Frequently Asked Questions About Sterile Insect Technique & Other Innovative Mosquito Control Efforts

Why are new mosquito control techniques needed?

Two invasive urban mosquitoes are spreading in California, the yellow fever mosquito, *Aedes aegypti*, and the Asian tiger mosquito, *Aedes albopictus*. First detected in 2013, these mosquitoes are now found in more than 300 cities and 22 counties throughout the state. Invasive *Aede*s mosquitoes spread viruses that cause Zika, dengue, chikungunya, and yellow fever. There are no human vaccines for many of these mosquito-borne diseases, and these diseases can have long-term health consequences. These mosquitoes can also spread the parasite that causes heartworm in dogs, cats and other animals, which can lead to severe disease in pets.

Invasive *Aedes* mosquitoes are harder to control because they have become resistant to commonly used insecticides. They lay their eggs in small, hidden water sources in people's front yards, backyards, and patios — areas where mosquito control agencies can't easily inspect. Due to the difficult nature of controlling invasive *Aedes* mosquitoes and the public health risks they pose, mosquito and vector control agencies need additional control methods. Many agencies are exploring the use of Sterile Insect Techniques (SIT) and other innovative technologies to help reduce the population of disease-transmitting mosquitoes.

What innovative technologies are being considered in California?

There are currently three different technologies that mosquito control experts are evaluating: *Wolbachia*, irradiation, and self-limiting mosquitoes.

- *Wolbachia* are bacteria naturally found in about 60 percent of insects around the world like butterflies, dragonflies, moths, and beetles. With this technique, male *Aedes* mosquitoes are raised in a lab with a specific type of *Wolbachia* that they do not normally have. These male *Aedes* mosquitoes are released to mate with wild female *Aedes* mosquitoes that have a different type of *Wolbachia* or none at all. During mating,

the mismatched *Wolbachia* bacteria causes the eggs not to hatch. This can reduce the overall number of *Aedes* mosquitoes over time.

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.

- Irradiated mosquitoes are raised in a laboratory where the male mosquitoes are separated from the females. Then, radiation found in x-rays and Gamma rays is used 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. Irradiated *Aedes aegypti* mosquitoes are currently being evaluated as a control method in Florida and this method has been used to control other types of mosquitoes in Italy.

- Self-limiting mosquitoes are being developed by Oxitec, a company that recently conducted 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.

  Oxitec has received approval from the U.S. Environmental Protection Agency for a pilot project in California that is being planned in partnership with the Delta Mosquito and Vector Control District in Tulare County. The company needs to receive approval from the California Department of Pesticide Regulation before it can begin the project.

Can modified mosquitoes bite people and alter their DNA?

No, SIT and other innovative technologies only involve releasing **male mosquitoes, which do not** bite people and cannot alter people's DNA.

Will these techniques replace traditional mosquito control efforts?

No, SIT and other innovative technologies will not replace traditional mosquito control methods. If used, they will be part of an Integrated Vector Management approach, which is an evidence-based, data-driven decision-making tool used to suppress mosquito-borne diseases. There are many decisions that are made to determine which mosquito control technique will be most effective in different areas and conditions to protect public health. These decisions are

made at a local level and any emerging technology that is used to protect the public from mosquito-transmitted diseases would be used in conjunction with traditional control methods.

Will SIT and other innovative technologies harm the environment or other insects?

No, these technologies specifically work to control invasive *Aedes* mosquitoes which are not originally found in California and 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.

Is Sterile Insect Technique a new technology?

No, SIT was first developed in the USA and some forms have been used successfully for more than 60 years to control different kinds of insects and agricultural pests that can damage crops and livestock. The California Department of Food and Agriculture successfully used SIT to control Mediterranean fruit fly infestations in citrus and other fruit trees. The United States Department of Agriculture also successfully used SIT to control screwworms, a type of fly that can be devastating to cattle.

Will the public have any input about the use of SIT or other innovative technologies?

Mosquito and vector control agencies work to not only educate the public about mosquito bite prevention and residential mosquito control, but also to solicit public feedback. Local agencies that decide to pursue SIT or other technologies will determine the best way to conduct public outreach and seek input.