vegetable Program

BIRD DAMAGE

management options in sweet corn production

NEW YORK SWEET CORN PRODUCTION

#4
RANK IN NATION

26,700+
ACRES PLANTED

$22M
FRESH MARKET VALUE

2017 statistics

INTRODUCTION

Wildlife damage, especially bird damage, is a persistent problem for vegetable producers. Sweet corn is noted to have the greatest direct damage by birds but other crops are also impacted – including the consumption of direct-seeded crops after planting, reduced quality from pecking, loss of crop stands by direct feeding, and implications with food safety rules. Not only does bird damage lead to yield loss, but the possibility of microbial contamination from bird droppings poses a huge food safety issue, as recognized in the Food Safety and Modernization Act. Many growers are attempting proactive measures to minimize bird damage but continue to have mixed results leading to crop losses.

New York sweet corn production ranks 4th in the US with over 26,700 acres planted. Fresh market sweet corn in New York had an estimated value in production of $22 million[1] in 2017. A recent survey of fresh market vegetable growers in western NY found that 66% grew sweet corn on an average of 3.4 acres (0.1 acre to >20 acres). Of those growers, 84% reported that they had bird damage with a 16% average estimated yield loss to birds (losses ranged from 3 to 40%). A loss of 3% has the potential to cost $102 in production per acre, 16% loss reduces value by $542 per acre, and growers experiencing a 40% yield reduction may lose over $1,300 per acre. The severity of damage caused by birds varies depending on location, maturity of sweet corn, and bird migration. In New York, we continue to see this pest problem grow and it is exceedingly costlier and much harder to handle. One farmer states he "had problems from the day seed hit the ground," while a single farm reported a loss of over 5,000 dozen ears at a location where multiple tactics were being utilized (nuisance permits and gas-fired cannons), and another reported a $1,500 loss for the 2017 season. The variability in effectiveness of current options, the continued loss of fresh market sweet corn to bird damage, and future food safety issues demonstrated the need for continued research to identify and evaluate options that may prove to be more effective in managing bird pests.

In an attempt to help growers mitigate bird damage in sweet corn, a New York Farm Viability Institute supported research project was initiated to evaluate bird deterrent options. We identified two new products – a chemical deterrent, Avian Control®, and an air dancer – that had shown promise in preliminary trials as bird repellents. In addition, we evaluated the effectiveness of other existing techniques in reducing bird damage in sweet corn: detasseling and scare eye balloons. Since producers have indicated that bird damage in sweet corn is one of their biggest management issues, this research focused on alleviating bird pests in sweet corn, but the information generated by this research may provide for use in other fresh market vegetable commodities with avian pests.

1 Vegetables 2017 Summary.2018. USDA NASS. ISSN:0884-6413 pg.

METHODS EVALUATED

Twelve on-farm trials evaluated bird management options from 2015-2017. At each location, the number, identity, and activity of birds flying in and out of the field trials were enumerated; data on sweet corn maturity and damage was also collected. Images of bird movement, activity (dropping on plants and surrounding areas), and damage were documented (Figures 1-3). For each of the four deterrents we evaluated, we have identified best management practices for their use.

Figure 1. Bird Movement
A flock of red-winged blackbirds in flight after being scared out of sweet corn plots.

Figure 2. Bird Droppings
Bird droppings on plants and surrounding areas pose a potential food safety concern.

