

Spider mite predators serve as biological control

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This is a photo of predator mite attacking a spider mite. Credit: David Biddinger, Penn State

The control of spider mites, which damage tree leaves, reduce fruit quality and cost growers millions of dollars in the use of pesticide and oil spraying, is being biologically controlled in Pennsylvania apple orchards with two tiny insects known to be natural predators, according to Penn State researchers.

"Spider mites feed on the chlorophyll in the cells of leaves, damaging their ability to use photosynthesis," said David Biddinger, tree fruit entomologist and biocontrol specialist at the Penn State Fruit Research and Extension Center in Biglerville. "When the numbers of mites per leaf reaches 25 to 30, the tree becomes stressed and the leaves start to bronze. This affects the quality of its fruit and in two to three seasons

can actually kill small trees."

The two most popular insect specialists used to control spider mites are a lady bug named *Stethorus punctum* and a predatory mite named *T. pyri*. These insects prey on two types of spider mites, the European red mites and the two-spotted spider mites, which are agricultural pests worldwide. Much of Biddinger's work is in Pennsylvania apple orchards, a prime target for both types of pest mites.

Although the lady bug and the predatory mite both hunt spider mites, their ways of tracking them down are different.

"It turns out the predatory mite sort of roams around and bumps into them," said Biddinger. "The lady bug on the other hand is a selective killer, hunting using visual and olfactory cues to prey on spider mites."

The lady bug is tiny, oval, and black and it is a [natural killer](#) of pest mites. It is attracted to specific volatile chemical signals given off by the damage the spider mites cause to leaves. It is not just the smell that drives the lady bugs wild; this insect cannot resist the yellowing of the leaves damaged by spider mites. Adult lady bugs can live for over a year and eat up to nine mites an hour or 75 to 100 a day.



This is a photo of a tiny, black lady bug mite predator. Credit: David Biddinger, Penn State

The predatory mite is much smaller than the lady bug. It is pear-shaped and is usually creamy-white in color. Young mites develop into adults in a very short time and their voracious appetites make them a formidable enemy to spider mites. Adults have a lifespan of about 75 days and can eat 350 mites during this time.

Reducing pest mite numbers and controlling outbreaks with the aid of mite predators is an important task. The biological control of spider mites reduces the need for mite-controlling chemicals and saves growers millions in integrated pest management costs.

"Biological control is basically using the good bugs to control the bad bugs," said Biddinger.

Growers chose lady bugs as their biological control agent until U.S. Environmental Protection Agency regulations prompted growers to switch to new pesticides that kill lady bugs. The predatory mite, however, was resistant and could live through sprayings. So predatory mites are now the hunter of choice for spider mites.

Biddinger, working with Donald C. Weber, research entomologist, U.S. Department of Agriculture, Agricultural Research Service Invasive Insect Biocontrol and Behavior Laboratory, Maryland, and Larry Hull, professor of entomology, Penn State, published their work in a special issue of *Biological Control* devoted to ladybugs in agriculture.

"With the pesticides we are using now it is very hard for the lady bug to survive," said Biddinger. "The predatory mite could never exist here

before because they could not stand the old pesticides, but they are resistant to the new pesticides. With the predatory mite being more effective than the lady bug, we are probably going to exceed the savings for growers that we had with the lady bug in the past. So far we have reduced miticide use by over 90 percent since we switched. This is saving growers about a million dollars a year and is reducing oil spraying by 45,000 gallons a year."

Source: Pennsylvania State University ([news](#) : [web](#))

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