

Selling controversial Zika-fighting plan to the public will take work

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As federal authorities weigh a plan to release genetically modified mosquitoes to help control the spread of the Zika virus, they need to overcome public fears about the risks and potential unintended consequences.

Under the plan, the British biotechnology firm Oxitec wants to release millions of altered mosquitoes in Key Haven, Fla., a small community on Stock Island just east of Key West. Oxitec said the mosquitoes are engineered to produce sterile offspring that die young, reducing populations of the mosquito species that commonly carries Zika.

So far, government and outside researchers have found little to fear about the plan, but opposition has emerged in Key Haven. A survey released this month by the Johns Hopkins Bloomberg School of Public Health found that 58 percent of residents in the Key Haven study site oppose the release of the [genetically modified mosquitoes](#).

That stands in contrast to national surveys. A Purdue University survey in February found that 78 percent nationally supported using engineered mosquitoes to fight Zika, while a University of Pennsylvania survey in March determined that a little over half approved of such action, with only 29 percent opposed.

"Understanding the attitudes of the community is really important for the plan to move forward," said Crystal Boddie, a senior associate at the UPMC Center for Health Security in Baltimore who helped conduct the

study as a doctoral candidate at the Bloomberg School. "Gaining acceptance will require a lot more dialogue between the residents and [public health officials](#), the local mosquito control office and the company that wants to do this."

Boddie said she thought the timing of the Bloomberg survey might have influenced the results. Few people surveyed may have felt at risk since it was conducted before the Zika virus began making headlines and its scientific link to the severe birth defect microcephaly was known. Microcephaly stunts the development of the brains and heads of afflicted fetuses, and it has been linked to Zika infection in pregnant women.

Support could have grown with the rising alarm about Zika, said Boddie, who wants to repeat the survey.

Oxitec has wanted to conduct a field study of its genetically modified mosquito in Key Haven since 2008, before an outbreak of dengue fever swept through the area in 2009 and 2010. The dengue virus is carried by the same species of mosquito, *Aedes aegypti*, that transmits Zika.

Oxitec said that its mosquitoes have reduced populations of *Aedes* mosquitoes by more than 90 percent in the laboratory and small field studies in other countries, including Brazil, where Zika has had the heaviest toll. Those tests have had no adverse impacts, company officials said.

If successful in Key Haven, Oxitec plans to apply for government permission to sell the vector control in other U.S. cities.

The plan took a tentative step forward in April when the U.S. Food and Drug Administration reported that it found no significant adverse impact from the modified mosquitoes, but the agency, which has final regulatory say, has not issued a final ruling or said when it will.

Residents of Key Haven have voiced worries about the safety of releasing millions of genetically modified mosquitoes. Others expressed concerns about being used as test subjects without their consent, while some questioned the need for such an action, since neither Zika nor dengue appears present in the Florida Keys.

Scientists who study [vector control](#) say they're more concerned the plan won't reduce the mosquito population enough or won't stem cases of mosquito-borne disease but said the community concerns can't be dismissed.

The company needs to explain the technology and how they plan to mitigate any risks, however small, said Thomas W. Scott, an entomology professor at the University of California, Davis and a member of the World Health Organization's Vector Control Advisory Group.

"The chance of any harm is really remote," said Scott, who once worked with Oxitec on another kind of mosquito control. "People are smart but don't have the kind of education to understand the science. The company has to explain this. The communication part can be really difficult."

He said there are other, newer technologies that raise concerns, such as so-called "gene drives" that promote specific gene inheritance and can alter entire populations.

In addition to regulatory and community approval, such systems would require "careful design considerations as they move through their development to avoid potential negative consequences," said Scott, citing the possible ecological and evolutionary impacts from altered genes jumping among species.

In Key Haven, local mosquito control officials plan to take a public vote in August to assess public sentiment on Oxitec's plan.

By then there could be cases of Zika transmitted by local mosquitoes. The U.S. Centers for Disease Control and Prevention reports there are now 618 travel-related cases of Zika in the United States, including 195 pregnant women. Most cases worldwide are in Central and South America.

Jack Bobo, chief communications officer for Oxitec's parent company, Intrexon, said officials will be going door to door in Key Haven to present their scientific findings.

"The main goal is to help people understand the public benefit," he said. "If someone doesn't see the potential benefit, it's not surprising they're going to focus on the risk."

Scientists outside of Oxitec say that modifying pests has been done since the 1950s to benefit agricultural crops, and many see little risk in modified mosquitoes.

Dr. Peter Hotez, dean for the National School of Tropical Medicine at Baylor College of Medicine in Houston, is less concerned about the safety and environmental impact of the modified mosquitoes and more concerned about how well they would control disease.

"So far, to my knowledge, it's not clear whether (genetically modified) mosquitoes have been tested at full scale and whether they have been shown to reduce dengue or Zika transmission," he said. "This is important because we know the old methods of *Aedes aegypti* control work, even if they are labor-intensive."

Those methods largely include spraying insecticide and draining standing water and treating for larvae.

Max J. Scott, professor of entomology at North Carolina State

University who studies pest control, agreed that modified mosquitoes aren't likely a "silver bullet" to stop Zika and he understands public fear about the technology, though it's not exactly new. He said modifications to pests in the past have been done in different ways than gene modification.

But Scott supports the trial because it's likely to work for some time. The problem is that only one gene has been modified in the mosquitoes and, eventually, the virus might become resistant to the change.

"Risks are very, very low," he said. "This definitely works and could be a really useful tool for people charged with controlling mosquitoes in Florida. ... (But) with the single lethal gene mechanism, there is potential for resistance to develop long term."

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