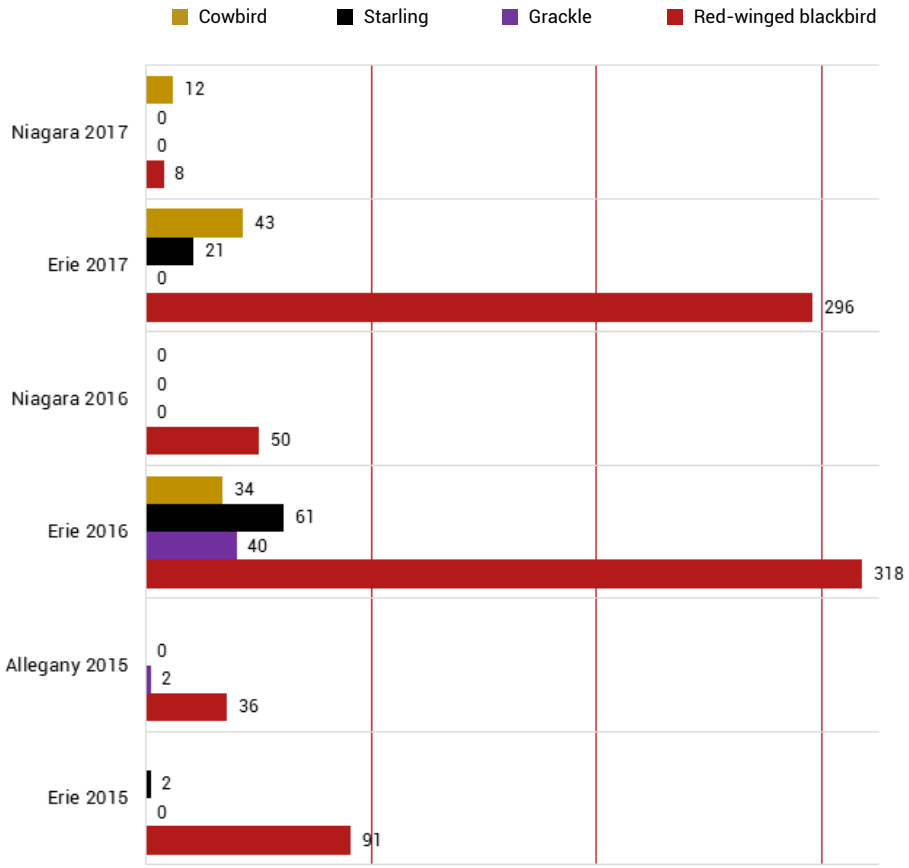
Figure 3. Bird Damage
Sweet corn damage caused by bird feeding.

SUMMARY OF RESULTS

Bird Type and Quantity

The red-winged blackbird (*Agelaius phoeniceus*) was the most abundant and most often observed bird at all sites in all three years (Figure 4), followed by the brown-headed cowbird (*Molothrus ater*). Other bird species observed feeding in sweet corn trials included European starling (*Sturnus vulgaris*) and common grackle (*Quiscalus quiscula*).

Figure 4. Total Number of Birds Observed in On-farm Trials by Year and County



SUMMARY OF RESULTS

Bird Damage

Birds caused an average of 2.8 to 11.5% loss in untreated plots (Figure 5). We did not find significant differences between treatments in individual years but, when combined, the balloons, air dancer, and detasseling tools all significantly reduced damage when compared to the untreated (Figure 5). Bird damage was reduced 38% with Avian Control, 63% with balloons, 77% with the air dancer, and 85% with detasseling as compared to the non-treated control (Figure 6).

During this study, it was noted that once deterrent tools were placed in a field, birds tended to fly over the entire research site and search out other sweet corn locations. When available, we evaluated damage in these off-site sweet corn fields and saw damage ranging from 15-50%. Averaging over all locations and years, we found that the untreated plots in our treatment sites had over 70% less damage as compared to the nearby sweet corn fields as the birds completely avoided the trial after tools were in place (Figure 7). The detasseling and air dancer treatments had over 90% less damage, while the Avian Control and balloon treatments had 80% less damage than these off-site sweet corn fields (Figure 7).

