Fungus Set To Fight Insect Pests

Trouble is brewing for silverleaf whiteflies and other plant pests.

The Agricultural Research Service (ARS) and Encore Technologies, LLC, are considering a licensing agreement to commercialize ARS' patented (No. 5,968,808) new method of mass-producing the fungus *Paecilomyces fumosoroseus* as a bioinsecticide.

Microbiologist Mark Jackson developed the method, which uses deep-tank liquid culture fermentation, based on his fungal nutrition studies at ARS' National Center for Agricultural Utilization Research, Peoria, Illinois. There, Jackson combined the method with an Encore procedure for formulating *Paecilomyces* spores into an air-dried powder that can be wetted and sprayed onto plants.

"I see this being used in greenhouses, out in the crop field, for organic uses, and the home pest control market," says David A. Goulet, Encore's president. "Anyplace where chemical use is a concern, this would fit the bill."

Thrips and aphids are just a couple of the pests that *Paecilomyces* could see action against.

Jackson has his sights on the silverleaf whitefly, a sap-sucking pest of 600 plant species, including cotton, tomatoes, and poinsettias. Whitefly infestations in these and other U.S. crops cause multimillion-dollar losses.

Paecilomyces kills whiteflies by snaking tiny filaments into their bodies to feed and grow. Jackson compares the sight to "*Gulliver's Travels,* when the Lilliputians tie down the giant." People and other animals face no such danger, but infected whiteflies die within several days. New spores then emerge to infect other whiteflies, sparing nonhost insects as they spread.

Despite such advantages over chemical controls, past attempts to formulate *Paecilomyces* have stumbled on high production costs and other problems, Jackson says. Only one U.S. company—Certis USA, LLC—has registered it as a biopesticide (Apoka Strain 97).

"The big problem with biocontrol agents is producing them cost-effectively and keeping them stable once produced," says Jackson. "We've overcome this problem by developing new technologies for spore production and stabilization." These involve feeding a *Paecilomyces* culture—any of 35 known strains—a diet of carbon, nitrogen, and other nutrients inside fermentation tanks. Combining the fermentation culture with appropriate temperature and aeration stimulates the fungus to produce highly infectious blastospores, which are ideal for bioinsecticide uses.

"We can do a 2-day fermentation run and obtain a yield of a billion blastospores per milliliter," Jackson reports. What's more, the blastospores can survive 1 to 2 years of cold storage.

Both features are expected to revive prospects for the fungus as a commercial bioinsecticide that can compete with, or complement, conventional chemical controls. In poinsettias, for example, the fungus might prove useful against whiteflies that threaten the crop 6 to 8 weeks before harvest, when insecticides aren't applied for fear of mottling the plants' coloring.

"Technically," says Goulet, "this material is 2 years from being ready to go" to market as a bioinsecticide product. First, though, it would require EPA registration.—By **Jan Suszkiw,** ARS.

This research is part of Crop Production, Product Value, and Safety, an ARS National Program (#304) described on the World Wide Web at www.nps.ars.usda.gov.

Mark A. Jackson is with the USDA-ARS National Center for Agricultural Utilization Research, 1815 N. University St., Peoria, IL 61604; phone (309) 681-6283, fax (309) 681-6693, e-mail jacksoma@ncaur.usda.gov. ★

SCOTT BAUER (K10621-1)

At the ARS National Center for Agricultural Utilization Research, microbiologist Mark Jackson and technician Angela Payne evaluate the fermentation progress of the bioinsecticidal fungus *Paecilomyces fumosoroseus,* destined for use in field trials.