

Do adult periodical cicadas actually feed on anything?

October 18 2023



A long-standing query about periodical cicadas that emerge every 13 or 17 years was recently answered by a team at USDA Agricultural Research Service: Once periodical cicadas emerge, do they actually feed on vegetation? Their analysis of cicadas' gut contents found plant DNA in mature adult cicadas but none in freshly emerged adults, a strong sign that adult cicadas do feed on plants, since no plant matter in cicadas' guts carries over from their nymph stage. Shown here is a Brood X 17-year cicada adult on a linden tree leaf in Maryland during the brood's 2021 emergence. Credit: Peggy Greb, USDA-ARS, public domain image

Every so often, cicadas emerge above ground and blanket the Earth with their exoskeletons while emitting a high-pitched chirp from sunrise to sunset. The periodical cicadas in the genus *Magicicada* come every 13 or 17 years, though other types of cicadas emerge much more frequently in our neighborhoods.

A long-standing agricultural query related to the periodical [cicadas](#) was recently answered by an Agricultural Research Service (USDA-ARS) research team at West Virginia's Appalachian Fruit Research Station. Simply: Once periodical cicadas emerge, do they actually feed on vegetation?

Magicicada pose a threat to U.S. agriculture due to their ability to damage orchard trees when they lay their eggs on tree branches. Many growers and nurseries take this into consideration and refrain from planting new trees in years when periodical cicadas emerge, as their eggs can kill young trees.

ARS researchers investigated the best way to solve this agricultural challenge by reviewing the life history, reproductive biology, and evolutionary relationships of cicadas over the past 150 years. But many have often disagreed about whether, or how much, the adults feed.

This is because the needle-like mouthparts of cicadas do not leave much evidence of any feeding, unlike chewing insects, and their digestive tracts that are notoriously difficult to dissect. USDA-ARS researchers studied [adult male](#) and female *Magicicada* during the 2021 emergence of Brood X in Maryland, Virginia, and West Virginia as the insect moved through [apple orchards](#) and wooded public parks and residential properties.

The findings, published October 18 in the *Journal of Insect Science*, disrupted the age-old popular myth of adult [periodical cicadas](#) not feeding. Scientists found mainly [woody plant](#) and Malus, or apple tree DNA, in adult cicada guts and found that 54% of those cicadas contained DNA from multiple [plant species](#).

While this strongly implies that adult *Magicicada* feed on plant sap, it was necessary to show that the recovered plant DNA was not just leftovers from meals eaten during the nymph stage.

"We tested teneral adults, or brand new adult *Magicicada* that had not had a chance to feed yet, to check for any leftover plant DNA," said USDA-ARS research team leader James Hepler, Ph.D. "We couldn't find any plant DNA in the guts of teneral adults, so we can be reasonably sure that the DNA found in mature adult *Magicicada* was eaten during the adult stage, since no DNA carries over from the nymph stage."

Cicadas appear to have highly permeable exoskeletons that permit considerable water loss and allow water to evaporate out of the insect a little easier than many other insects. Also, the presence of essential amino acid-producing endosymbionts in the gut tissues of adult *Magicicada* imply that, despite the [water loss](#), some nutrition is being derived as they feed on plant species.

USDA-ARS will continue to examine the life cycle of Brood X and solve agricultural challenges directly related to their life span above ground. More studies will also be conducted to look at the impact that adult *Magicicada* contribute to tree physiology.

More information: James Hepler et al, Do adult *Magicicada* (Hemiptera: Cicadidae) feed? Historical perspectives and evidence from molecular gut content analysis, *Journal of Insect Science* (2023). [DOI: 10.1093/jisesa/iead082](https://doi.org/10.1093/jisesa/iead082)

Provided by Entomological Society of America

Citation: Do adult periodical cicadas actually feed on anything? (2023, October 18) retrieved 29 April 2024 from <https://phys.org/news/2023-10-adult-periodical-cicadas.html>

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