DNA analysis of bluebird feces reveals benefits for vineyards

November 23 2016

A Western Bluebird feeds its nestlings in a California vineyard. Credit: G.

Do bluebirds nesting in California's vineyards help grape growers by eating agricultural pests, or hurt them by eating insects that are beneficial? The researchers behind a new study in *The Auk: Ornithological Advances* found that bluebirds' presence is likely a net positive—and they did it by analyzing DNA in bird poop.

Bluebirds are one of several groups of birds that catch insects on the wing, but because they're constantly on the move and the animals they eat are tiny, it's difficult to determine exactly what species make up their diet. Julie Jedlicka of Missouri Western State University and her colleagues tackled this question using a new approach called "molecular scatology," analyzing DNA fragments in the birds' feces to determine insect species the bluebirds were eating. They found that Western Bluebirds in Napa Valley vineyards mostly ate mosquitos and herbivorous insects, likely having only negligible effects on the predaceous insects that benefit vineyard production by eating pests. Jedlicka hopes that these results encourage more vineyard owners to install bluebird boxes, helping replace natural tree cavities lost when land is cleared.

Jedlicka and her colleagues collected 237 fecal samples from adult and nestling bluebirds living on three vineyards in Napa County, California. "Many people I talk to get a very romantic vision in their minds when they think about how beautiful it must be to do fieldwork in California vineyards, especially in the Napa Valley," says Jedlicka. "Honestly, the landscape was beautiful, but the fieldwork is very demanding. Temperatures during the summer often rose into the 90s and 100s, and I was lucky to have wonderful help from vineyard farm workers and undergraduate field assistants."

"This study provides important new insights, both in terms of its findings on bluebird diets in vineyard ecosystems and in its advances in molecular diet analyses," according to Matthew Johnson of Humboldt State University, an expert on ecosystem services provided by birds who was not involved with the study. "Even though the authors did not find specific pest species in bluebird diets, they did confirm that bluebirds are mainly eating herbivorous insects, including those in the same families as major pests. This suggests bluebirds may contribute to ecosystem functioning in these systems. Their work also illustrates the power of new techniques to reveal bird diets and marks new advances in scatology."

More information: "Molecular scatology and high-throughput sequencing reveal predominately herbivorous insects in the diets of adult and nestling Western Bluebirds (Sialia Mexicana) in California vineyards" americanornithologypubs.org/do … 10.1642/AUK-16-103.1

Provided by The Auk

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