

Grower Perceptions of Bird Damage to New York Fruit Crops in 2011

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New York State is among the nation's top apple, grape, and cherry producers, with annual tree fruit and grape crop production in excess of \$323 million (NYS Department of Agriculture and Markets, 2012).

“Our multistate project has surveyed growers of blueberries, cherry, grape and Honeycrisp apple to assess the importance of bird predation on these crops. It is clear that bird damage continues to be a major concern for fruit producers especially blueberry and cherry producers.”

New York typically produces from 600 to 1,000 tons of sweet cherries, 350,000 to 650,000 tons of apples, and 110,000 to 172,000 tons of processed grapes.

In 2012, New York ranked second nationally in apple production, and third in grape production. Managing losses of fruit crops is vital to maintaining the economic viability of New York's fruit production.

Although the costs of bird damage and damage prevention have been a long-standing concern to fruit producers, these topics have received little recent attention from researchers. Efforts to study bird damage in fruit crops have been uncoordinated and piecemeal, which has limited the ability of outreach specialists to offer research-based strategies for affordable and effective prevention of bird damage.

In 2011, an interdisciplinary team of researchers, led by Dr. Catherine Lindell at Michigan State University, were awarded a NIFA multi-state grant to study bird damage to fruit crops in New York (NY) and other major fruit-producing states (i.e., Michigan, Washington, Oregon, California). Collectively, over 70% of US fruit production occurs in these states (USDA ERS, 2012). This report focuses on data from New York State that was part of the national project (Anderson et al. 2013).

Researchers and fruit-producer organizations in all five fruit growing states are collaborating on this multi-year project, which will include fruit producer surveys, field research on bird damage management, and consumer and marketing research. The primary objectives of the research are to estimate bird damage, and evaluate the effectiveness of damage prevention methods, for wine grapes, tart and sweet cherries, blueberries, and Honeycrisp apples. The research team decided to focus specifically on Honeycrisp apples in order to shed light on the economic costs and benefits associated with bird damage management for a high-value, fresh-market apple variety.

The long-term goal of the project is to provide producers

with cost-effective, environmentally-sustainable, strategies for bird management, based on robust field testing and clearly identified costs and benefits. In this article, we highlight findings from surveys of New York fruit producers completed as part of the NIFA project in 2012.

Fruit Grower Survey

Survey instrument: The research team developed a 21-question survey instrument that gathered information about: farm size and location, fruit crop production area and yield by fruit type, bird damage and damage management actions, estimated costs of bird damage management, fruit producers' perceptions of trends in bird damage and effect of bird damage on profitability, and grower attitudes toward common birds on their farms. All audiences in New York received the instrument as part of a mail survey. In other states, some fruit growers received the instrument as part of a web-based survey.

Survey implementation Members of the Human Dimensions Research Unit (HDRU) at Cornell University assisted with and coordinated survey implementation. Three organizations in New York State agreed to assist with survey implementation. We were permitted to access membership lists maintained by New York Wine and Grape Foundation, and by the Cornell University Department of Horticulture that allowed us to implement mail surveys with audiences of wine grape and blueberry producers, respectively. The New York Apple Association (NYAA) agreed to implement the survey directly, without releasing their membership list to Cornell. That allowed us to reach an audience of apple and cherry producers.

Surveys of all three audiences (grape producers, blueberry producers, and apple/cherry producers) were implemented between March 5 and April 10, 2012. Members of all groups received an identical questionnaire and similar cover letters. Grape and blueberry producers were contacted up to 4 times. Members of the NYAA mailing list received up to 3 contacts (the fourth contact was eliminated to reduce implementation burden on NYAA staff).

The Survey Research Institute at Cornell University was contracted by HDRU to conduct telephone interviews with non-respondents in the two NY survey groups for which the investigators had access. A total of 75 interviews were completed with non-respondents from the NY wine grape producer survey, and 28 non-respondents from the NY blueberry producer survey. The non-respondent interview contained a few questions to assess whether respondents differed from non-respondents on key traits (e.g., whether they grew any fruit or had experienced bird damage in 2011).

