

# The Economic Impact of Bird Damage to cv. Honeycrisp Apples

Funding provided by USDA's Specialty Crop Research Initiative

Summer 2014



Netting is an effective bird management method reported by growers.

## Economic Impact of Bird Damage

- Bird crop damage is one of the greatest factors influencing grower's annual profit. 56.7% of survey respondents reported that bird damage was a significant factor or the most significant factor affecting their profits.
- Managing bird damage prevents between \$87 million and \$115 million in annual losses to Honeycrisp apple grower revenue in the five states.
- Unmanaged bird damage to Honeycrisp apples would cause a \$142 million dollar loss in the combined output of the five states and result in over 2,300 lost jobs.
- Average current damage per acre ranges from \$121 in OR to \$2,941 in WA. Per acre management benefits range from \$758 in OR to \$11,606 in WA.

Bird damage is a persistent problem faced by fruit growers. The economic impact of bird damage and the value of bird management are poorly understood, particularly for fruit crops. In 2012, funding was provided by USDA's Specialty Crop Research Initiative to perform an interdisciplinary research study of bird damage to 'Honeycrisp' apples, wine grapes, blueberries, and tart and sweet cherries in five states: California, Michigan, New York, Oregon, and Washington.

Objectives of the economic analysis of bird damage were to:

- Survey fruit growers to assess current bird damage levels and the effectiveness of management techniques.
- Calculate the monetary value of the crop lost to birds and the benefits of management.
- Estimate the economic impact of bird damage to the regional economy in each state in terms of changes in output and employment.



Honeycrisp apples are a high-value crop in the US

The average annual economic impact of bird damage to Honeycrisp apples in MI, NY, OR, WA, and CA was \$48 million with a loss of 788 jobs.

Fruit growers estimated their 1) yield loss in 2011, 2) yield loss if they did not use any bird management, and 3) yield loss if they and their neighbors did not use bird management. These estimates were used to calculate the value of crops lost to birds, and a low and high estimate of the economic benefits of current bird management. Additionally, impacts to the broader economy from damage to crops and the savings associated with bird management were estimated using a model of the regional economy that predicts how a change in one industry can affect revenue and employment throughout the economy. These results illustrate how crop loss affects the region's economy.

Table 1. Annual impact of bird damage to Honeycrisp apples and the economic benefits of bird management.

	Michigan	New York	Oregon	Washington
<b>Current Damage</b>	-\$1,489,906	-\$1,373,583	-\$23,454	-\$26,758,486
<b>Benefit (low estimate)</b>	\$3,897,156	\$2,396,463	\$146,590	\$80,637,058
<b>Benefit (high estimate)</b>	\$6,166,929	\$2,951,741	\$357,679	\$105,587,538

The low number of respondents from California precluded calculations for that state.



Protective wiring installed around apple trees in an orchard

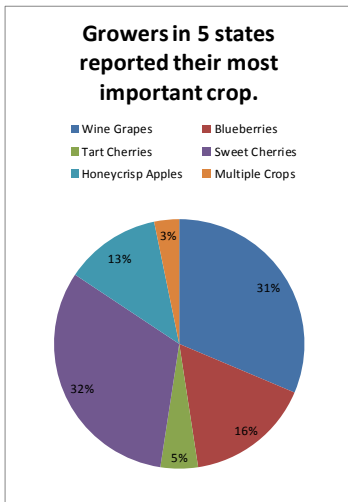
### Destructive Birds

Apple growers were asked which bird species cause the most damage.

**#1: Crows**

**#2: Starlings**

**#3: Turkeys**



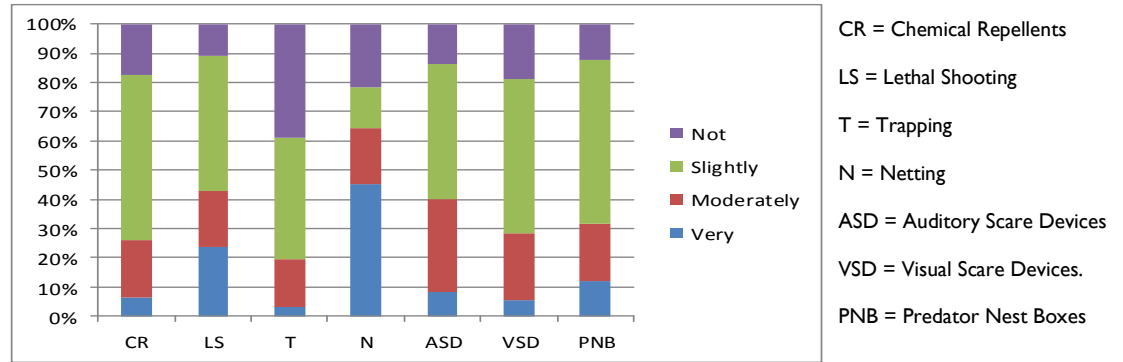
- Research Affiliates:**
- Michigan State University
  - Cornell University
  - Trinity Western University
  - Washington State University
  - Oregon State University
  - USDA/APHIS/WVS National Wildlife Research Center

For more information, visit [birddamagetofruitcrops.info](http://birddamagetofruitcrops.info)

## Bird Damage Management Techniques and Their Perceived Effectiveness

Growers use a variety of bird management tactics to combat crop loss. The use of a given management technique is dependent on the crop, region, and depredating species and may change over time.

**Figure 1. Effectiveness of bird management techniques as reported by growers whose most important crop was Honeycrisp apples.**



## Data Collected from Growers to Estimate Damage

A survey administered by Cornell University's Human Dimensions Research Unit queried growers to collect data on the 5 crops in the study within MI, NY, OR, WA and CA, with results reported separately for each crop. Questions asked for demographic information, growers' experiences with bird damage, which bird management techniques they were using, and how effective they believe the techniques are. Table 2 displays select survey results.

### General Survey Results

- 1,590 survey respondents grew at least one of the five crops.
- 22% of those respondents grew Honeycrisp apples, and 13% said Honeycrisp apples were their most important crop.
- The average farm grew 11 acres of Honeycrisp apples yielding 704 bushels per acre.

### Bird Damage to Honeycrisp Apples

- On average, 6% of the crop was lost to birds.
- Apple yield loss varied by state and was between 0.4% and 18%.
- Without management, growers expected birds to damage up to 37% of their crop.
- Bird management costs per acre ranged from \$250 in MI to \$1,400 in WA.

**Table 2. Survey results from Honeycrisp apple growers in five states.**

State	Percent Respondents Growing Crop	Yield per Acre*	Annual Bird Management Costs	Percent Lost to Bird Damage		
				Current	No Management (Low estimate)	No Management (High estimate)
California	0.6%	-	\$400	17.7%	20.0%	25.0%
Michigan	30.2%	673	\$341	3.5%	12.6%	18.0%
New York	35.1%	679	\$249	4.7%	12.9%	14.8%
Oregon	4.2%	800	-	0.4%	2.9%	6.5%
Washington	22.6%	893	\$1,411	7.4%	29.7%	36.6%

Note that outliers have been removed for percent lost to bird damage and yield per acre in this table

\*Yield measured in bushels