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ECOLOGICAL TRAPS

Offering alluring habitat for songbirds, exotic plants such as Asian honeysuckle may actually decrease the animals' long-term survival and fitness

BY JOHN CAREY

Asian honeysuckles are beautiful and showy bushes. Their white and pink flowers can fill the air with fragrance. Songbirds, including northern cardinals, American robins and gray catbirds, flock to nest in the plants' dense leaves and gorge on their smorgasbord of red and yellow berries.

But these lush plants have a darker side. Since Amur honeysuckle and other Asian species were introduced to the United States in the 1800s, birds have spread their seeds across the eastern part of the country, creating dense thickets everywhere from Vermont to Ohio. The deep shade cast by honeysuckle has devastated countless native plants. "Spring and summer wildflowers are just annihilated," says ecologist Amanda Rodewald of Ohio State University.

So, too, are tree seedlings such as sugar maple as well as native herbs. At Ohio's Miami University, ecologist David Gorchov compared the survival of these plants in areas where honeysuckle was removed to areas where the bushes were left intact. "We thought that some native plants would be affected by honeysuckle, while others would not be," he says. "But we found that everything we looked at was affected." Tree seedling survival was reduced up to 70 percent, and herb growth and reproduction rates plunged by up to 80 percent, primarily because of the shade cast by honeysuckle, Gorchov hypothesizes.

A MALE NORTHERN cardinal eats a berry of nonnative Amur honeysuckle in Jefferson County, Missouri. With abundant food and lush foliage for nesting, these invasive plants appear to help cardinals. But recent research suggests that they do more harm than good.

break Imagery

CONCLUDING THAT "HONEYSUCKLE IS GOOD FOR BIRDS IS LIKE GOING TO A HIGHWAY REST STOP, SEEING STARLINGS AT A DUMPSTER AND SAYING THAT REST STOPS ARE GOOD FOR BIRDS."

But what about the birds that appear to be thriving in honeysuckle? Researchers at Pennsylvania State University created a stir with a 2011 paper, published in the journal *Diversity and Distributions*, concluding that the number of fruit-eating birds such as cardinals, robins and catbirds tripled during the past three decades in parts of central Pennsylvania due to the spread of nonnative honeysuckles. Their findings have fueled a controversial argument from a handful of ecologists that some nonnative plants actually may help native wildlife. These scientists also question whether the benefit of removing nonnative plants always justifies the considerable cost such restoration efforts entail.

"Most [nonnative species] seem to have little impact at all, and some have desirable effects," writes Macalester College biologist Mark Davis in a recent commentary published in *BioScience*. He argues that plant species should be judged on their ecological merits, not on whether they are native. "Is there any evidence that the long-term survival of any native North American plant or bird species is truly being threatened by nonnative plants?" Davis asks. "I seriously doubt it."

But the idea of giving up the fight against nonnative plants remains highly contentious. "It's still the minority view among ecologists," says Rodewald. And based on a growing body of research conducted by her and other scientists, continued concerns about exotic plants—particularly highly invasive species such as honeysuckle—remain justified.

Scientists are taking a closer look at the plants' impact on birds, for example. While it's true that abundant honeysuckle berries attracted large numbers of fruit-eating songbirds in Pennsylvania, concluding that "honey-



A GRAY CATBIRD (above) munches on nonnative mulberry. Scientists are finding that catbirds and other species that seem to thrive on exotic plants are generalists: birds that do well with almost any kind of food. In contrast, specialists such as the Acadian flycatcher (above right) are particular. These birds avoid areas with Asian honeysuckle.

suckle is good for birds is like going to a highway rest stop, seeing starlings at a dumpster and saying that rest stops are good for birds," says University of Delaware entomologist Doug Tallamy. Birds in the Pennsylvania study were all generalists: species that thrive when there's more food of almost any type. Most generalists are doing well

and do not need special protection or concern from conservationists.

In contrast, scientists are finding that more specialized species are hurt by honeysuckle invasions. When Rodewald began to study how birds are faring in Ohio as suburbs increasingly bump up against remnants of forest, she noticed that some special-



ists, including the Acadian flycatcher, avoid areas with a dense honeysuckle understory altogether.

Tallamy's research shows that birds also may be harmed indirectly because nonnative plants affect insects. He has found that the number and diversity of plant-eating insects, especially caterpillars, drops dramatically when exotic plants invade. That's not a problem for species such as catbirds that eat a variety of worms, spiders and other food. But warblers and chickadees rely on caterpillars for 90 percent of their diet during the breeding season, eating hundreds per day. "That's a lot of insects," Tallamy says. "If you don't have those insects, you don't have the birds."

