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Wax + pheromones = 'outstanding' oriental fruit moth control in tree fruit

By Renee Stern, Contributing Editor

Wax dollops may start dotting tree branches throughout orchards as a way to improve pheromone mating disruption.

Michigan State University researchers have seen "outstanding results" when it comes to shutting down mating of oriental fruit moths using a technique that combines pheromones with a wax emulsion, says Jim Miller, professor of entomology.

Achieving similar results with codling moths will take more work and is the primary focus of this year's research, says Larry Gut, associate professor of entomology at MSU. Tests are planned not only in Michigan but also with researchers in Washington state and British Columbia.

He also sees possibilities in leafroller control for tree-fruit crops, particularly as an attract-and-kill approach.

"Leafrollers are really attracted to these point sources," Gut says.

Miller and Gut are working closely with ISCA Technologies Inc. of Riverside, Calif., which holds the license for wax emulsion technology—known as SPLAT, or specialized pheromone and lure application technology—developed by University of California researchers.

ISCA Technologies this year is seeking registration for the formulation to control oriental fruit moths, not only the top peach pest but also becoming a major threat in Midwest and East Coast apple orchards.

"We believe this (SPLAT) is a superior formulation," says company president Agenor Mafra-Neto. "It's so malleable and easy to deal with."

SPLAT, or specialized pheromone and lure application technology, involves a wax-and-pheromone mixture squirted on or applied to trees.

Fooling Mother Nature

Mating disruption works by overpowering the pheromone emitted by female insects with many sources of synthetic pheromones, making it harder, if not impossible, for males to find a mate. One method uses pheromone dispensers placed throughout the orchard, generally no more than one per tree. While

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these typically last all season, the synthetic pheromone sources don't reach a high enough density to swamp out the true females, Miller says.

At the other end of the scale are microencapsulated sprayable products. These have a shorter lifespan that requires more frequent applications, and the large camouflaging cloud may overdisperse pheromones without providing attractive sources, he says.

Wax fills the gap

The emulsifiable wax product fills the gap between the two, Mafra-Neto says.

For now, the researchers swipe the wax-and-pheromone mixture onto branches in 3-milliliter dollops with a putty knife—a process that takes half the time needed to apply twist-tie dispensers—but they're also working with engineers to automate the process. Miller sees as one possibility a mechanism like a whirling cup to spin off drops of the mixture, which has a toothpaste-like consistency, to stick to leaves and branches.

Equipment similar to what's used in paint-ball games offers another way to apply the material to canopy tops, Mafra-Neto says.

Putting out many pheromone sources is key. In the oriental fruit moth tests, as few as 10 drops per tree produced high disruption in mating. "But for field use you would want at least 30 drops per tree," Miller says.

The more, the merrier

In tests of high-density sources—30 and 100 drops per tree—the MSU team saw more than 99 percent shutdown of oriental fruit moth mating. That translates to zero mating within the test orchards, he says.

"It's a flat-out ratio game," he says. More pheromone sources per moth make it that much harder for them to find mates.