Figure 5. Percent Sweet Corn Ear Damage Due to Birds

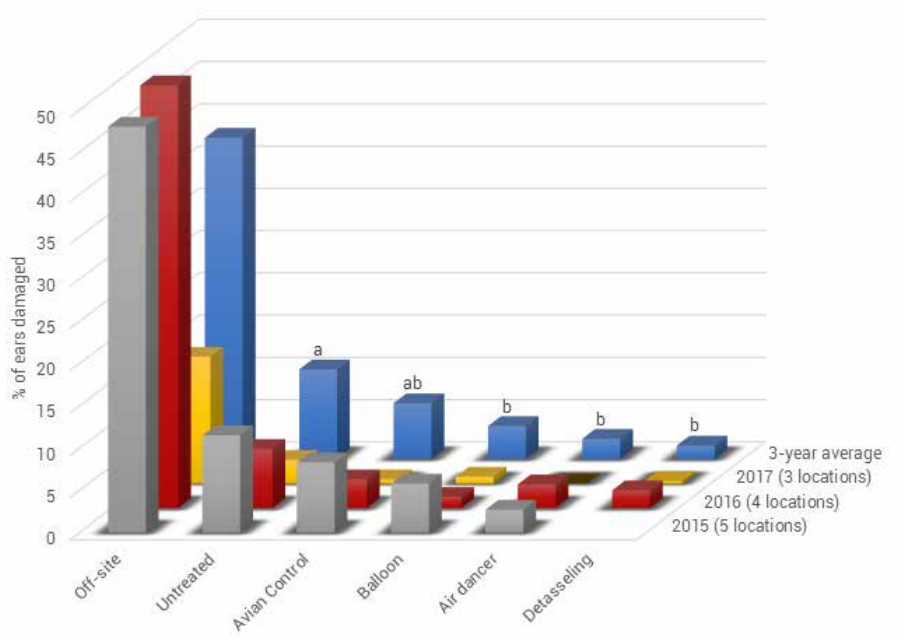


Figure 6. Three-year Average Reduction in Ear Damage for Deterance Tools as Compared to Untreated

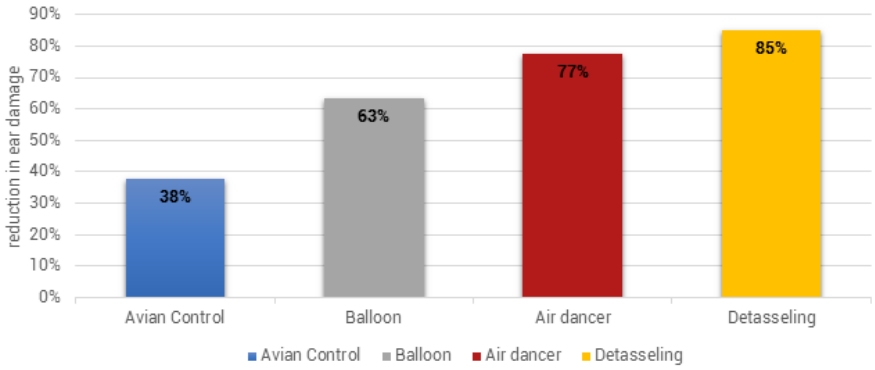
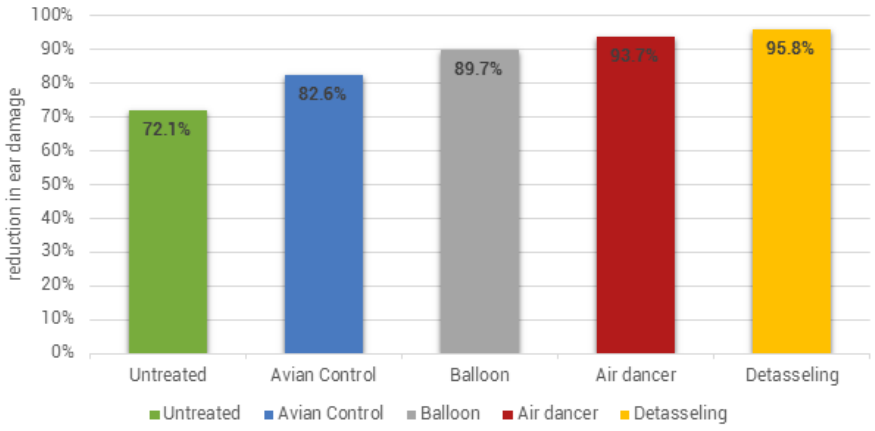


