



New Techniques Are Needed to Control Mosquitoes and Protect Public Health

Two invasive urban mosquitoes are spreading in California, the yellow fever mosquito, *Aedes aegypti*, and the Asian tiger mosquito, *Aedes albopictus*. These mosquitoes are now found in more than 300 cities throughout the state. Invasive *Aedes* mosquitoes spread viruses that cause Zika, dengue, chikungunya, and yellow fever. There are no human vaccines for many of these mosquito-borne diseases and they can have long-term health consequences. These mosquitoes can also spread the parasite that causes dog heartworm, which can lead to severe disease.

California mosquito and vector control agencies work to control mosquitoes to prevent the spread of serious diseases and protect people from their painful and itchy bites. Invasive *Aedes* mosquitoes are harder to control because they have become resistant to commonly used insecticides. Also, they often lay their eggs in small water sources in people's front yards, backyards, and patios — areas where mosquito control agencies can't easily inspect. Invasive *Aedes* mosquitoes are not from California, so they don't have a place in our natural ecosystem. Reducing or controlling these mosquitoes will not harm insect-eating animals that are native to California.

New methods to control invasive *Aedes* are needed more than ever to protect the health and well-being of Californians.

STERILE INSECT TECHNIQUES ARE INNOVATIVE WAYS TO CONTROL INVASIVE MOSQUITOES

There are currently three forms of Sterile Insect Techniques (SIT) — *Wolbachia*, irradiation, and self-limiting mosquitoes — all of which are environmentally friendly control methods. These systems work by releasing sterile male mosquitoes into the environment to mate with wild females of the same species. Females that mate with sterile males lay eggs that do not hatch, and over time, this reduces the number of female biting mosquitoes in the area. The sterile male mosquitoes that are released do not bite and can't spread diseases. These SITs can reduce the use of pesticides and do not harm beneficial insects.

The [International Atomic Energy Agency](#) and the [Food and Agriculture Organization of the United Nations](#) are conducting pilot projects using SIT to control disease-transmitting mosquitoes in Brazil, China, Cuba, Germany, Greece, Italy, Mauritius, Mexico, Singapore, Spain, Thailand and the United States, with encouraging results.



Sterile Insect Technique was first developed in the USA and has been used successfully for more than 60 years by many agencies to control different kinds of insects and agricultural pests that can damage crops and livestock. [The California Department of Food and Agriculture](#) successfully used this method to control Mediterranean fruit fly infestations in citrus and other fruit trees and [The United States Department of Agriculture](#) has also had success using SIT to control screwworms, a type of fly that can be devastating to cattle.

STERILE INSECT TECHNIQUES

Wolbachia is a beneficial bacteria that lives inside many insects including butterflies, dragonflies, moths, and some mosquitoes, but not in *Aedes aegypti* mosquitoes. Scientists have developed a strain of *Aedes aegypti* that carries *Wolbachia*. If a male mosquito with *Wolbachia* mates with a wild female, her eggs will not develop, and she will not produce any offspring.

The [Consolidated Mosquito Abatement District](#), in partnership with [Verily](#) and [MosquitoMate](#), recently completed a successful three-year pilot project called [DeBug Fresno](#), which used *Wolbachia* male mosquitoes to reduce populations of *Aedes aegypti* mosquitoes by 95% in tested residential communities in Fresno County.

Irradiation uses radiation to sterilize male mosquitoes. Females that mate with sterile males lay eggs that do not hatch, which reduces the number of mosquitoes within the treated area. According to the [U.S. Centers for Disease Control and Prevention](#), irradiated *Aedes aegypti* mosquitoes are currently being evaluated as a control method in communities in Florida. This method has been used to control [other types of mosquitoes in Italy](#).

Self-limiting mosquitoes are being developed by [Oxitec](#), a company that has conducted public health mosquito control projects in Brazil and recently received federal and state regulatory approval to launch a pilot project in the Florida Keys. When Oxitec's Friendly™ *Aedes aegypti* male mosquitoes mate with wild females, their offspring inherit a copy of the self-limiting gene, which prevents female offspring from growing and surviving to adulthood. Oxitec's mosquitoes only target their own species, and their self-limiting gene can't establish in the ecosystem.

ADDITIONAL RESOURCES

- U.S. Centers for Disease Control and Prevention: [Sterile Insect Techniques for Controlling Mosquitoes](#)
- World Health Organization: [Benefits of Mosquito Sterilization](#)
- International Atomic Energy Agency: [Sterile insect Technique for Mosquitoes FAQ](#)
- Sacramento-Yolo Mosquito and Vector Control: [Frequently Asked Questions about SIT](#)
- [Detailed Wolbachia information](#) from the National Environment Agency
- World Mosquito Program [video on Wolbachia](#)
- Results from [Debug Fresno project](#)
- Diptera.ai's [irradiated mosquitoes](#)
- Oxitec's [Friendly™ Technology](#)