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Aerial Mosquito Control to Reduce Arbovirus Risk

Summer 2019

What is Eastern equine encephalitis (EEE)?

Eastern equine encephalitis (EEE) is a rare but serious disease caused by a virus that can affect people of all ages. EEE is generally spread to humans through the bite of a mosquito infected with the virus. EEE can cause severe illness and possibly lead to death in any age group; however, people under age 15 are at particular risk. EEE does not occur every year, but based on mosquito sampling, a high risk of occurrence of human cases currently exists.

What does it mean to find the presence of positive mosquito samples?

Because EEE does not occur every year, the identification of EEE virus in mosquitoes indicates that activity is present during the current season. There are two types of mosquitoes that can be found with EEE: bird-biting species and mammal-biting species. When virus is found in mammal-biting mosquitoes, the risk for human disease increases because these mosquitoes are much more likely to bite people. Based on the positive findings this year, the fact that mosquito sampling indicates abundant numbers of mosquitoes, and that environmental conditions are optimal for continued mosquito breeding, a high risk of occurrence of human cases exists.

What can be done to reduce risk of EEE?

The basis of all risk reduction is understanding the risk and being vigilant about practicing personal protective behaviors (e.g., using repellents, ensuring screens are in adequate repair, and wearing clothing that covers your skin while outdoors). Source reduction (e.g., removing potential breeding sites, such as garbage cans, flower pots, bird baths, discarded auto-tires or other containers that hold water) is most useful for decreasing West Nile virus risk but is also good practice against EEE. In communities that belong to a Mosquito Control Project (MCP), the local Board of Health works with the project to make decisions about control activities that may include reducing populations of mosquitoes while they are still in their immature or larval state and reducing populations of adult, flying mosquitoes using truck-based ground spraying.

When is aerial spraying of insecticides considered?

Truck-mounted ground spraying is already taking place in some communities in southeastern Massachusetts. In situations where there is a high risk of human disease, the state's response plan recommends consideration of the use of an aerial pesticide spray in the evening and overnight hours to reduce the number of infected, adult mosquitoes in the specific areas of high risk. Many breeding areas of high concern are not accessible by truck-mounted ground sprayers.

It should be noted that although the aerial spraying is considered necessary to reduce human risk, it will not eliminate risk it. It is critical that residents protect themselves from mosquito bites by staying indoors during peak mosquito hours, applying insect repellent when outdoors, draining standing water where mosquitoes breed, repairing screens, and protecting animals and pets.

How is aerial spraying conducted?

Aerial spraying is conducted by airplane during the early evening and night time hours (i.e., usually from dusk up to shortly after midnight) in areas of concern. Mosquito control professionals apply approved pesticides as an ultra low volume (ULV) spray. ULV sprayers dispense very fine aerosol droplets that stay aloft and kill adult mosquitoes on contact.

What pesticide product would be used in the aerial spraying?

The pesticide used is called Anvil 10+10, a product extensively tested and used in both ground-level and aerial spraying in the U.S. to control mosquitoes. Anvil 10+10 contains two ingredients: Sumithrin and Piperonyl butoxide. Sumithrin is an ingredient similar to the natural components of the chrysanthemum flower which is also found in other pesticide products used indoors, in pet shampoos, and tick control treatments. Sumithrin is rapidly inactivated and decomposes with exposure to light and air, with a half-life of less than one day in the air and on plants. In soil, it degrades rapidly and has proven to be extremely effective in killing mosquitoes worldwide for over 20 years. Piperonyl butoxide (PBO) serves to increase the ability of Sumithrin to kill mosquitoes. The product is registered by EPA and in Massachusetts for this use. It was used in previous aerial applications for mosquito control (2006, 2010, 2012). It is also used by some of the Mosquito Control Projects for ground applications.

Are these pesticides used elsewhere to control mosquitoes?

Yes. Other states (i.e., New York, New Jersey, Illinois, Delaware, North Carolina, Arkansas, Florida, Alabama, Louisiana, Texas) regularly apply these same products.

Can these targeted ground and aerial sprays with adulticides harm insects or wildlife?

