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## Companies & Industries

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### Biopesticides: Killer Bugs for Hire

By Patrick Winters and Jack Kaskey on July 19, 2012

The global crop-protection industry is dominated by agrochemical companies such as Syngenta ([SYT](#)), Monsanto ([MON](#)), and Bayer CropScience. It's also dominated by awesome, crime-fighting bugs (note: that is not the technical term). With U.S. and European Union regulators, not to mention supermarket chains, toughening their stance against traditional pesticides, Basel-based Syngenta is now breeding and selling fly-munching mites, caterpillar-killing wasps, and "premium quality" bees in bulk to help farmers find chemical-free solutions to crop damage.

Monsanto, the biggest developer of genetically modified crops, is engineering naturally occurring molecules to help kill weeds, insects, and plant viruses. At Marrone Bio Innovations, founded in 2006 and based in Davis, Calif., a new product called Zequanox, made from a common microbe, is proving an effective killer of the zebra and quagga mussels that clog factory and power generator pipes. "You can save a lot of money when you don't need to stop a factory" to turn back the freshwater invaders, says Pamela Marrone, the startup's founder and chief executive officer, who has a Ph.D. in entomology.



Illustration by Gerald LeungThe Pollinator

Don't think for a moment that the agrochemical industry, criticized by environmentalists and foodies for its chemically powered pesticides and genetically modified seeds, is having a collective *Silent Spring* moment. Syngenta and Monsanto still rake in billions from those products and have no plans to wind down their manufacture. The big push into bio farming could even help improve the potency of their bad-boy insecticides. It may also open the way to lucrative new patented products that combine naturally occurring bacterial strains and insects with the heavy-artillery stuff already in their lineups.

The biological-control market is only 3 percent, or \$1.3 billion, of the \$44 billion global crop-protection business, yet it's growing 10 percent a year, according to David Cary, executive director of the International Biocontrol Manufacturers' Association. That's faster than the pace for traditional pesticides and agricultural seeds. Dealmaking in this business "has really escalated in the last 12 months," says Cary. On July 6, Bayer CropScience, a unit of Bayer ([BAYN](#)), acquired biological pest management solutions specialist AgraQuest (also based in Davis and also founded by Marrone, before she began Bio Innovations) for \$425 million.

Last year, Syngenta expanded its insect-breeding capacity with a new, 5-hectare (12.3-acre) site near Faro in southern Portugal. Four other production centers, managed by Syngenta's subsidiary Bioline, are turning out bug assassins in the U.K., the U.S., the Netherlands, and Spain. The investment—the company won't say how much—comes as EU regulations surrounding agrochemicals have become "more and more conservative" over the past two to three years, says John Atkin, chief operating officer at Syngenta. Given the tougher regulatory climate, "we're focusing on bio-controls, focusing on ever-improved chemical products which we feel the regulators will be receptive to," Atkin says.

Syngenta has already built up its arsenal of insect plant guardians at Bioline. It sells wasps, sold in packs of 200, to farmers who use them to kill caterpillars that attack strawberries, tomatoes, and melons. It's nature at its most brutal: Female wasps lay eggs within caterpillar eggs; the baby wasps eat their way through the caterpillar eggs from the inside, killing the larvae in the proverbial cradle. Bioline also offers the *amblydromalus limonicus* mite in units of 10,000 or 20,000 to hunt the whiteflies and thrips that menace cucumbers and roses.

The biggest profits on the horizon may come from hybrid products that combine what nature has to offer with toxic insecticides produced in labs. Some crop-killing pests are able to develop resistance to powerful chemicals with one generational mutation, according to William Dunham, managing partner of the biological-control market research firm DunhamTrimmer, based in Mendham, N.J. "If you rotate biopesticides [with traditional ones], you can prolong the life of the product," Dunham says. Also, companies with pesticides whose patent is expiring may be able to add naturally occurring bacteria and launch an entirely new product eligible for a new patent.

Take a Bayer CropScience product called Poncho/VOTiVO, a biological and chemical seed treatment introduced in 2011 that kills wireworms, black cutworms, and microscopic worms called nematodes that can annihilate corn, soybean, and cotton fields. Bayer claimed in February that farmers experienced higher yields and earned on average an additional \$24.75 per acre in corn and \$15.20 per acre in soybeans by using the product. "It has been a blockbuster," says

Marrone, of Bio Innovations, which has three similar biological-control products under development to kill nematodes and is selling a bio-fungicide in the U.S. and introducing it in Europe via its partner Syngenta.

The increasing cost of getting agrochemicals approved in Europe is another incentive for Syngenta to invest more in biopesticides. Syngenta in May signed an agreement with Belgian crop-chemical maker Devgen ([DEVG](#)) to commercialize biological ways of controlling insects.

Europe's antipathy toward crops genetically engineered to withstand common pests and drought already has led Syngenta to relocate some research to the U.S. Opponents of genetically modified crops in Europe are increasingly vocal about chemicals, citing studies that say they are hurting wildlife. On June 1, France said it would suspend Syngenta's Cruiser crop chemical, for use on oilseed rape (known in the U.S. as canola), after a study suggested that bees fed the product's active ingredient had difficulty returning to their hives. Atkin says he hopes other European countries will continue to allow Cruiser. "We are doing whatever we can to enforce our arguments," he says. That debate seems sure to continue. Yet there's little disagreement about the long-range business potential of biopesticides. Companies are figuring out how best to leverage Mother Nature to protect plants—and profits.

***The bottom line:*** *The \$1.3 billion biopesticide market is growing 10 percent a year as farmers unleash killer bugs to eradicate profit-eating pests.*