Gardens with too many nonnative plants threaten populations of insect-eating birds, study finds

by Hannah Hagemann on 26 December 2018

- *Researchers teamed up with community scientists to explore how nonnative plants in yards and gardens affect the breeding success of chickadees, a common insect-eating bird in the U.S.*
- *In gardens with less than 70% of native plants by biomass, chickadee populations crashed, because the insects they usually eat cannot live on nonnative trees and flowers.*
- *Landscaping with native plants helps resident animals thrive by sustaining balanced populations of their prey.*

When homeowners decide between planting native trees or exotic ginkgos, they also may be deciding the fate of insect-eating birds in their neighborhood, a new study finds.

The research, published recently in the *Proceedings of the National Academy of Sciences*, is the first to explore how landscaping choices affect the population of a common insect-eating bird.

Native plants sustain the insects needed by resident birds, scientists

found. If there are too many exotic trees or flowers, insect-eating birds cannot find enough of their usual prey to successfully raise their young.

Chickadee eats a caterpillar. Photo by Doug Tallamy of the University of Delaware.

Managed urban landscapes with large number of nonnative plants are expanding in the U.S., with unknown impacts on local animal populations. **"**We landscape largely with plants from Asia, and that's destroying the food webs around us," said entomologist Doug Tallamy of the University of Delaware, coauthor on the paper.
To explore how such landscaping affects native birds, Tallamy and first author Desiree Narango worked with Peter Marra, director of the Smithsonian Migratory Bird Center (SMBC). They focused on the Carolina chickadee (*Poecile carolinensis*) as a common representative of the 432 species of birds across North America that eat insects.
The researchers teamed up with a community science organization, Neighborhood Nestwatch, in residential Maryland and Washington, D.C. They enlisted 159 homeowners who placed chickadee nest boxes in their yards.
The researchers recorded the number and sizes of native and nonnatives plants and trees as well as the number and species of insects living on each plant. For three breeding seasons starting in 2013, they observed how often the birds were foraging and from natives and nonnatives. The team also videotaped the birds to find out the types and numbers of insects they brought back to the nest. Homeowners helped the team monitor the number of eggs laid by chickadees and how many fledglings survived from each nest. The scientists also took blood plasma samples from the chickadees for chemical analysis to confirm how often the birds ate caterpillars and spiders.
In yards containing more nonnative plants and trees, fewer insects were available for chickadees to eat, the researchers found. When chickadees roosted in yards dominated by nonnative plants, their

habits shifted, Tallamy said. Caterpillars that frequently find homes on native plants and trees, such as oaks, are the most nutritious food for chickadees. But in yards dominated by nonnatives, such as burning bush, spiders or insects that aren't as nutritious for birds became their main meals. The baby birds developed more slowly, and fewer survived. “It's not the right food," Tallamy said.

White Oak is a native tree that provides the right kind of food for chickadees. Photo by Doug Tallamy of the University of Delaware.

Burning Bush, a nonnative plant chickadee scour for food on. Photo by Doug Tallamy of the University of Delaware.

The threshold for this difference was 70% native plants by biomass, the team's statistical analysis showed. Below that level, chickadees did not breed successfully. Above that level, the bird populations thrived.

The reason is the natural balance of insects sustained by native plants. Leaves contain toxins to ward off herbivores; only insects that have adapted to these native leaves survive in such gardens. “Insects can only eat the plants they coevolve with," Tallamy told Mongabay. “The research was done here, but it's applicable all over the world."

Now, the challenge is getting nurseries and homeowners to shift their landscaping habits. “We have used plants only as decorations in the past," Tallamy said. “We need to choose plants based not only on how they look, but what their functions are in our landscape." To help homeowners in the U.S. pick the best native plants for their area, Tallamy developed an interactive website (https://www.nwf.org/NativePlantFinder/About).

Chickadee perches. Photo by Doug Tallamy of the University of Delaware.

The study is an important step in understanding how homeowners can affect bird ecology, said Rebecca Dolan, director emeritus of the Indiana University Herbarium. “Few studies have quantified these effects," she said. “It will encourage people to do similar studies that involve different kinds of wildlife and bird species." Narango and Tallamy are now investigating which native U.S. plants are “keystone" species: plants that cultivate the highest percentage of insect-food. The team hopes to encourage homeowners to plant keystones and enhance the food webs in their neighborhoods.

Header image: Chickadee perches. Photo by Doug Tallamy of the University of Delaware.

Citation Narango, D.L., Tallamy, D.W., Marra, P.P. (2018) Nonnative plants reduce population growth of an insectivorous bird. *Proceedings of the National Academy of Sciences* 115 (45) 11549-11554; DOI: 10.1073/pnas.1809259115

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