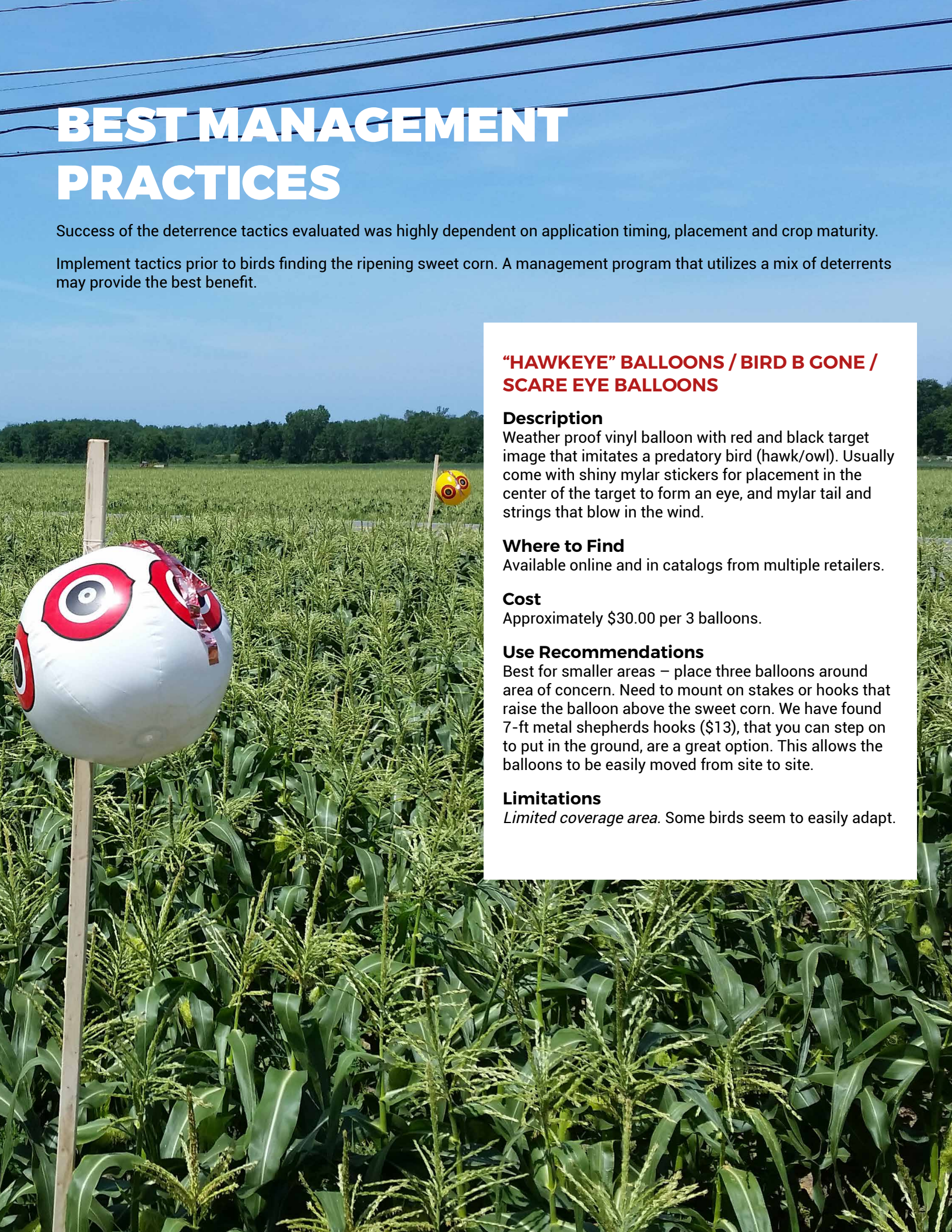
Figure 7. Three-year Average Reduction in Bird Damage to Sweet Corn Ears as Compared to Off-site Locations



BEST MANAGEMENT PRACTICES

Success of the deterrence tactics evaluated was highly dependent on application timing, placement and crop maturity.

Implement tactics prior to birds finding the ripening sweet corn. A management program that utilizes a mix of deterrents may provide the best benefit.



"HAWKEYE" BALLOONS / BIRD B GONE / SCARE EYE BALLOONS

Description
Weather proof vinyl balloon with red and black target image that imitates a predatory bird (hawk/owl). Usually come with shiny mylar stickers for placement in the center of the target to form an eye, and mylar tail and strings that blow in the wind.