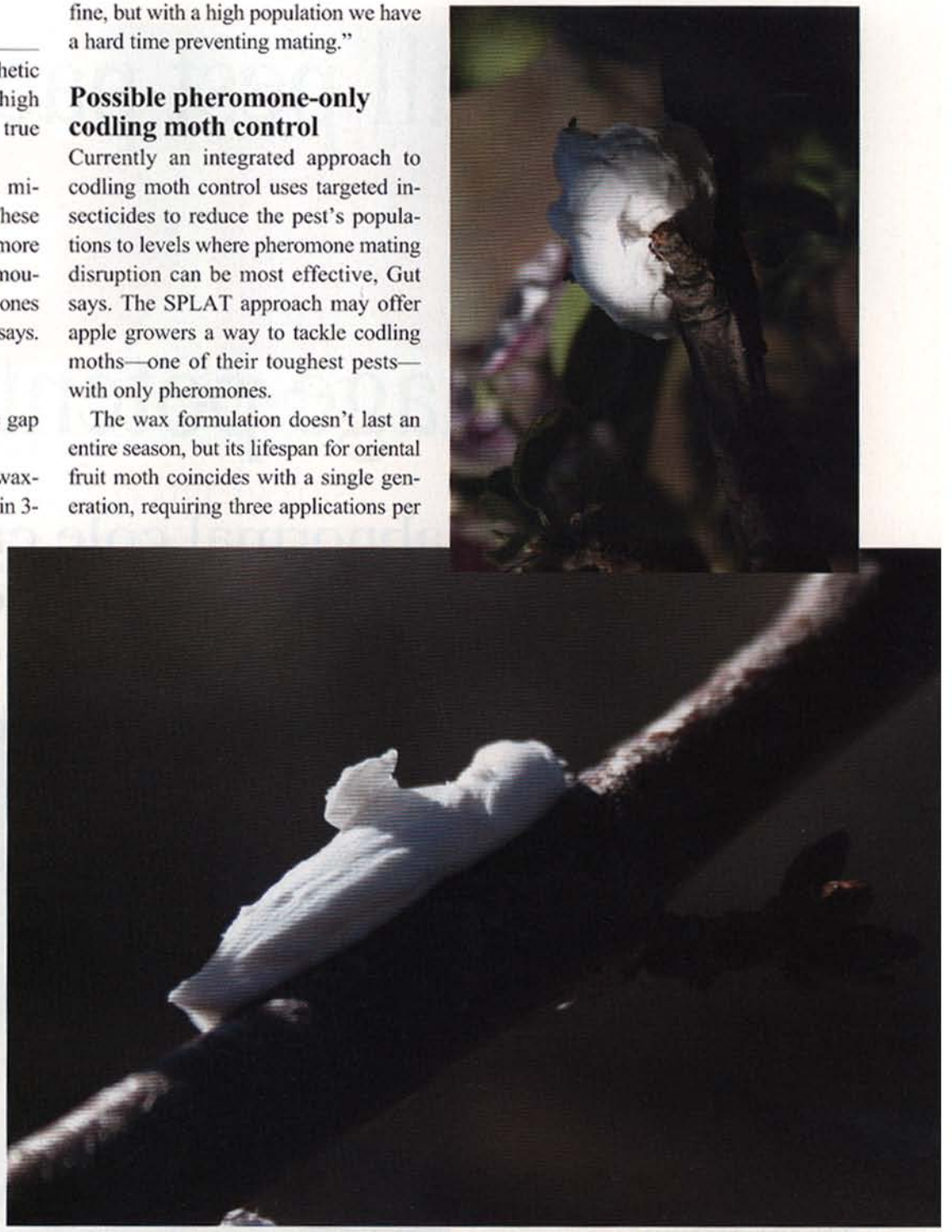
Slight behavioral differences between codling moths and oriental fruit moths create extra hurdles in getting similar mating disruption performance from the wax-and-pheromone mixture, Mafra-Neto says.

"We have good results (with the existing codling moth formulation), but not as outstanding as oriental fruit moth," he says. "With a medium to low population it works fine, but with a high population we have a hard time preventing mating."

Possible pheromone-only codling moth control

Currently an integrated approach to codling moth control uses targeted insecticides to reduce the pest's populations to levels where pheromone mating disruption can be most effective, Gut says. The SPLAT approach may offer apple growers a way to tackle codling moths—one of their toughest pests—with only pheromones.

The wax formulation doesn't last an entire season, but its lifespan for oriental fruit moth coincides with a single generation, requiring three applications per season, Miller says.



An emulsifiable wax-based product fills the gap between short-lived sprayable, microencapsulated pheromones and pheromone dispensers placed throughout the orchard.

Changes to the mixture that make it less watery have pushed the effective life to six to eight months, Mafra-Neto says.

That's important in areas with a much longer growing season, such as the Brazilian orchards where company tests protected the crop over six months from oriental fruit moth with a single application.

High temperatures don't appear to affect use, based on tests in Arizona cotton fields during summer months, he says. And they've tweaked the formulation to increase stickiness after discovering some difficulties with wax not adhering to plants when it was applied in temperatures near freezing level.

Once the wax cures overnight on trees, it holds fast even in rain. Heavy rains last year had no impact on its effectiveness, Gut says. G

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