

Increased insecticide use in the Midwest linked to landscape change

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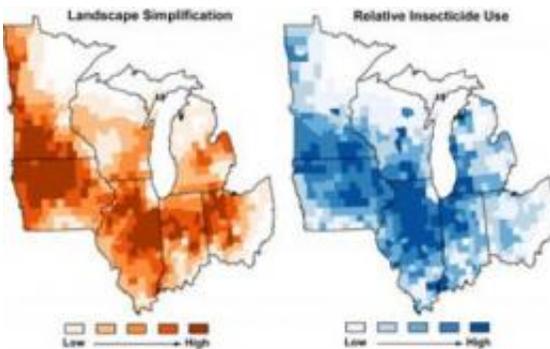
Ladybeetles thrive in more diverse landscapes; they suppress pests and reduce insecticide use. Credit: Kurt Stepnitz/MSU

The continued growth of cropland and loss of natural habitat have increasingly simplified agricultural landscapes in the Midwest. A Great Lakes Bioenergy Research Center (GLBRC) study concluded that this simplification is associated with increased crop pest abundance and insecticide use, consequences that could be tempered by perennial bioenergy crops.

While the relationship between landscape simplification, crop pest pressure, and [insecticide](#) use has been suggested before, it has not been well supported by [empirical evidence](#). This study, published online in the [Proceedings of the National Academy of Sciences](#) during the week of July 11, is the first to document a link between simplification and

increased insecticide use.

"When you replace natural habitat with cropland, you tend to get more crop pest problems," says lead author Tim Meehan, University of Wisconsin–Madison associate scientist in the Department of Entomology. "Two things drive this pattern. As you remove natural habitats you remove habitat for beneficial predatory insects, and when you create more cropland you make a bigger target for pests — giving them what they need to survive and multiply."



Simplified landscapes, with lots of cropland and little natural habitat, promote crop pests. These maps of the Midwest show landscape simplification on left and relative insecticide use on right. Credit: Tim Meehan/UW-Madison

Because landscape simplification has long been assumed to increase pest pressure, Gratton and Meehan were not surprised to find that counties with less [natural habitat](#) had higher rates of insecticide use.

One striking finding was that landscape simplification was associated with annual insecticide application to an additional 5,400 square miles in the Midwest — an area the size of Connecticut.

Although simplification of agricultural landscapes is likely to continue, the research suggests that the planting of perennial bioenergy [crops](#) — like switchgrass and mixed prairie — can offset some negative effects.

"Perennial crops provide year-round habitat for beneficial insects, birds, and other wildlife, and are critical for buffering streams and rivers from soil erosion and preventing nutrient and pesticide pollution," says Doug Landis, Michigan State University professor of entomology and landscape ecology.

Perennial grasslands that can be used for bioenergy could also provide biodiversity support, specifically beneficial insect support, says Claudio Gratton, UW-Madison professor of entomology.



Fields with soybean crops dominate large areas of US midwestern landscapes.
Credit: Julie Doll, MSU/NSF KBS LTER Site

"If we can create agricultural landscapes with increased crop diversity, then perhaps we can increase beneficial insects, reduce pest pressure and reduce the need for chemical inputs into the environment," he says.

"We are at a junction right now. There is increased demand for

renewable energy, and one big question is: where it will come from?" Gratton says. "We hope that these kinds of studies will help us forecast the impacts that bioenergy crops may have on agricultural landscapes."

Provided by University of Wisconsin-Madison

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