

Relative grape damaging potential of three species of birds

Mark E. Tobin



Roger L. Hothorn

Per bird, the European starling (above) ate slightly more grapes than did the American robin (below). Each consumed over 3.5 times as many grapes as did finches.



Roger L. Hothorn

At least 20 and possibly as many as 40 species of birds damage ripening grapes in California, but the economic importance of individual species has not been clearly defined. Several studies in California vineyards have documented the various types of birds that damage grapes or have estimated the overall damage due to all species. However, estimates of the damage potential of each species should not be based strictly on its relative abundance in vineyards: the different body sizes, feeding habits, and social behaviors of the various species also influence the amount of grapes they damage. A better knowledge of the actual damage capability of individual bird species could help grape growers predict potential damage severity from observed bird numbers, thereby allowing more species-specific and cost-effective bird damage control programs to be implemented.

During 1981, I conducted trials to quantify the grape-damaging potential of three of the avian species most frequently found in California vineyards: house finches (*Carpodacus mexicanus*), European starlings (*Sturnus vulgaris*), and American robins (*Turdus migratorius*). Wild birds of these three species were confined in communal cages and provided grapes for the duration of the grape-growing season, and their damage and consumption of the grapes were measured twice weekly for five weeks.

All birds were caught in the wild and held in captivity at the Dixon, California, Field Station of the Denver Wildlife Research Center, U.S. Fish and Wildlife Service, for 90 to 120 days before testing. During this time, the birds were provided free access to maintenance foods and water. Maintenance foods were Alber's Egg-maker 20 poultry pellets for the European starlings and American robins and a mixture of several small grain seeds (millet, sorghum, sudan grass, watergrass, and sunflower seed) and grit for the house finches.

In the test, for each of the three species, two groups of six birds (three males and three females) were each placed in

Average amounts of maintenance food and grapes damaged or consumed during ten 24-hour-long assessment periods by groups of six caged birds at Dixon, California, during August-September 1981

Bird species	Grape variety	Number of grapes damaged*	Weight consumed	
			Grapes*†	Maintenance food
			grams	grams
House finch	Ruby Cabernet	46.1	98.9 (80%)	24.1
	Zinfandel	66.4	112.5 (84%)	21.8
	Mean	56.3 a	105.7 a (82%)	22.9
American robin	Ruby Cabernet	206.8	342.7 (92%)	27.9
	Zinfandel	194.4	383.6 (92%)	33.7
	Mean	200.6 b	363.2 b (92%)	30.8
European starling	Ruby Cabernet	246.6	393.6 (89%)	50.9
	Zinfandel	177.3	342.5 (83%)	71.4
	Mean	212.0 b	368.1 b (86%)	61.6

* Means in each column followed by the same letter are not significantly different at the 5% level, Bonferroni t test.
† Number in parentheses is the percent of consumption by weight that was grapes.

separate outdoor communal cages (2.5 × 2.5 × 2.1 meters for starlings and robins, and 5.0 × 2.5 × 2.1 meters for finches) and provided free access to maintenance food and water. Beginning three days before the start of grape-consumption assessment, the birds were also provided with grapes. For the remainder of the study, all birds had free access to both maintenance food and grapes at all times.

I recorded consumption and damage of grapes, as well as consumption of maintenance food, twice weekly during 24-hour assessment periods. The same types of food were offered during the assessment periods and the intervening days. On Monday and Thursday of each week, at about 2:00 p.m., I removed the old food and provided six undamaged bunches of grapes and a pan of fresh maintenance food in each cage. Twenty-four hours later, I removed these foods and replaced them with more grapes and maintenance food. Consumption during each semiweekly assessment period was estimated by weighing the food immediately before and after it was offered to the birds. I measured damage to the grapes by visually examining each bunch and counting the number of berries pecked or removed.

To estimate weight loss due to dehydration, I also placed two bunches of each grape variety and a pan of each type of maintenance food in an empty cage during each assessment period and measured the amount of weight lost during the 24 hours. Statistical analysis indicated that the amount of dehydration was not significant.

The grapes were picked at a vineyard on the University of California, Davis campus up to five hours before they were offered to the birds. Six bunches of grapes were suspended just above the perches in each cage. One caged group of each species of birds was provided

Zinfandel grapes during the entire study; the other group was provided Ruby Cabernet grapes. All bunches were approximately similar in size and appearance.

To help ensure that the grapes used during each assessment period were at a similar stage of maturity, I estimated the sugar content of each bunch by selecting one grape from the middle of the bunch and measuring its total dissolved solids (TDS) with a hand-held refractometer. For each 24-hour assessment period and each grape variety, I used only bunches with TDS estimates differing by less than 2° Brix.

All three species readily ate grapes, but consumption varied significantly among the species. In terms of the average grams of grapes removed, the starling and robin groups were quite similar, and each of these species consumed about 3.5 times as much as house finches (see table). The average weight of grapes removed per bird per 24-hour assessment period was 61.3 grams for starlings, 60.5 grams for robins, and 17.6 grams for finches.

Damage to the grapes reflected the same trend among the species as the weight consumed: the starlings damaged only slightly more than the robins, but each of these species damaged over 3.5 times as many grapes as the finches. In average number of grapes per bird per assessment period, starlings damaged 35.3 grapes, robins damaged 33.4, and finches damaged 9.4.

The starlings and robins used in this test were considerably larger than the finches (65 to 75 grams versus about 20 grams), and it is not surprising that they caused much more damage. However, when estimating the relative effects of these species, other factors have to be considered. For instance, the damage caused by house finches may be greater than the actual number of berries fed

on. Starlings and robins pluck entire grapes off the bunch, finches only peck holes in the skins of the grapes and eat the pulp, which may lead to infection and further damage from disease.

The number of birds visiting a vineyard is another factor that obviously influences the overall level of damage. Large flocks of house finches may cause just as much damage as smaller flocks of starlings or robins. All three species are widespread in California and tend to be gregarious. However, migratory and nomadic movements may be pronounced, and flock sizes vary greatly at different times of the season and in different vineyards.

There was no significant correlation in this study between either consumption or damage and the amount of total dissolved solids in the grapes. Past field studies conducted both by this author and by the U.S. Fish and Wildlife Service (Richard W. DeHaven, personal communication) have indicated that there is a threshold level of acceptability at which the grapes become palatable. Birds usually do not begin causing extensive damage to grapes until the fruit has matured to about 11° to 13° Brix, but further increases in TDS beyond this point do not seem to affect either the number of birds visiting the vineyard or the overall level of bird damage.

Although maintenance foods and grapes were both provided at all times, grapes represented more than 80 percent of the total weight consumed within each grouping by grape variety and bird species. When the two grape varieties were averaged, grapes made up 86 percent of the diet for starlings, 92 percent for robins, and 82 percent for house finches. This indicates that grapes, when provided with the alternative foods used, were preferred by each of the three species. In a vineyard, preference for grapes undoubtedly varies according to what other types of food are available, including the abundance of insects and weeds in the vineyard and the other kinds of crops grown nearby. Birds frequently forage in vineyards for food other than grapes, and the presence of large flocks does not necessarily indicate that significant damage is occurring.

These trials suggest that on a per-bird basis, the American robin and European starling should be of much greater concern to vineyardists than the house finch. However, growers should monitor their specific situations closely to determine the extent of damage that is actually occurring.

Mark E. Tobin is Post Graduate Research Biologist, Division of Wildlife and Fisheries Biology, University of California, Davis.