

Gene-altered mosquitoes could be used vs. dengue

Jennifer Kay, Associated Press



KEY WEST, Fla. (AP)—Mosquito control officials in the Florida Keys are waiting for the federal government to sign off on an experiment that would release hundreds of thousands of genetically modified mosquitoes to reduce the risk of dengue fever in the tourist town of Key West.

If approved by the Food and Drug Administration, it would be the first such experiment in the U.S. Some Key West residents worry, though, that not enough research has been done to determine the risks that releasing genetically modified mosquitoes might pose to the Keys' fragile ecosystem.

Officials are targeting the *Aedes aegypti* mosquitoes because they can spread dengue fever, a disease health officials thought had been eradicated in the U.S. until 93 cases originated in the Keys in 2009 and 2010.

The trial planned by mosquito control officials and the British company Oxitec would release non-biting male mosquitoes that have been genetically modified to pass along a birth defect that kill their progeny before reaching maturity. The idea is that they will mate with wild females and their children will die before reproducing. After a few generations, Key West's *Aedes aegypti* population would die off, reducing the dengue fever risk without using pesticides and at relatively a low cost, the proponents say. There is no vaccine for dengue fever.

"The science of it, I think, looks fine. It's straight from setting up experiments and collecting data," said Michael Doyle, pointing to research Oxitec has had published in peer-reviewed scientific journals. He inherited the project when he took the lead at the Florida Keys Mosquito Control District in mid-2011.

The district's website says the modified genes will disappear from the environment after the mosquitoes carrying it die, resulting in no permanent change to the wild mosquito population. The district also says that the mosquito species isn't native to the Keys, nor is it an integral food source for other animals.

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Dengue fever is a viral disease that inflicts severe flu-like symptoms—the joint pain is so severe its nickname is "breakbone fever." It isn't fatal but victims are then susceptible at subsequent exposures to dengue hemorrhagic fever, which can be.

"It's very uncomfortable. You ache all over, you have a terrible fever," said Joel Biddle, a Key West resident whose dengue fever symptoms lasted more than a week in 2009.

Biddle is among those concerned about the Key West trial. He worries the modified genetic material will somehow be passed to humans or the ecosystem, and he wants more research done. He and other Key West residents also chafe at the fact that the project was in the works long before it was made public late last year.

Only female mosquitoes bite, so the modified genetic material wouldn't be passed on to humans, Mosquito control and Oxitec officials said. They also say they're being transparent about their data and the trial.

Real estate agent Mila de Mier has collected more than 117,700 signatures on a petition she posted on Change.org against the trial. Most come from outside the Keys, which de Mier says shows that tourists don't support the mosquito control district.

"We are dependent here on our tourists, and people from all over the country have been sending the message," de Mier said.



A University of Florida professor who studies mosquito control said Oxitec's technology works and evidence from the company's experiments elsewhere show it can control mosquito populations, but it's not clear whether its methods are as effective at controlling the risk of disease transmission. Phil Lounibos of the Florida Medical Entomology Laboratory also said it would take repeated releases of modified mosquitoes for the program to work, and the public outcry against genetically modified organisms, even when it's irrational, may be insurmountable.

"The public resistance and the need to reach some agreement between mosquito control and the public, I see that as a very significant issue, outside of the (operating) costs, since this is not just a one-time thing," Lounibos said.

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The *Aedes aegypti* has shown resistance to pesticides used to control other species, and is the most difficult for the district to manage. Common in the Southeast and the Caribbean, it lurks in standing water around homes and businesses and can breed in containers as small as bottle caps.

District inspectors go door-to-door to remove the standing water where they breed, a time-consuming task. The district spends roughly \$1 million a year to suppress *Aedes aegypti*, 10 to 15 percent of the agency's budget, Doyle said.

"Unfortunately, control of *Aedes aegypti* is a never-ending job," said Larry Hriber, the mosquito control district's research director.

In the trial, thousands of male mosquitoes bred by Oxitec would be released in a handful of Key West blocks where the *Aedes aegypti* is known to breed; the number of mosquitoes in those neighborhoods would be measured against the numbers from similar blocks where no modified mosquitoes were released.

The state's agriculture department oversees the mosquito control district, and Doyle said he would not expect any challenge from the state if the FDA signed off on the trial. The mosquito control district wouldn't need any local permit for the trial, either, but officials held a public meeting earlier this year and have posted information on the agency's website.

Still, it could take years for the FDA to approve the trial.

There hasn't been a case of dengue fever in Key West since November 2010, but two other cases were reported elsewhere in South Florida this fall.

The mosquito trial proposed for Key West wouldn't be the first release of genetically modified insects in the U.S.

In 2009, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service concluded that integrating genetically modified pink bollworms, bred by Oxitec to be sterile but more competitive in mating than regular bollworms, into the agency's plant pest control program was "the environmentally preferable alternative" to combat the cotton pest. The program was discontinued, however, after officials found that the genetically modified insects were not as hardy as pink bollworms sterilized through irradiation, and that their use would cause farmers to lose their organic certification.

Oxitec said the USDA's environmental assessment is one of several examples of proof that the trial's risks and methods are being independently evaluated. The company has trials in Brazil, the Cayman Islands and Malaysia, and it says it's gotten positive reviews from the latter two governments. It also cites its published research in peer-reviewed journals.

But Biddle, the onetime dengue patient, wants Oxitec to continue testing the modified mosquitoes outside the U.S.

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"Why the rush here?" the Key West man said. "We already have test cases in the world where we can watch what is happening and make the best studies, because wouldn't it be wonderful if we could find out how it can be fail-safe—which it is not right now. It's an open Pandora's box."

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