Response Rates and Analysis Subgroups

We received 722 usable responses from a total of 1,606 deliverable questionnaires (overall response rate 45 %). By group, we received the follow results: NY blueberries 55% response (139 delivered, 77 usable returns); NY wine grapes 45% response (861 delivered, 391 usable returns); NY apples/cherries 42% response (607 delivered, 254 returned). Only the 56% of NY respondents (n = 401) who grew wine grapes, blueberries, cherries, or Honeycrisp apples in 2011 were included in our analyses. For some comparisons, we grouped producers according to their most important fruit crop, and that further reduced the number of responses available for analysis. Very few respondents identified tart cherries as their most important fruit crop (Table 1), so no further analysis was possible with that grower subgroup.

Perceptions of Bird Damage

Level of bird damage by crop: Producer estimates of yield lost to bird damage in 2011 ranged from 6% in wine grape to nearly 30% in sweet cherry crops (Table 2). These estimates were very similar to estimates of yield loss to bird damage based on field research completed by the project team in 2012.

Species causing the most damage: We asked fruit producers to list the top three bird species that cause damage to their wine grape, blueberry, sweet cherry, and Honeycrisp apple crops. Growers perceived starlings and robins to be the greatest source of bird damage to wine grapes, blueberries and sweet cherries (Figure 1). Blackbirds were also often identified as pests on sweet cherries and blueberries. Honeycrisp apple producers believed that crows were the most frequent species damaging their fruit crop. These perceptions were consistent with field observations of bird damage completed by the project team during 2012.

Impact on profitability: When aggregated as a single group of NY fruit producers, we found that 40% of respondents said that bird damage had little or no influence on their ability to make a profit, 51% said bird damage was one of several factors that affect their profitability, and 9% said bird damage was the most significant factor affecting their profitability. When aggregated by most important fruit crop, blueberry producers were most likely to label bird damage as the single largest threat to profitability (Table 3).

Many fruit producers in NY believed that bird damage has been increasing over the past 5 years. Producers whose most important crop was sweet cherries were the most likely to believe that levels of bird damage have been increasing (Table 4).

Use and Perceptions of Damage Control Methods

Sixty-five percent of NY fruit producers reported that they typically take some actions to

Table 1. Number and average acreage of fruit production operations, by target audience.

Crop	All 2011 growers (n)	Mean acreage (range)	Most important fruit crop (n)	Mean acreage (range)
Wine grapes	143	45.02 (<1 – 800)	98	54.7 (<1 – 800)
Blueberries	116	4.07 (<1 – 40)	58	5.72 (<1 – 35)
Tart cherries	42	9.58 (<1 – 118)	4	47.66 (10 – 118)
Sweet cherries	86	4.88 (<1 – 40)	33	7.54 (<1 – 40)
Honeycrisp apples	140	7.01 (<1 – 200)	53	5.73 (<1 – 35)

Table 2. Percent of fruit crop yield that New York State growers perceived they lost to bird damage in 2011, by grower type.

Estimated yield lost to bird damage	Fruit grower type			
	Wine grapes (n=134)	Blueberries (n=100)	Sweet cherries (n=76)	Honeycrisp apples (n=124)
	(% of Respondents)			
0%	18.7	7.0	1.3	18.5
1-5%	53.7	31.0	14.4	61.2
6-10%	11.9	20.0	14.5	9.7
11-20%	11.9	23.0	24.9	4.8
>20%	3.6	19.0	44.7	5.6
Mean %	6.2	13.2	29.8	5.6

