Tomatoes account for more than $2 billion in farm income nationwide each year. But the silverleaf whitefly (*Bemisia tabaci*) cuts into those revenues, spreading a virus known as tomato yellow leaf curl virus (TYLCV) that can wipe out an entire crop. To compound the problem, a new biotype of silverleaf whitefly is raising concerns because it is resistant to insecticides and has spread to 26 states since its discovery in the United States in 2004. The threat is taken seriously in Florida, where growers raise up to 40,000 acres of fresh-market tomatoes each year.

Cindy L. McKenzie, an Agricultural Research Service entomologist in the Subtropical Insects Research Unit in Fort Pierce, is showing how growers can combat the silverleaf whitefly and other crop pests by using plants as storehouses for predatory insects that can migrate to tomatoes and other cash crops and feed on the pests.

Choosing the Right Banker

McKenzie teamed up with Lance S. Osborne, an entomologist at the University of Florida Mid-Florida Research and Education Center, Apopka, Florida; and Yingfang Xiao, a postdoctoral associate researcher, to do extensive work showing how growers can combat the silverleaf whitefly and other crop pests by using plants as storehouses for predatory insects that can migrate to tomatoes and other cash crops and feed on the pests.

Technician Katherine Houben (from the University of Florida) looks for beneficial insects on a papaya plant serving as a “banker plant” in a crop of poinsettias. Banker plants attract beneficial insect parasitoids and predators that can help control pests.
Encarsia sophia, a tiny nonstinging wasp whose larvae feed on the silverleaf whitefly.

This banker plant system is now being tested for application in commercial greenhouse tomato production. The limiting factor in adoption by tomato growers was proving that papaya was not a host plant for TYLCV. In a second paper, in Florida Entomologist, the researchers went a step further, showing that papaya is not susceptible to the TYLCV commonly spread by silverleaf whiteflies and that the papaya whitefly, used as the food source for Encarsia, will not infect the tomato plants with TYLCV because they do not feed on tomato.

Beyond Poinsettias, Tomatoes, and Whiteflies

McKenzie, Osborne, and Xiao have also shown that corn will bank a gall midge that effectively controls the two-spotted spider mite. The gall midge has been previously used as a biocontrol for the mite, which attacks green beans and other greenhouse vegetables. But their work, published in Crop Protection, is the first to show how a banker system can be used to effectively “store” the midges.

The research team is also studying whether different varieties of ornamental peppers can bank a type of predatory mite, Amblyseius swirskii, that is effective at controlling whiteflies and thrips in Florida’s greenhouses. Results so far are extremely promising, and the concept is catching on among growers.

Stephen Mullen, general manager at Knox Nursery in Winter Garden, Florida, was initially skeptical about using insects to control the whiteflies that attack poinsettias in his greenhouse. But the nursery is interested in cutting back on insecticide use. So 2 years ago, as part of a cooperative arrangement with McKenzie and Osborne, he began using a combination of banker plant systems: predatory mites banked on ornamental peppers and nonstinging wasps banked on papaya plants. Though the work is continuing, Mullen is pleased with the results so far. The predators have managed to control the whiteflies largely on their own, so the nursery is using very little insecticide in its production of poinsettias.

“I’m convinced this is working. It is absolutely working,” he says.

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