The US Environmental Protection Agency (EPA) has evaluated these pesticides for their safety and has determined that they do not pose an unreasonable risk to birds or mammals, if used according to the product label directions.

Anvil and other similar pesticides are toxic to land-dwelling and water-dwelling invertebrates (e.g., dragonflies, beetles) and to fish. There is less risk to fish in larger ponds than in smaller ones and the risks to large natural water bodies are minimal. However, people may want to cover a small ornamental fish pond in their yard during the night of spraying.

Is there a risk to drinking water sources?

No. Aerial spraying is not expected to have any impacts on surface water or drinking water. Surface drinking water sources are mapped and aerial spraying will not occur over these water supply reservoirs. Also, the product is rapidly inactivated and decomposes in sunlight and air, does not dissolve easily in water, and is broken down by microorganisms in streams and water bodies that receive sunlight. Therefore, residues in water would not be expected. Because of these characteristics and the fact that spraying does not occur over drinking water supply reservoirs, exposure through drinking water is not expected.

Are there any health impacts associated with exposure to Anvil 10+10?

There are no health risks expected during or after spraying. There is no evidence that aerial spraying of Anvil 10+10 will exacerbate certain health conditions, such as asthma or chemical sensitivity.

Are there precautions I should take if aerial spraying will occur in my area?

No special precautions are recommended. Aerial spraying is conducted at night and the active ingredients of the pesticide product used for aerial application for mosquito control generally break down quickly and leave no residue.

Although aerial spraying is considered necessary to reduce human risk, it will not eliminate risk. It is critical that residents protect themselves from mosquito bites by staying indoors during peak mosquito hours, applying insect repellent when outdoors, draining standing water where mosquitoes breed, repairing screens, and protecting animals and pets.

Even if no precautions are required, are there extra steps people can choose to take if they are still concerned?

Although not necessary, steps that can be followed in areas where aerial spraying is scheduled to take place include:

- Close windows and turn off fans in spray areas. Shut off air conditioners unless they have a setting for recirculating indoor air. In very hot weather, you can open the windows or turn fans and air conditioners back on soon after the aerial spraying is completed.
- Keep pets indoors during spraying. Although pets that remain outdoors could be exposed to small amounts of Anvil 10+10, they are not expected to experience adverse health effects from the spraying. There are many pesticide products (e.g., flea collars, pet shampoo, dips) containing similar ingredients that are used directly on pets to control ticks and insects.
- If clothes or outdoor items are exposed during spraying, wash them with soap and water.
- No special precaution or waiting periods are needed for outdoor swimming pools.

Are there any restrictions on consuming fruits and vegetables from home gardens or local farms?

No. The US EPA has established a tolerance (acceptable level) for the product that allows wide-area mosquito application on food crops, fodder crops, pasture and grazing areas. The application is not expected to leave a detectable residue on food crops, pastures, or forage crops. Livestock may graze in treated areas following the application. As always, consumers should rinse any homegrown or purchased fruits and vegetables with water before preparation or consumption.

If I am a beekeeper, should I take special precautions to protect the bees before or after aerial spraying?

No. Aerial spraying of Anvil at night should not impact honeybee colonies as honeybees are inside the hives at night.

What if I think that I am experiencing an adverse reaction to pesticide spraying?

If you believe you may be experiencing any health effects from pesticides, call your health care provider or the Massachusetts Poison Control Center 800-222-1222. If symptoms are severe, call 911 for assistance.

Who do I contact to learn more about aerial spraying in my area?

Your local health department will be aware of any plans for aerial spraying. Updates will be provided via local media outlets, social media, and other channels.

For questions about aerial spraying, contact MDAR Crop and Pest Services at (617) 626-1700.

For the most updated information on EEE risk and aerial spraying, contact the DPH Division of Epidemiology (617) 983-6800 or visit the DPH website at www.mass.gov/guides/aerial-mosquito-control-summer-2019 for updated mosquito results, maps and incidence of positive mosquito samples.

For general information on mosquito control, contact the State Reclamation and Mosquito Control Board within MDAR at (617) 626-1723.