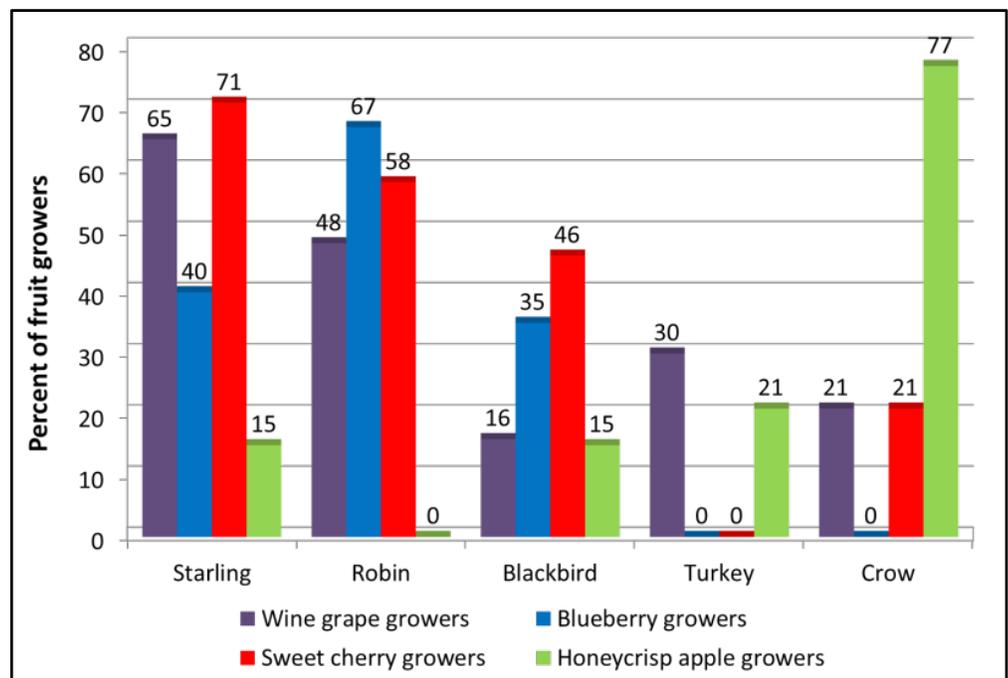


Figure 1. Bird species named most frequently by fruit growers asked to name the top three species that damaged their fruit crops in 2011.

Table 3. Estimated influence of bird damage on ability to make a profit from fruit crops in 2011, by grower type.

Influence on ability to make a profit	Most important fruit crop in 2011			
	Wine grapes (n=87)	Blueberries (n=52)	Sweet cherries (n=30)	Honeycrisp apples (n=47)
	(% of Respondents)			
Little or no influence	26.5	21.2	3.3	25.5
One of several significant factors	65.5	53.8	86.7	63.8
Most significant factor	8.0	25.0	10.0	10.7

Chi square = 16.865, df = 6; p = 0.010

Table 4. Perceived trend in amount of fruit crop lost to birds, reported in 2011 by fruit growers in New York State.

Over past 5 years bird damage has:	Most important fruit crop in 2011			
	Wine grapes (n=85)	Blueberries (n=52)	Sweet cherries (n=30)	Honeycrisp apples (n=48)
	(% of Respondents)			
been increasing	34.1	40.4	63.3	45.8
remained relatively stable	57.6	53.8	33.3	52.1
been decreasing	8.3	5.8	3.4	2.1
Total	100.0	100.0	100.0	100.0

Chi square 9.627, df=6, p=0.141

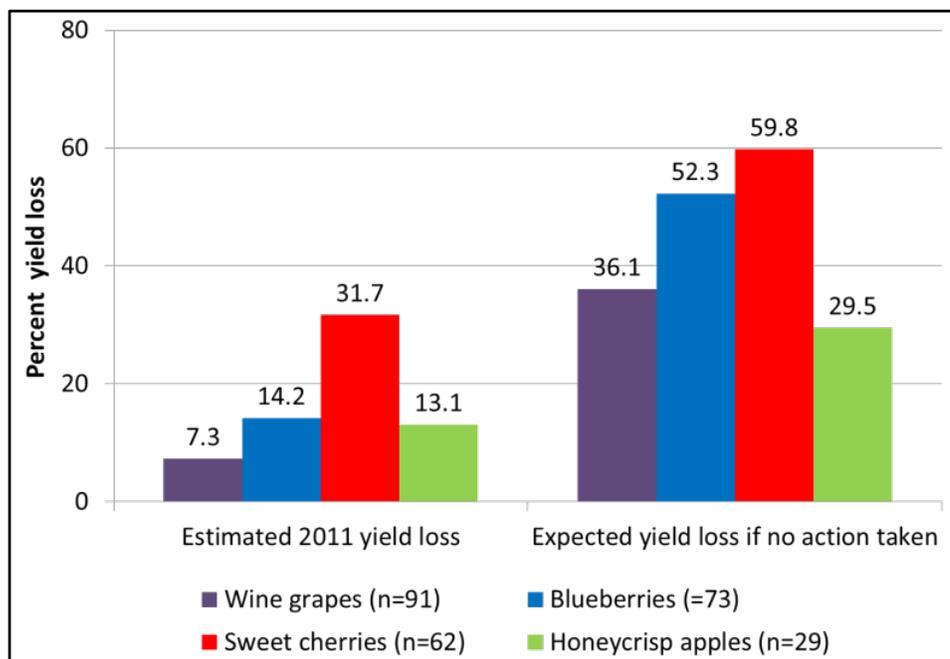


Figure 2. Estimated percent of fruit crop lost to bird damage in 2011, and estimated percent loss if no control actions were taken, among fruit growers who took some damage control actions in 2011.

