

Tactics Simplify Wasp-Rearing

SCOTT BAUER (K7920-7)



Biosteres arisanus wasps inject their eggs into oriental fruit fly eggs.

Helpful wasps that kill crop-destroying fruit flies should be easier to breed indoors, thanks to ongoing work by scientists with the Agricultural Research Service in Hawaii.

Massive numbers of lab-reared beneficial wasps can be deployed outdoors to attack Mediterranean fruit flies and other tropical and subtropical fruit fly pests. The wasps, harmless to humans, “may reduce reliance on chemical insecticides,” says ARS entomologist Ernest J. Harris in Honolulu.

Harris is the first to establish a thriving indoor colony of *Biosteres arisanus* wasps. He says the insect, less than a quarter inch long, “is one of the most important wasp enemies of medfly and oriental fruit fly, in part because it outcompetes other parasitic wasp species.”

Medflies attack more than 400 crops worldwide; oriental fruit flies pester more than 230.

ARS colleagues at Honolulu have used the “Harris strain” of *B. arisanus*, along with other species of beneficial wasps, in experiments to streamline mass-rearing. A key

discovery was that female *B. arisanus* wasps readily lay their eggs in fruit fly eggs that are placed atop a gelatinous substance called agar.

A wasp egg is about 8 times smaller than a fruit fly egg, notes Renato C. Bautista, a researcher with the University of Hawaii who works with Harris.

Female wasps can easily reach and parasitize the fruit fly eggs that ARS entomologist John Spencer places on agar in laboratory petri dishes.

“Agar keeps the fruit fly eggs from drying out,” says entomologist John P. Spencer of the Honolulu laboratory. “We put about 5,000 fruit fly eggs on agar in a 3-3/4-inch-square petri dish and give caged female wasps about 22 hours to insert their eggs into the fruit fly eggs. After that, it’s easy to move the parasitized eggs from the agar block to large trays that we use for the next steps of production. Using agar has probably boosted our production at least fivefold compared to our previous method.”

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The lab procedures are the work of a team led by Spencer. The techniques have attracted interest from scientists in other countries trying to combat non-native fruit flies.

When a wasp egg hatches, the insect grows inside the developing fruit fly, eventually killing it. Wasps that emerge from pupal cases—the capsulelike chambers that housed the immature flies—can then be put to work outdoors.

Related experiments have shown that a pneumatic air separator—a device normally used for cleaning seeds—simplifies sorting of parasitized from unparasitized fruit flies. The chore is best handled when the fruit fly is a pupa; that is, just before it becomes an adult.

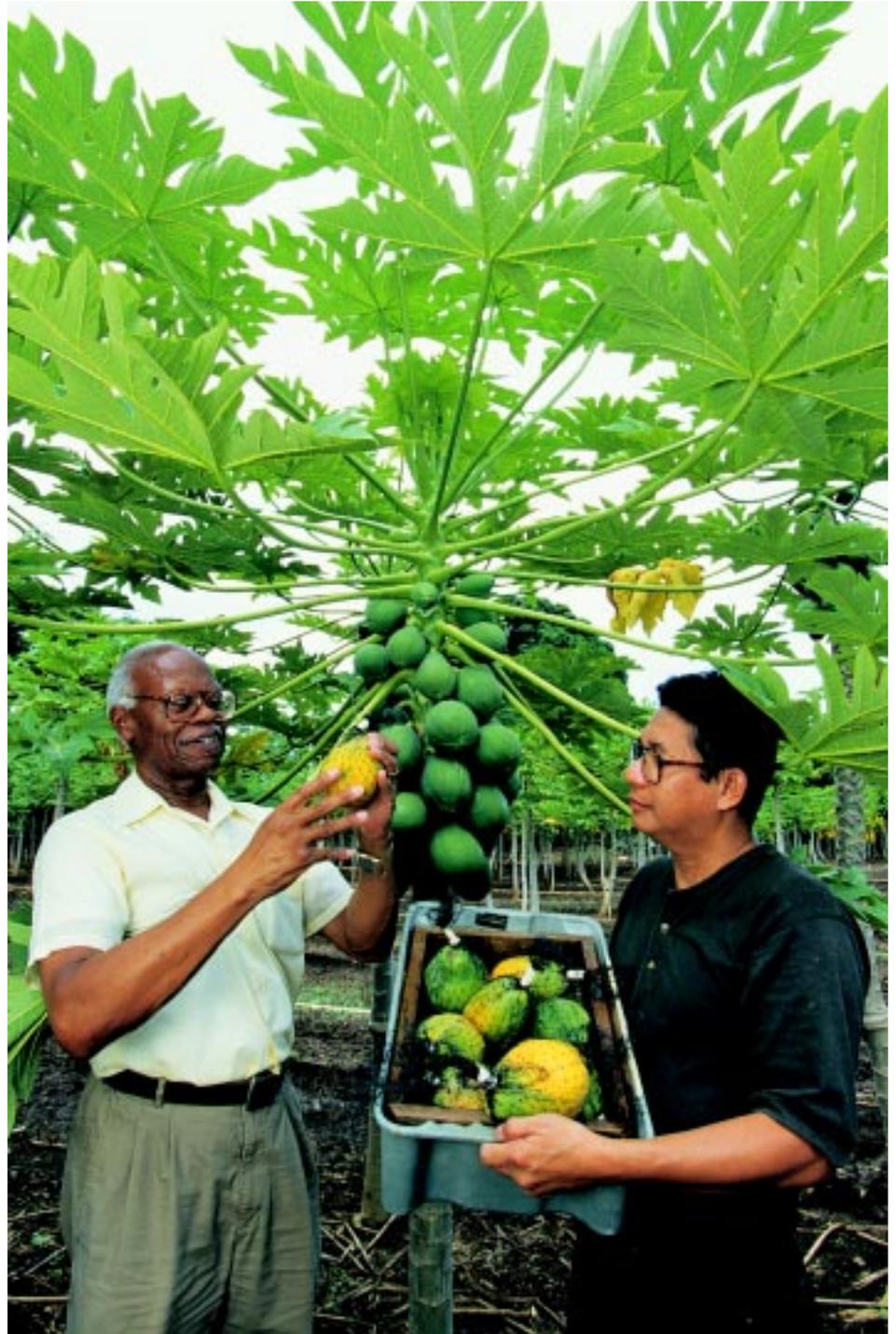
These studies were led by ARS food technologist Harvey T. Chan at Hilo, Hawaii.

The separator swiftly and accurately sorts fruit fly pupae parasitized by any of three wasps—*Dia-chasmimorpha longicaudata*, *D. tryoni*, and *Psytalia fletcheri*. “Unparasitized pupae,” explains Chan, “are heavier than their parasitized counterparts. That creates a natural division of floaters versus sinkers.”

The approach, Chan says, should be easy to automate.—By **Marcia Wood**, ARS.

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Entomologists Ernest J. Harris (left), who is with the Agricultural Research Service, and Renato C. Bautista, with the University of Hawaii, examine a papaya fruit trap with oriental fruit fly eggs parasitized by *Biosteres arisanus* wasps.