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Unique research project aims to resolve mystery involving two hemlock pests

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For decades, homeowners and foresters have been lamenting the demise of eastern hemlock trees because of the invasion of the hemlock wooly adelgid, an invasive insect which feeds on hemlocks and can cause even mature trees to die within four years.

This threat has resulted in numerous studies and researchers are trying to come up with biocontrols. At URI, however, Dr. Evan Preisser is taking a different approach - actually two of them, one of which may provide a game-winning homer.

Preisser, an assistant professor in the Department of Biological Sciences, was recently awarded a Hatch Grant from CELS for an intriguing project entitled "When Invasive Herbivores Compete, Who Wins? The Impact of Hemlock Wooly Adelgid and Elongate Scale on Hemlock."

The study may cast light on a few mysteries that surround the eastern hemlock, a tall and shade-tolerant conifer that has been a landscaping favorite for decades.

A bit of history:

Of the two herbivores affecting the trees, the elongate hemlock scale is an old timer. It was first found in New York City in 1908, and probably arrived by hitching a ride on some cargo sent from Asia.
As pests go, it was not a serious one— while it sometimes killed already-weakened trees, most healthy eastern hemlocks could survive indefinitely. It was also a slowpoke that for decades stayed largely confined to the New York/ southwestern Connecticut area.

"This little bug sat for 70 years before starting to move quickly into the northeast," says Preisser.

Its range expansion began some years after another invasive pest, the hemlock wooly adelgid, arrived in Virginia from Japan in 1954. The adelgid spread quickly up and down the East Coast and is now a serious pest in Massachusetts, Connecticut, and Rhode Island. This fast-moving pest is also a killer of eastern hemlocks that sits at the base of the tree's needles and sucks juices out of the tree; heavily-infested trees can die in little as four years.

The elongate hemlock scale seems to be following the adelgid, noted Preisser, who has been monitoring hemlock stands infested with both herbivores at 142 privately-and publicly-owned sites in Massachusetts and Connecticut.

And now there is another mystery—the wooly adelgid may be declining in some areas. "Why, is not understood," says Preisser. One possibility is that the presence of scale makes the trees less nutritious to the adelgids.

Preisser and his lab manager Jeffrey Backer (a 2005 CELS graduate and Presidential Award winner) have begun research at East Farm examining interactions between the adelgid and scale. In the lower portion of the apple orchard that had been cleared years ago, Preisser and Backer have planted more than 100 hemlocks, each enclosed in pest-resistant mesh that lets in light and water. The researchers are then purposefully infesting some trees with adelgid, some with scale, some with both pests, and some with neither. The plan is to track what happens to these trees over the next three years.

In yet another experiment, the researchers are working with Professors Richard Casagrande and Brian Maynard of the Plant Sciences department to root cuttings taken from naturally-growing eastern hemlock trees that seem to be resistant to adelgids. Thousands of the cuttings are now residing in a misting chamber in the Ornamental Horticulture greenhouse nearby.

Preisser received his doctorate in population biology from the University of California at Davis, where he met his wife Carol Thornber, a marine biologist. When she landed a job at URI, he began postdoctoral work with Joseph Elkinton at the University of Massachusetts at Amherst studying hemlock wooly adelgid. When he joined the URI faculty, he brought his interest in the hemlock problem with him.

While many researchers are trying to find a predator capable of consuming the adelgids, Preisser says he prefers to take the less traveled route. It is highly likely, he says, there are at least some naturally-growing eastern hemlocks that are resistant to the adelgids.

Preisser and his colleagues are currently focused on finding such potentially resistant trees and using them to develop resistant cultivars for replanting in

adelgid-devastated forests. “I don’t know if the environment has the time for years of study to determine why those trees are resistant,” he says. “Rather than running the bases trying to find out what makes them resistant,” he says, developing resistant cultivars may win the game. “Let’s try for the home run,” he says.