Beneficial arthropods find winter sanctuary in uncultivated field edges, study finds

June 3 2021, by Diana Yates

Many species of ground-dwelling beetles, ladybugs, hoverflies, damsel bugs, spiders and parasitic wasps kill and eat pest species that routinely plague farmers, including aphids and corn rootworm larvae and adults. But the beneficial arthropods that live in or near cropped lands also are susceptible to insecticides and other farming practices that erase biodiversity on the landscape.

A new study reveals that beneficial arthropods are nearly twice as abundant and diverse in uncultivated field edges in the spring as they are in areas that are cropped—if those field edges are rich in an array of flowers and other broad-leaved plants and not just mowed grass. The findings are reported in the *Journal of Insect Science*.

Former graduate student Scott Clem, who led the research with University of Illinois Urbana-Champaign entomology professor Alexandra Harmon-Threatt, captured the beneficial bugs as they emerged from the soil in early spring. The study focused on overwintering arthropods in organic farm fields and field edges in Illinois, as the use of pesticides may wipe out many of the beneficial creatures, said Clem, who earned a Ph.D. in May.

Predatory arthropods that overwinter near cropped areas are immediately available in spring and may be more useful to farmers than insects and other arthropods that disperse in *agricultural fields* during the growing season, Clem said.
"A benefit of understanding overwintering is that those arthropods that emerge in the spring may be more inclined to feed on pests when pest populations are low," he said. "And so, they may be more likely to nip pest populations in the bud before the pest problem becomes a big deal."

To understand how species richness and diversity differed between cropped land and natural field edges, Clem set up dozens of tiny "emergence tents" that capture any insects emerging from the ground in a small area. He put 10 tents in each of five organic soybean fields in Illinois and 10 in nearby field edges in early March, and left them there until late April. Then he collected and analyzed all the arthropods caught in the tents.

Four of the five uncultivated field edges were enrolled in the Conservation Reserve Program, a land conservation initiative administered by the Farm Service Agency of the U.S. Department of Agriculture. The CRP offers financial rewards to farmers who agree to "remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality." It is the largest conservation program in the nation, protecting 22 million acres. The field edges in the study were a mixture of grasses and broadleaf plants, including some flowering plants.

Clem collected and identified more than 4,200 potential natural enemies of pests, consisting of 95 species including predatory beetles, true bugs and parasitoid wasps. Overall arthropod diversity and abundance were nearly two times greater in the field edges than in the adjoining fields. However, one site—with a field border made up mostly of mowed grass and less plant diversity than the other sites—had far fewer of these beneficial arthropods, the researchers found.

"We were able to determine that these field edges are important for maintaining natural enemies of pest species in the landscape," Clem said.
"And the quality of the field border is likely to benefit the arthropod communities that live there and enhance the services they provide."

"This research supports the idea that these uncropped areas—whether you want to call them field borders, field margins or even ditches—are really beneficial for insects and other arthropods," Harmon-Threatt said. "Preserving some land that is not cultivated and not mowing your field edges might make a big difference for insect conservation, but it's probably also making a difference in controlling pests in farm areas, which is also super-important for meeting our other goals of feeding a growing population."


Provided by University of Illinois at Urbana-Champaign


This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.