



Scientists in the ARS Beneficial Insects Research Unit at Weslaco, Texas, have found that a strain of the fungus *Metarhizium anisopliae* is deadly to *Varroa* mites, such as this one on an adult worker honey bee's thorax.

Saving Bees

Fungus Found To Attack *Varroa* Mites

Parasites known as *Varroa* mites infest honey bee colonies, sucking blood from the bees and causing weight loss, deformities, diseases, and reduced lifespan. These mites, which can nearly destroy an entire colony within a few months, now infest honey bee colonies across most of North America.

The honey bee is critical to maintaining natural vegetation, transferring pollen between flowers as it collects the pollen and nectar for its hive. And more than 130 agricultural plants in the United States are pollinated by honey bees. Every year, beekeepers send their best bees throughout the country to help pollinate crops, one farm at a time. In 2003, the value they added to U.S. crops was estimated at \$10 billion, not including the honey, beeswax, and royal jelly also produced. USDA's National Agricultural Statistics Service reported more than 2.5 million honey bee colonies—up 1 percent from 2002—and U.S. honey production increased 5 percent, to 181 million pounds.

Since 2000, scientists in the ARS Beneficial Insects Research Unit (BIRU) at Weslaco, Texas, have been looking for a disease-causing agent, or pathogen, that can stop *Varroa* mites. The mite has developed resistance to the only approved chemicals—fluvalinate and coumaphos—now used for control, and coumaphos is on the U.S. Environmental Protection Agency's "hit list" for possible removal from the market. So the

researchers have looked at various disease agents, tried different dosages and application methods, and conducted toxicity tests. Finally, they selected a strain of the fungus *Metarhizium anisopliae* that was highly pathogenic to *Varroa* mites.

This potent fungus, which also kills termites, doesn't harm bees or affect their queen's production. To test it, the scientists coated plastic strips with dry fungal spores and placed them inside the hives.

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Since bees naturally attack anything entering their hives, they tried to chew up the strips, spreading the spores throughout the colony.

In field trials, once the strips were inside the hives, several bees quickly made contact with the spores. Within 5 to 10 minutes, all the bees in the hive were exposed to the fungus, and most of the mites on them died within 3 to 5 days. The fungus provided excellent control of

Varroa without impeding colony development or population size.

“We tried to find a pathogen of *Varroa*, and we did it!” says ARS entomologist Walker A. Jones, research leader of the BIRU. Tests showed that *Metarhizium* was as effective as fluvalinate, even 42 days after application. “Commercial beekeepers are very edgy about using fluvalinate and coumaphos and are eager to see this natural control get to market,” Jones says.

This research was begun by Rosalind James, formerly with the Weslaco unit. Lambert H.B. Kanga, former BIRU research associate and now chair of the Entomology Department at Florida A&M University at Tallahassee, continues to collaborate on the project. “While *Metarhizium* doesn't kill as fast as fluvalinate and coumaphos, the result is the same,” Kanga says. “*Metarhizium* gets the job done, and we won't have to worry about *Varroa* becoming resistant to the fungus.”

The scientific team is now fine-tuning the strategy for transfer to producers.—
By **Alfredo Flores**, ARS.

This research is part of Crop Production, an ARS National Program (#305) described on the World Wide Web at www.nps.ars.usda.gov.

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