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# **Arkansas tomato fruit worm study develops new insecticide recommendations**

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## Fast facts

* Tomato fruit worm has built up resistance to pyrethroids in Arkansas
* Diamide insecticide recommended for better tomato fruit worm control

(807 words)

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FAYETTEVILLE, Ark. — When it comes to managing tomato fruit worms in Arkansas, using the right product once is often as good as it gets.

The pesky caterpillar of the *Helicoverpa zea* moth has become resistant to insecticides containing pyrethroids as the active ingredient, at least in Arkansas. A two-year study by the Arkansas Agricultural Experiment Station found that alternative insecticides are needed for adequate control in tomatoes.

Aaron Cato, an integrated pest management specialist for the University of Arkansas System Division of Agriculture Cooperative Extension Service and a researcher for the experiment station, conducted a study at the Southwest Research and Extension Center near Hope. He found that applications of diamide insecticides with the active ingredients chlorantraniliprole or cyantraniliprole were able to provide significantly better protection than pyrethroid insecticides.

Cato also confirmed the importance of being on the lookout for tomato fruit worm eggs and spraying when growers reached the threshold of one egg per 10 tomato plants. The study showed one pyrethroid application at that threshold offered the same protection as six straight weekly sprayings of a pyrethroid pesticide.

Diamides selectively act on the intracellular calcium channels that play a central role in caterpillars' muscle and nerve functions. They have the added benefit of being less active on the beneficial predatory insects that help control spider mites, Cato said.

*Helicoverpa zea* is a tomato fruit worm species in the family Noctuidae. Some also call it soybean pod worm, corn earworm, and cotton bollworm. Cato said the diamide insecticides have worked well on the caterpillars in those row crops but had not been field-tested in Arkansas on many specialty crops like tomatoes.

Resistance to pyrethroids is less common in other states, Cato said, likely because the moths come from a different source. He added that the "H. zea" moths that migrate to Arkansas in the spring to lay their eggs are usually from Texas and Louisiana but do not stay for the winter in Arkansas.

A previous study by Virginia Tech University over 10 years ago developed the recommendation of spraying pyrethroids once growers found at least one egg per 10 plants. The Arkansas researchers used that threshold to determine its effectiveness with current resistance issues and determine if it was a good mark for newer diamide products.

"If you get them at the point where they are just coming out of eggs, you're going to get your best control because the caterpillars are usually protected inside of flowers and fruit where they're hard to get at," Cato said of the current threshold recommendation for tomato fruit worm.

Cato said the 2020 and 2021 tests showed the diamides offered protection for at least 21 days so some crops may need a second application. There was no difference with the pyrethroid insecticides if the tomato plants were sprayed every week or only one time at the one-egg-per-10-plant threshold. It indicated the threshold was appropriate. One pyrethroid spray wasn't as effective as a diamide due to resistance and because of its faster degradation.

"What we found is we lost twice as many tomatoes when using pyrethroids, whether sprayed at threshold or multiple times," Cato said. "Pyrethroids still work some when the pests are resistant, but usually you go from over 90 percent control to less than 75 percent control, and that 20 percent is a lot of lost profit for growers."

In the test plots sprayed with a pyrethroid containing the active ingredient lamda cyhalothrin, researchers found damage to about 4 percent of the tomatoes. The diamide sprays containing active ingredients chlorantraniliprole or cyantraniliprole saw damage to about 1.5 percent of the tomatoes. He noted that the Integrated Pest Management economic threshold to make it worth your money to spray insecticide is 3 percent damage to fruit.

Cato said pyrethroids may still be needed for other insects like stinkbugs since the diamides only kill caterpillars in this case. And although they were not looking to study foliage eaters like yellow-striped armyworm, they found the diamide products similarly controlled those caterpillars. These species are often found in row crops but more commonly in specialty crops like tomatoes and hops.

"So, all of those other species are still controlled by pyrethroids," Cato said of the foliage eaters like yellow-striped armyworm and tomato hornworm.

Amanda McWhirt, assistant professor and extension horticulture production specialist, was a partner in the study with support from the Southern Sustainable Agriculture Research and Education, a U.S. Department of Agriculture National Institute of Food and Agriculture grants and outreach program.

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