Table 5. Proportion of fruit growers who utilize specific control methods, among growers who took some damage control action in 2011, by grower type.

Damage control methods	Fruit grower types			
	Wine grapes (n=84)	Blueberries (n=47)	Sweet cherries (n=52)	Honeycrisp apples (n=69)
	(% of Respondents)			
Auditory scare devices	66.6	70.2	63.5	17.4
Visual scare devices	54.8	68.1	57.7	23.2
Lethal shooting	42.9	23.4	21.2	23.1
Netting	33.3	23.4	13.5	1.4
Chemical repellents	5.9	2.1	48.1	4.3
Hawk nest boxes	4.8	6.4	3.8	5.8
Trapping	0.0	4.3	0.0	0.0

prevent or reduce bird damage to their crops. From 86% (Honeycrisp producers) to 100% (sweet cherry producers) of growers took actions to protect their most important crop. Fruit producers who took some action to prevent or reduce bird damage believed that their crop losses to bird damage would be much higher if they took no actions (Figure 2).

Methods used by crop: We asked producers about their use of seven types of damage control methods for birds. Auditory and visual scare devices were the most commonly used tools. Netting was used infrequently, but was used most often by producers whose primary crop was wine grapes. Predator nest boxes and trapping were seldom used tools regardless of fruit crop (Table 5).

Perceived effectiveness of methods:

We asked producers to report how effective they believed each of these methods were in controlling bird damage in their most important fruit crop. Wine grape, blueberry, and sweet cherry producers were more likely to describe auditory and visual scare devices as slightly effective, than they were to describe those techniques as moderately effective (and very few perceived scare devices as “very” effective). A majority of wine grape and blueberry producers believed netting was “very effective”, but far fewer actually used netting to protect their wine grape or blueberry crops.

Conclusions

It is clear that bird damage continues to be a major concern for fruit producers. The majority of growers (60 to 90%, Table 3) indicated that birds were one of several significant factors affecting profitability. One-quarter of blueberry producers in New York indicated that

birds were the single most important factor impacting their crop, and this was a higher percentage of growers than for other major fruit crops (8 to 10%).

As a consequence of their small fruit size, as compared to grapes, cherries, or apples, many more small bird species can damage blueberries, making bird control particularly difficult for this crop. Also, blueberries have a much longer ripening season than cherries or grapes, so techniques that provide short-term bird control will not last for the entire blueberry harvest season. On the other end of the spectrum with large fruit, overall bird damage in apples was reportedly much lower, and large birds (i.e., crows) were responsible for the fruit damage.

Most blueberry, cherry, and grape producers in New York State (55 to 70%) use auditory and visual deterrents for bird control. If no bird management occurred, growers believe bird damage would be significantly greater, affecting 30 to 60% of the crop, and increasing fruit losses two- to five-fold (Figure 2). However, these scaring devices provided limited, short-term control of bird damage, and better methods are still needed to prevent fruit losses.

About one-quarter of blueberry producers, and one-third of grape growers, use netting to prevent bird damage. Although netting is one of the more effective ways to reduce crop losses, it is expensive, requires some type of supporting structure, and is labor intensive for application and removal. If not installed properly, some birds may get under the netting and still damage fruit. Also, if the netting is secured too tightly, birds may be able to peck fruit through the netting. With high bird pressure, even netting may not be completely effective for preventing fruit losses.

Approximately half of cherry producers in New York apparently utilize chemical bird repellents (active ingredient, methyl anthranilate). Fruit growers have expressed concerns about efficacy, frequency of application, potential changes to fruit flavor, and pre-harvest intervals. On-going research associated with this project is targeted at evaluating efficacy of currently-registered bird repellents.

Ongoing Field Research

Researchers with this multi-state project are continuing with in-field assessments of bird damage to selected fruit crops. We are also evaluating current and novel bird-control methods to determine their efficacy across crops and different regions of the United States. Landscape patterns and weather may be important predictors of bird damage to crops each year. We anticipate that this information will allow us to make better recommendations to fruit growers for managing bird damage.

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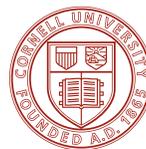
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Cornell Extension Fruit Field Day in Niagara and Orleans Counties

July 24, 2014 at 8:00am
Kast Fruit Farm on Lattin Rd.,
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See back cover for details.



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