

Papaya plants reduce the need for pesticides on tomatoes in Florida, new study finds

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Whiteflies can be biologically controlled in Florida greenhouse tomatoes, according to a new University of Florida study, which helps reduce the need for pesticide applications.

Biological control, or biocontrol, is the mitigation of [pests](#) using natural means rather than synthetic ones. Florida is the country's top producer of fresh tomatoes, and sales of the state's crop for 2009-2010 exceeded \$402 million.

Lance Osborne, an entomology professor and associate director of UF's Mid-Florida Research and Education Center in Apopka, led the study that found that [papaya](#) plants can be used to host a wasp that attacks silverleaf whiteflies, an insect that is a major pest of tomatoes. The findings are published in the current issue of the journal *Biological Control*.

“The major issues involved with this whitefly are its ability to transmit viruses and to become resistant to most pesticides,” Osborne said. “This pest is very prone to developing resistance, so 100 percent reliance on pesticides equates to resistance. It equates to almost disaster.”

“We’re trying to reduce the use of pesticides so we don’t develop a super strain of whitefly that’s resistant to everything,” he said.

Whiteflies feed on tomato leaves and transmit diseases, including tomato yellow leaf curl virus. By introducing papaya plants with wasps into the

greenhouse before any pest whiteflies are detected, the wasps act as sentries and attack any whiteflies that might become established in the crop.

Wasps have been used before to control whiteflies in greenhouse production systems, but those sold commercially tended to be expensive and ineffective.

Osborne and his team solved the problem by introducing papaya plants into the system. The papaya plants come with a whitefly that's specific to papaya but not a pest for tomato or other crops, thus allowing the wasps to survive.

The researchers found the wasp significantly controlled silverleaf whiteflies on tomatoes while at the same time preying on papaya whiteflies.

The wasps were able to fly from papaya plants located in the corners of greenhouses to attack silverleaf whiteflies on tomatoes located in the center. Successful tomato production occurred without the use of pesticides.

“This system has the ability to be just as effective as insecticide controls,” said Osborne, a member of UF’s Institute of Food and Agricultural Sciences. “The idea is not to limit insecticide use completely, but to have plants that don’t have resistant whiteflies and ultimately, not any whiteflies at all.”

Insecticides can be used, but with fewer applications, Osborne said, as part of an integrated pest management system that uses the best methods available to solve pest problems while mitigating negative environmental effects. The system is known as a banker plant system because it stores, or banks, extra prey for the [biological control](#) organism. The wasp works

by laying eggs in immature whiteflies, killing the whitefly when the wasp offspring hatches inside of it and feeds on its insides before emerging.

Yingfang Xiao, a postdoctoral associate researcher and lead author on the study, said the papaya plant also has the potential to host other [biocontrol](#) agents, such as predatory mites and spiders.

“It could be possible that papaya may support multiple natural enemies for controlling multiple pests,” Xiao said.

The system has been used in a commercial herb, tomato, cucumber, eggplant and lettuce greenhouses around the state well as in a commercial poinsettia greenhouse, where it has also been effective.

For now, the system is limited to Florida, as papaya has tropical and subtropical climate requirements and moving the papaya whitefly across state lines is illegal. However, Osborne said his team is looking for another whitefly and host plant that could be used by growers in other regions.

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Provided by University of Florida

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