Rodewald's latest research suggests that even generalists like cardinals may be harmed. She began the work, she says, with an observation that "honeysuckle seemed to be contributing to higher predation rates." To figure out why, she and her students set up observation posts in 14 forests in central Ohio, hiring a landscaping company to laboriously clear honeysuckle from several 5-acre plots. For the following six years, more than a

NWF PRIORITY STOPPING INVASIVES

For decades, combating the threat posed to native biodiversity by harmful invasive species has been a top NWF priority. With support from the Turner Foundation, the Federation over the past several years has worked closely with its partners in the National Environmental Coalition on Invasive Species (NECIS), employing a variety of tactics, from scientific research and policy advocacy to grassroots activism and public education. Recent NECIS victories include: new U.S. Coast Guard regulations to slow introduction of invasives from ship ballast water discharges, an import ban of five harmful constrictor snake species under the U.S. Lacey Act and introduction in the House of Representatives of legislation strengthening U.S. Fish and Wildlife Service authority to screen and regulate the live animal trade to prevent imports of potential new invaders. To learn more, go to www.nwf.org/invasives.

dozen students and technicians (along with video cameras) watched what happened to 888 cardinal nests during the breeding seasons, observing each nest at least every few days. "It was a ton of work," recalls Rodewald.

Their painstaking observations paid off, providing a clear picture of how honeysuckle affects cardinals. Typically in the wild, male cardinals that are in the best condition grab the best territories and nesting spots and breed earliest in the year. They also successfully rear more young than their less-fit competitors—an example of natural selection at work.

But this pattern changes when honeysuckle invades a forest. Because honeysuckle leafs out sooner in spring than most plants, the fittest cardinals rush to mate and nest in the shrubs' dense foliage. But instead of a gain in reproductive success, these birds pay a price. The early nesters rear 20 percent fewer young than those that nest later.

The reason? Predation, as Rodewald initially suspected. Perhaps because the first nests in honeysuckle are just about the only nests in a forest, locating them is easier for predators

such as raccoons, hawks and crows. Parasitic cowbirds (which kick cardinal eggs out of nests and replace them with their own) also disproportionately affect early nesters. “Nests in honeysuckle are especially vulnerable to predation early in the breeding season, a time widely considered to be the most favorable for raising young,” Rodewald says. “Breeding in honeysuckle seems to flip natural selection. It is a kind of ecological trap.”

The story does not end there. As part of her study, Rodewald’s team also captured cardinals in mist nets and collected feathers from 280 birds. The

researchers then photographed the feathers and used computer software to measure both the shade of red and the intensity of color in each feather. Normally, males with deeper, redder color are the most fit because they’ve been able to find food sources rich both in nutrients and the carotenoid pigments that make feathers red. But Rodewald discovered that in urban and suburban areas with a lot of honeysuckle, the normal relationship between fitness and color breaks down. She suspects honeysuckle berries, unlike the berries of native plants, contain abundant pigments but

NORMALLY, MALE CARDINALS with the brightest red feathers are also the most fit, because they’ve competed successfully for foods that contain the carotenoid pigments that produce red—which happen to be the most nutritious foods. The berries of Asian honeysuckle break down that relationship because they provide the pigments but are nutrient poor.





are poor in the protein and fat birds need for energy.

The result: Honeysuckle “reduces the value of plumage brightness as a sign of male quality,” Rodewald says. “To a female, a bright red male would normally be a cue that this is a guy she wants to be with, because she will fledge more young. Instead, the cue is meaningless in cities.” (The availability of birdseed in urban areas—which contains plenty of nutrients but no carotenoid pigments—also may contribute to the disconnect between feather color and fitness.)

Bird populations will not suddenly crash because of honeysuckle and other nonnatives whose “devastating impacts on insects and plants are so obvious you can count them,” says Rodewald. “With the birds, the effects of invasives can be much more nuanced and more subtle—and may be taking longer to play out.”

But over time, these effects could add up. Tallamy is particularly concerned about specialists such as war-

IN TENNESSEE, a prothonotary warbler nabs a caterpillar. When exotic plants invade an area, the number and diversity of caterpillars decline, posing a potential threat to warblers, which rely on these plant-munching insects for 90 percent of their diet.

blers that depend on plant-munching insects. “My prediction is that birds that specialize on insect herbivores will take a bigger hit than those that eat other insects,” he says.

Tallamy points out that it’s not even clear which birds would be most affected because scientists still do not know which species depend on herbivorous insects. That’s why he recently spent 16 days watching a chickadee nest in his backyard, learning that it took 4,800 caterpillars to raise a single clutch of chicks. Tallamy has now put out a call to nature photographers for images of birds with insects in their beaks to try and pin down what various species eat.

Such efforts should help scientists understand the threat nonnative plants pose to birds and other wildlife. “While many nonnative plants are

fairly benign, others can be ecologically destructive,” says botanist Bruce Stein, NWF’s director of climate change adaptation. “We need to pick our battles wisely by figuring out which ones we can live with and which, if left unattended, will undermine our ecosystems.”

Meanwhile, homeowners can help by planting native trees and other plants in their yards. “We are so used to hearing disastrous environmental news, and it often seems there is little that one person can do,” says Tallamy. “But I’ve been going all over the country saying that you *can* do something. You can change the plants in your yard.” The caterpillars and the birds will thank you.

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