

# Research explores how grape pests sniff out berries

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Female grape berry moths are the biggest insect threat to wine grapes in the eastern U.S. The moths lay their eggs on grapes and, once hatched, the larvae penetrate the skin, then eat and damage the fruit. But no one is

quite sure how the moths home in on berries from the wider landscape.

A new study, published Nov. 21 in the *Journal of Chemical Ecology*, investigates how these pests find their target amid a sea of other plants in the landscape.

The researchers originally hypothesized that grapes might have a unique profile of volatile compounds that the moths recognize, and perhaps other neighboring plants have volatile organic compound profiles that deter moths.

They created a [study design](#) that gauged the attraction of female grape [berry](#) moths to volatile organic compounds emitted from grape vines, the moths' natural host plant, as well as to nearby gray dogwood and apple trees.

"Chemical cues, signals, are used by almost all insects to locate resources in their habitat, such as mates or host plants," said Charles Linn, a senior research associate at Cornell, now retired, and the senior author on the paper.

"Grape plants produce maybe hundreds of compounds, but the insects are really only detecting a subset with their antennae," said Greg Loeb, professor of entomology at Cornell AgriTech and a co-author of the paper.

Michael Wolfin, Ph.D. '17, a postdoctoral researcher at Penn State, is the paper's first author.

The researchers ran [gas chromatography](#), electro-antennal detection and mass spectrometry analyses coupled with behavioral tests in a wind tunnel and identified 11 [volatile organic compounds](#) emitted by grapes that the moths detected. Though these compounds appear in particular

ratios in grapes, they are common and are shared by most [plants](#), including gray dogwood and apples.

When the study's authors used the grape vine odors to lure the moths into traps, the method worked, but ineffectively.

In [wind tunnel](#) tests, the researchers found the moths flew upwind at the same rates toward both plant clippings and extracts of volatiles from grapes, dogwood or apples.

"The berry [moth](#) wasn't showing clear evidence of discrimination based on these [compounds](#)" over long distances, Loeb said. "We suggest that maybe plant-eating arthropods are using these common volatiles to find the correct habitat, and then using other cues to zero in on where they are going to lay their eggs."

"These results support a model that is in marked contrast to others in the literature and should provide a new hypothesis for future testing," Linn said.

More study is needed to determine what cues the moths use to find berries. A preliminary study using artificial wax grapes showed that berry moths would not lay eggs on bare wax, but when a [grape](#) skin was laid over the wax, the females did lay eggs, suggesting there is something on the skin's surface they recognize.

Though no deterring volatiles were found, the research offers clues for breeders to perhaps develop varieties with tweaked ratios of volatiles to throw insects off scent.

**More information:** Michael S. Wolfen et al. Proximate Mechanisms of Host Plant Location by a Specialist Phytophagous Insect, the Grape Berry Moth, *Paralobesia viteana*, *Journal of Chemical Ecology* (2019).

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