

## Tackling a Trio of Tropical Troublemakers

### Hawaii Scientists Fight Invasive Banana Moth, White Peach Scale, and Nettle Moth



A late-instar larva of stinging nettle caterpillar feeding on a leaf. The larvae are up to 1 inch long and have sharp, spiky hairs that can cause pain if touched.

It seems that just about everyone loves Hawaii. What's not to like about glorious scenery, perfect weather, and the welcoming "aloha" spirit.

Perhaps it's no wonder, then, that a trio of troublesome invasive insects—banana moth, white peach scale, and nettle moth caterpillar—are among the ecosystem invaders that have made themselves at home in the Island State.

Banana moth and white peach scale are biting into growers' profits, while nettle caterpillar is making life uncomfortable for agricultural workers and residents alike with its painfully prickly hairs.

So, a trio of tropical researchers, ARS entomologist and research leader Eric Jang and entomologists Peter Follett and Robert Hollingsworth, are developing science-based strategies to quash the invaders. The scientists are with the ARS Tropical

Crop and Commodity Protection Research Unit, part of the U.S. Pacific Basin Agricultural Research Center in Hilo, Hawaii.

#### Alluring Compound Entices Male Banana Moths

Hollingsworth is developing a tactic known as "mating disruption" to spoil romance and reproduction of the banana moth, *Opogona sacchari*. He's doing that by working with a synthetic chemical that mimics a natural compound—emitted by female banana moths—that attracts suitors. In outdoor tests, Hollingsworth has shown that small amounts of the chemical, placed on rubber stoppers throughout an abandoned orchard, prevents male moths from finding female moths held in traps. Research is continuing in an effort to discover how much of the chemical is needed to completely disrupt mating.

The alluring compound may be a sex pheromone, or it may be one component of the pheromone. It was isolated from female banana moths and synthesized at the Hilo laboratory by former postdoctoral associate Matthew Siderhurst, in collaboration with Jang.

The banana moth attacks not only its namesake crop but also more than a half-dozen others, including coffee, pineapple, rambutan, sweetpotato, and ornamental plants such as *Dracaena*, the potted green plant of dentists' and doctors' offices everywhere.

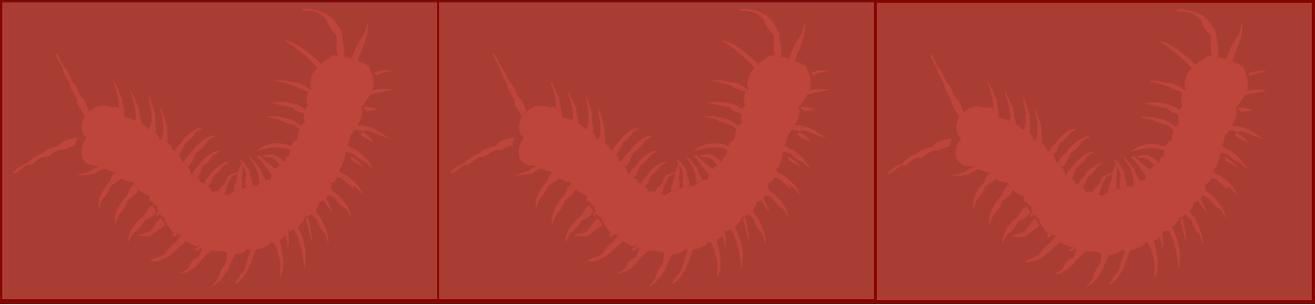
Hollingsworth and Follett are collaborating in new research to clobber another invader, the white peach scale, or *Pseudaulacaspis pentagona*. This insect, referred to as "armored" because of its protective shell, first showed up in Hawaii in 1997.

The scientists hope to rein in the scale by introducing a miniature wasp called *Encarsia diaspidicola*. The scale is only about one-eighth inch long. It becomes a hapless victim when the female wasp, which is several times smaller than the scale, slips her eggs under the armor and into the soft-bodied scale. The eggs hatch into nearly microscopic, worm-like larvae that slowly kill the scale by feeding on its innards.

ERIC JANG (D1501-1)



Trap containing male nettle moths captured with a synthetic pheromone component. This new invasive species attacks grasses, palms and other ornamentals, and more.



In laboratory tests, the scientists have shown that the wasp, which is harmless to people, pets, and livestock, similarly doesn't pose a threat to nontarget scales, such as the palm scale—native to Hawaii—and the closely related false oleander scale. This is evidence that the scientists must have in order to win permission to turn the helpful wasp loose to attack the white peach scale.

But how do you prove that a wasp you can barely see isn't attacking the nontarget scales?

To solve that problem, molecular biologist Jesse de León, with ARS's Beneficial Insects Research Laboratory in Weslaco, Texas, developed genetic markers to detect telltale sections of the wasp's DNA in ground-up samples of the various scales. The markers—a research first for the wasp—are sensitive enough to

ROBERT HOLLINGSWORTH (D1499-1)



Adult female banana moth (bottom), about one-half inch long, and a pupal case from which it emerged.

detect even an extremely small amount of the wasp's DNA in the mashed-up scales.

The University of Hawaii-Manoa and USDA's Forest Service are partners with ARS in this research.

The caterpillar lifestage of the third menace, the nettle moth, *Darna pallivitta*, gives people a prickly sting they won't forget if they're unfortunate enough to come in contact with its spiky hairs. Jang is trying out a highly experimental approach that, if it works, could be quite amusing. In brief, he plans to use sexually sterile fruit flies, such as the Mediterranean fruit fly, as winged carriers of a nettle moth pheromone. The theory is that if sterile fruit flies are set free by the thousands, with each carrying a drop of the natural chemical on its back, they would quickly and inexpensively distribute the scent wherever they fly. Like decoys, the fruit flies would create confusion among moth males trying to find, and mate with, female moths.

GABOR NEUMANN (D1500-1)



White peach scales on a papaya trunk. Adult white peach scales are about 2-2.5 millimeters in diameter.

This concept, dubbed “mobile mating disruption,” so intrigued the State of Hawaii Department of Agriculture that it has awarded a grant to Jang and cooperators to pursue the innovative approach.

The nettle moth pheromone was identified and synthesized by researcher Siderhurst in experiments funded by the Hawaii Invasive Species Council. The pheromone is “essential to the mobile mating disruption tactic,” says Jang. “It can also be placed in traps to detect the insect and monitor its spread.”

The moth poses a threat to tourism, to the safety of agricultural workers who come across it while working with infested plants, and to the residents of Hawaii who want to enjoy working or relaxing in their gardens without fear of being stung by this pest.

In this work, and in that with the banana moth and white peach scale, it will be these insect invaders, and not people or Hawaii's agricultural or tourism economies, that feel the sting.—  
By **Marcia Wood**, ARS.

*This research is part of Crop Protection and Quarantine, an ARS national program (#304) described on the World Wide Web at [www.nps.ars.usda.gov](http://www.nps.ars.usda.gov).*

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