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Fungal Foam Tested Against Avocado Threat

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Avocados aren’t just nutritional powerhouses; they’re also the chief ingredient in such party favorites as guacamole dip.

More than 99 percent of the nation’s $322 million avocado crop is grown in south Florida and southern California (less than 1 percent is produced in Hawaii), which makes recent infestations of groves there by invasive, wood-boring ambrosia beetles so alarming. A host of counter strategies are in the works, including a biobased approach to controlling ambrosia beetles that attack avocado trees.

To fight the harmful fungi, Rooney and colleagues are investigating the potential use of beneficial fungi to target the ambrosia beetles. These include entomopathogenic (insect-infecting) species of *Metarhizium*, *Isaria*, and *Beauvaria*. Early evidence has been promising, notes Rooney, whose team is collaborating with Jorge Peña, Daniel Carrillo, and Jonathan Crane—all with the University of Florida at Homestead—and Akif Eskalen and Richard Stouthamer at the University of California-Riverside.

Using DNA markers, ARS chemist Chris Dunlap devised special tests called “bioassays,” which enabled the team to genetically confirm the microbe’s ability to infect and kill the beetles—in addition to visual proof in the form of moldy growth on the pests’ bodies.

“Our research has shown that three separate strains of the fungi are fatal to the insects, with fungal-induced beetle mortality greater than 95 percent,” Dunlap reports.

A foam originally developed by ARS as a way to pump fungal spores into the galleries of Formosan subterranean termites may be useful against ambrosia beetles that attack avocado trees.

Repeating this success inside the trunks of avocado trees is the next important step in the team’s investigations, and that’s where the biobased foam could figure prominently.

Dunlap and ARS colleagues Mark Jackson, Robert Behle, and Maureen Wright originally developed the foam as a way to pump fungal spores deep into the galleries of Formosan subterranean termites, which can nest inside trees. The research team is evaluating the foam’s potential against ambrosia beetles in orchard-scale trials with avocado trees.

Polyphagous shot hole borers stimulate a host response in avocado that includes gumming and a white residue around holes the insect has formed. “This gives away their position, and we can spray the foam directly there at the sites of infestation,” Dunlap says.

That’s not the case with redbay ambrosia beetles, which makes locating them more difficult. For this reason, “We’ll probably use a combination of spraying the entomopathogenic fungi on trees and on an avocado mulch, which we know the beetles are attracted to.”

Continued field research will be key to determining the effectiveness of this biobased approach to controlling ambrosia beetles. But if successful, it could ultimately help to safeguard an important domestic crop.—By Jan Suszkiw, ARS.

This research is part of Crop Protection and Quarantine (#304), an ARS national program described at www.nps.ars.usda.gov.

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