Drifting herbicides produce uncertain effects

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Researchers are advocating increased caution using certain herbicides that have a range of effects -- positive and negative -- on field edges and old fields. The researchers studied the effects of dicamba and 2,4-D on plants and animals that lie just outside of the targeted area for the sprays. Credit: J. Frank EJ. Franklin Egan

Farmers should take extra precautions so drifting herbicides do not create unintended consequences on neighboring fields and farms, according to agricultural researchers.

The researchers found a range of effects—positive, neutral and negative—when they sprayed the herbicide dicamba on old fields—ones that are no longer used for cultivation—and on field edges, according to J. Franklin Egan, research ecologist, USDA-Agricultural Research Service. He said the effects should be similar for a related compound, 2,4-D.

"The general consensus is that the effects of the increased use of these herbicides are going to be variable," said Egan. "But, given that there is really so much uncertainty, we think that taking precautions to prevent herbicide drift is the right way to go."

Farmers are expected to use dicamba and 2,4-D on their fields more often in the near future because biotechnology companies are introducing crops genetically modified to resist those chemicals. From past experience, 2,4-D and dicamba are the herbicides most frequently involved in herbicide-drift accidents, according to the researchers.

Because the herbicides typically target broadleaf plants, such as wildflowers, they are not as harmful to grasses, Egan said. In the study, the researchers found grasses eventually dominated the field edge test site that was once a mix of broadleaf plants and grass. The old field site showed little response to the herbicide treatments.

Because dicamba and 2,4-D typically target broadleaf plants, such as wildflowers, and not grasses, the researchers found that the number of wildflowers diminished, while grasses soon dominated the field edges, which were once blends of broad leaf plants and grasses. Credit: J. Franklin Egan

Herbicide drift was also associated with the declines of three species of herbivores, including pea aphids, spotted alfalfa aphids and potato leaf hoppers, and an increase in a pest called clover root curculio, Egan said. The researchers found more crickets, which are considered beneficial because they eat weed seeds, in the field edge site.

The researchers, who report their findings in the current issue of *Agriculture, Ecosystems and Environment*, did not see a drop in the number of pollinators, such as bees, in the fields. However, the relatively small size of the research fields limited the researchers' ability to measure the effect on pollinators, according to Egan.

"That may be because pollinators are very mobile and the spatial scale of our experiment may not be big enough to show any effects," Egan said.

Farmers can cut down on herbicide drift by taking a few precautions, according to Egan. They can spray low-volatility herbicide blends, which are less likely to turn to vapors, and use a nozzle design on the sprayer that produces larger droplets that do not easily drift in the wind.

Egan also recommended that farmers follow application restrictions printed on herbicide labels and try to spray on less windy days when possible.

The tests were conducted on two farms in Pennsylvania. One field edge site was located near a forest and alfalfa field. The old field was an acre plot near Penn State's Russell E. Larson Agricultural Research farm.

Egan worked with Eric Bohnenblust, doctoral candidate in entomology; John Tooker, assistant professor of entomology and extension specialist, and David Mortensen, professor of weed and applied plant ecology, all of Penn State, and Sarah Goslee, U.S. Department of Agriculture ecologist.

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