Where to Find
Available online and in catalogs from multiple retailers.

Cost
Approximately $30.00 per 3 balloons.

Use Recommendations
Best for smaller areas – place three balloons around area of concern. Need to mount on stakes or hooks that raise the balloon above the sweet corn. We have found 7-ft metal shepherds hooks ($13), that you can step on to put in the ground, are a great option. This allows the balloons to be easily moved from site to site.

Limitations
Limited coverage area. Some birds seem to easily adapt.

AIR DANCER

Description
A brightly colored air tube that inflates and then partially deflates over and over again, creating a very tall and foreboding presence by constantly jumping up noisily and shaking at random to provide a “scare” to keep birds at bay. We set our timer with a 10-minute on/off cycle from before sunrise to dusk.

Where to Find
Available online from various retailers.

Cost
Approximately $200 for air dancer and fan; additional costs for power source.

Use Recommendations
Reusable scare tactic.

Limitations
Power source. If local electric power is readily available, it is very simple to hook up with power extension cords and timer. Generated power is an option; both 1800 ($180) watt and 3500 ($370) watt generators were used in this study. The limitation on using generators is that they need to run continuously, unless turned on and off at sunrise and sunset, to keep timer on track, requiring a daily fuel refill. Solar power could be a future option, but currently the cost is prohibitive due to the energy storage required to keep the timer and fan running.

Limited coverage area.

CHEMICAL DETERRENT

Description
For our trials, we evaluated Avian Control® Bird Repellent (methyl anthranilate). It is a primary chemical repellent that stimulates temporary pain in receptors associated with taste and smell rendering the food source unpalatable. This product is also labeled for use in other vegetable and fruit crops. See the label for crop specific information.

Rate
12 oz - 42 oz/A

Re-entry interval = 4 hrs, Pre-harvest interval = 0 days.

No fogging or irrigation application in New York.

Reapplied on 6-8 day intervals.

Where to Find
Available for online purchase through Avian Enterprises, LLC or various retailers ($96 for 64 oz).

Cost
32 oz/A rate = $48 (~ $96 per acre when sprayed twice at 32 oz/A rate).

Use Recommendations
Initial application should be applied when sweet corn is two weeks from harvest, prior to birds discovering food source, and then re-applied 7-days later. Reapplication is needed if the product is washed off by rainfall. Application rate is 12 oz - 42 oz/A; we evaluated at 32 oz/A.

Limitations
Not an organic option.

Application needs to be made prior to birds finding food source.

Reapplication required if washed off by rain.

DETASSELING

Description
Tassels were removed after pollination and two weeks prior to crop maturity. The tassel and upper leaves were removed just above ripening ear to eliminate a perching site for the birds.

Cost
By-hand using handheld clippers: 1 hr = 5000 ft^2 = 8.7 hours for 1 acre @ $10.50/hour = $91.35 per acre.

Use Recommendations
Use new clippers and move down one row at a time.

Limitations
Labor intensive or expensive mechanized options for tassel removal, although harvest crews may prefer working in the fields where tassels have been removed.

May not be compatible with mechanical harvesting equipment that grasp tops of the cornstalks.

CONCLUSIONS

Initial bird damage on the first picking of sweet corn can be extremely high. We had a site experience 86% loss of ears overnight due to the migration of red-winged blackbirds. 10% damage was observed even when air cannons and nuisance permits were being deployed.

Birds would completely avoid the research sites if tactics were deployed prior to them finding the food source. The flock would fly over the research sites to other, unprotected locations.

Success of the four deterrence tactics was highly dependent on application timing, placement and crop maturity.

We cannot stress enough the importance of implementing these tactics prior to birds finding the ripening sweet corn. We evaluated these tactics individually and suggest a management program that utilizes multiple tactics may provide the best benefit.

FUTURE DIRECTIONS / RECOMMENDATIONS

There are a number of bird lasers on the market with a wide range of costs. Dr. Rebecca Brown at the University of Rhode Island has developed a laser scarecrow that might be a great low-cost option. The laser scarecrow is not commercially available, but you can access the specs if you want to build your own.

https://sites.google.com/view/urilaserscarecrow/

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