

Scientists pursue gene-disrupting pesticides

RNA interference touted as pest-specific weapon

By MATEUSZ PERKOWSKI
Capital Press

Since appearing in West Coast fruit orchards several years ago, the spotted wing drosophila has forced growers to increase their chemical usage.

The invasive fruit fly has also seriously set back the integrated pest management approach to controlling insects with biological methods.

A USDA researcher is hoping to give farmers a powerful new weapon against the insect: a biopesticide that disrupts critical genes specific to spotted wing drosophila but doesn't harm other species.

At this point, entomologist Man-Yeon Choi is still early in the process of identifying gene sequences that are essential to the fly's physical processes or its ability to reproduce.

Interfering with the function of those genes would either kill the pest or prevent it from generating viable offspring.

Once that is accomplished, Choi will still have to find a delivery mechanism, like a bait, that will effectively be taken up by the fly.

"This is a long-term project," he said.

Choi isn't alone in his research. Some scientists expect the mechanism known as RNA interference will be used against a variety of agricultural pests with much fewer environmental effects than current pesticides.

"It's not going to be broad spectrum. It's going to be a surgical strike," said Wayne Hunter, a USDA research entomologist. "You can go and remove one organism from an ecosystem."

However, the technology still faces practical hurdles.

While the concept is prom-



USDA

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Senior scientist, The Center for Food Safety

ising, it's unlikely to be a silver bullet for all agricultural pests, said Greg Heck, a scientist at Monsanto Co. who specializes in RNA interference.

The feeding strategies of some insects would basically disarm an RNA interference pesticide, while others would have to consume so much of the substance as to render it unfeasible, Heck said.

"If it takes tons and tons of RNA, you're not going to be able to produce it and apply it in a cost-effective way," he said.

RNA interference is already encountering opposition from critics who fear the pesticide industry will rush ahead without fully understanding the consequences of the technology.

The Center for Food Safe-

ty, a nonprofit that has battled genetically engineered crops for years, worries that RNA interference isn't as specific or benign as supporters expect.

"There are a lot of things we don't know about it that are potentially pertinent to risk. Do you go forward without knowing what you're doing, or do you step back and figure it out?" said Doug Gurian-Sherman, senior scientist and director of sustainable agriculture for the group.

RNA interference works by manipulating natural processes at the cellular level. Ribonucleic acid, or RNA, is a molecule that carries out various functions directed by genes, such as making enzymes needed for digestion.

While RNA is most often in the form of a single "strand,"

there is also "double-stranded" RNA that's crucial to the replication of viruses.

When double-stranded RNA is encountered by special proteins in a cell, they assume it's a virus and chop it up. If corresponding genetic sequences are found elsewhere, the proteins also destroy them to prevent the virus from spreading.

Scientists realized they could trick the cell into destroying its own genetic sequences by inserting double-stranded RNA that matches those sequences.

A susceptible insect that ingests such specially designed RNA would then shut off the expression of key genes, neutralizing itself as a pest.

"Other insects can eat the compound but it won't affect them because they don't have

the same gene sequences," said Hunter.

While RNA interference affects gene function, it doesn't change the genetic makeup of the pest, he said.

"This technology is non-transgenic. It does not transform the insect," Hunter said.

Gurian-Sherman of the Center for Food Safety argues that double-stranded RNA taken up by an insect can affect genes beyond the targeted sequence.

RNA interference could affect genetic sequences that are similar but not identical, he said. "That type of specificity doesn't occur in reality."

As a result, beneficial pests could inadvertently be harmed by the technology, particularly if they're related to the target pest, Gurian-Sherman said.

The structure of some genetic configurations can be similar in different species, so it's conceivable even humans could be impacted, he said.

"Evolution conserves these

things and reuses them as we evolve."

Hunter of USDA said these concerns are unfounded because conventional pesticides have a much greater potential to injure non-target species. RNA interference pesticides will also be tested to avoid non-target effects prior to commercialization.

There's no evidence the technology would affect humans, who have evolved to break down RNA, he said. "We've been eating double-stranded RNA since we've been eating vegetables."

RNA interference pesticides have little persistence when exposed to the elements, which is a double-edged sword — it's good for the environment, but reduces pest exposure to the substance, said Heck of Monsanto.

When the technology is ready for the market, it will be most effective as one of several modes of action, he said. "It's something we will have to integrate into control systems."

Train-the-trainer IPM workshops set

By MITCH LIES
For the Capital Press

Agricultural researchers at the three Northwest land grant universities are hosting a series of train-the-trainer workshops on integrated pest management in June.

The series includes two three-day workshops:

- At the Oregon State University Hermiston Agricultural Research and Extension Center on June 8, 9 and 10.

- At the Washington State University Whitman County Extension Center in Colfax on June 24, 25 and 26.

Two more will be held in 2016, said Silvia Rondon, OSU Extension entomologist specialist.

The workshops are designed for extension field faculty, agency professionals and crop consultants. They will include presentations on monitoring techniques, pest identification and pest management techniques.

"It's all about increasing use of IPM in the region," Rondon said. She added that



Oregon State University

Oregon State University Extension entomologist Silvia Rondon leads a train-the-trainer IPM workshop at the Hermiston Agricultural Research and Extension Center in a past workshop. Rondon and other researchers will be conducting two three-day train-the-trainer workshops in June, one in Hermiston and one in Colfax, Wash.

the workshops are "very region specific."

The land grant universities have offered short courses on IPM for control of insects in years past, Rondon said, but this is the first year the universities are adding diseases and weeds to the course agendas.

As part of the courses, participants will be provided materials for collecting weeds, insects and diseased

Online
More information is available at <http://extension.oregon-state.edu/umatilla/ipm>

plant tissue.

Participation is limited to no more than 20 per session, and the workshops "are very hands on," Rondon said.

All sessions will also be available on line, she said.

Judge dismisses pesticide challenge

Legal fight over cyantraniliprole likely to continue

By MATEUSZ PERKOWSKI
Capital Press

A federal judge has dismissed a lawsuit against the U.S. Environmental Protection Agency's commercialization of a new insecticide, but the ruling won't likely end the legal dispute.

Last year, the EPA approved the registration of cyantraniliprole for a wide variety of crops, offering farmers a new mode of action against pests.

However, environmental groups — the Center for Biological Diversity, the Center for Food Safety and Defenders of Wildlife —

filed a lawsuit against EPA claiming it violated the Endangered Species Act by registering the chemical.

The plaintiffs claimed the pesticide is highly toxic to sensitive species and sought an injunction against its commercialization until EPA implemented steps to prevent those harms.

U.S. District Judge Gladys Kessler has now dismissed that lawsuit for procedural reasons, finding that plaintiffs cannot directly challenge the agency under the Endangered Species Act, but must instead seek relief under the Federal Insec-

ticide, Fungicide and Rodenticide Act.

The environmental groups plan to continue fighting EPA's approval of cyantraniliprole, either by appealing Kessler's ruling or pursuing the FIFRA option, said Brett Hartl, endangered species policy coordinator for the Center for Biological Diversity.

The new pesticide has the potential to harm 1,300 species, he said. "It's a large realm of ecological impact across the board."

Capital Press was unable to reach a spokesperson for DuPont, the product's manufacturer, for comment as of press time.

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