

Oxitec has engineered two other agricultural insects with gene constructs similar to that in its diamondback moth: the olive fly and the Mediterranean fruit fly, or Medfly. Oxitec tested its Medfly in netted field trials in Africa and has received approval in Brazil to test its Medfly in open-field trials with its partner Moscamed, a state-owned company in Juazeiro. The company is awaiting clearance in Spain to field-test its olive fly, and the *DsRed2* marker gene has already undergone field testing in pink bollworm and mosquito. Most other genetic modification of agricultural pests has been done in a handful of academic laboratories, including that of Al Handler, research geneticist at the USDA's research arm in Gainesville, Florida, who is working on Caribbean fruit fly; Ernst Wimmer, professor of developmental biology at Georg-August-University in Göttingen Germany, who is working on Medfly; and Max Scott, professor of entomology at North Carolina State University in Raleigh, who has transformed a screwworm fly and is awaiting field trial approval in Panama.

Oxitec is also the creator of the world's first field-tested sterile transgenic mosquito—*Aedes aegypti*—aimed at controlling the carrier for dengue fever and other diseases (*Nat. Biotechnol.* 29, 1034–1037, 2011). These mosquitoes were

transformed with a similar construct to that used for diamondback moths and have been tested in open trials in the Cayman Islands, Panama and Brazil. Oxitec's OX513A mosquitos reduced the dengue mosquito population in an area of Juazeiro, Brazil, by 95%, according to a July 2 report (*PLOS Negl. Trop. Dis.* 9, e0003864, 2015).

Environmental groups criticized the mosquito trials, saying that reducing wild pest populations might create an 'empty niche' that other potentially damaging insects might fill and affect organisms higher in the food chain (*Nat. Biotechnol.* 29, 9–11, 2011). Oxitec's diamondback moth is facing similar protests from activist groups and an organic growers association, who say the USDA's environmental review of Oxitec's moth was insufficient.

The groups in June sent a letter to the governor of New York and other authorities, requesting that the Cornell trials be stopped. One of their concerns is that GM moths might lay eggs on organic crops, where the female larvae will die and "leave genetically engineered residue behind on the plant," says Anne Ruffin, executive director of the Northeast Organic Farming Association of New York, and a co-signer of the letter.

That residual material could cause organic farmers to lose their USDA organic certification, Ruffin says. USDA inspectors randomly,

and sometimes upon suspicion, test farms for contamination by GM and other forbidden materials. If contamination is found, the organic farmer might be asked to develop a plan to eliminate it and later re-inspected to see if that plan was successful, says Ruffin.

But such a scenario is unlikely, says Drew Kershen, an agriculture law professor at the University of Oklahoma in Norman. Even if a USDA inspector encountered GM moth material, an organic grower only has to show that he took reasonable measures to avoid it and that its presence was inadvertent, he says. "End of matter. There is no mandatory requirement for additional plans or tests."

Opposition to the moth trials has puzzled some scientists. "I see this as a green technology," says Scott at North Carolina State University. The technology would reduce pesticide use. The gene won't persist in the environment because it dies out with the insect population, and it is nontoxic to anything that eats the GM moths, he says. Plus, the target is an invasive pest, not a food crop. "This could be an incredibly important advance for human health and the environment," adds Roush. "And not just in Georgia or Florida but in places like Thailand" where the moths would reduce human exposure to pesticides, he says.

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Around the world in a month

 **SLOVENIA**
Slovenian regulators certify AmpliPhi Biosciences' phage-based antibacterial therapies plant in Ljubljana, making it the world's first cGMP-certified facility dedicated to producing bacteriophage products for human use. The 6,500-sq.-ft. plant houses cell banks, storage areas for phage stocks and libraries of pathogenic bacteria.

 **SOUTH AFRICA**
The first antimalarial compound developed in Africa enters clinical trials. The compound was developed at the Drug Discovery and Development Centre at the University of Cape Town. This antimalarial drug seems to be more effective than chloroquine or artemisinin and could potentially be the first single-dose cure for malaria.

 **CHINA**
The Chinese Academy of Sciences starts construction on the \$322.6-million Genetic Resources R&D Center (South) in Changzhou. Upon completion it will include a stem cell bank, buildings for genetic counseling, diagnostics and treatment, and laboratory capabilities for tissue engineering, genetic testing for diseases and regenerative medicine.

 **IRAN**
Iran unveils a GM cotton developed by a biotech research institute in Alborz Province. The institute reports the GM cotton, still to be approved by the Iranian parliament's Biosafety Committee, increases crop yields by up to sevenfold over conventional cotton.