



Integrated Pest Management (IPM) of Mosquitoes in Early Childhood Education (ECE) Settings

Mosquitoes are small flying insects that have been around for millions of years, getting better and better at finding people and other animals to bite. You may wonder why these pesky insects bite, and whether to worry about them. Can they make you sick? What can you do to protect yourself and the children in your care without exposing them to pesticides?

Why are mosquitoes a problem in ECE settings?

The most important consequence of some mosquito bites in California is the transmission of West Nile virus (WNV) or Western equine encephalomyelitis virus. These diseases are rare but may be serious in children, people with weakened immune systems, and the elderly, and can lead to death.

Mosquito bites can also result in allergic reactions, pain, irritation, redness, and itching. Children who scratch their bites too much, especially with dirty fingers, may also develop secondary bacterial infections.

Mosquito characteristics and habits

Mosquitoes go through several stages in their life cycle before becoming adults. It is important to know that mosquitoes spend much of their life in still water. Female mosquitoes lay their eggs in water, and the eggs develop into larvae and then pupae. When

the pupae hatch into adults, they leave the water and become flying land insects. Adult mosquitoes normally live less than a week or two in nature.

Female mosquitoes bite because they require blood from animals to develop their eggs, and many species bite people, pets, and livestock for this purpose. The males don't bite at all, and survive by sipping nectar from flowers.

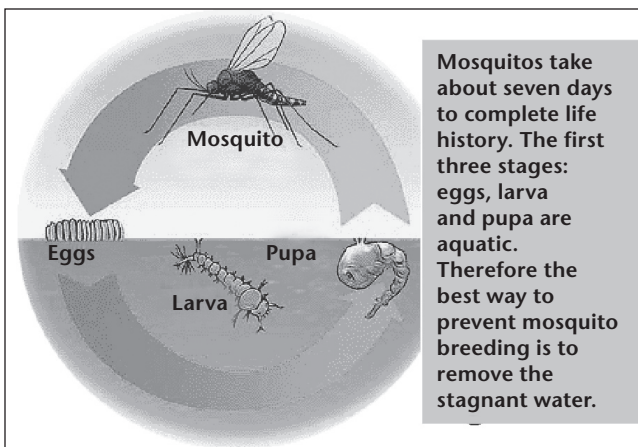
Mosquitoes are well equipped to find their human victims. Mosquitoes can detect chemicals in your sweat and heat from your body. They also notice when you move, especially when you wear clothing that is a different color from your surroundings. It is good to learn when mosquitoes in your area are active so you can avoid them. Some mosquitoes bite at night, while others bite during the day.

IPM strategies to manage mosquitoes

Mosquitoes are best managed on an area-wide basis by public agencies. In California, there are more than 50 mosquito and vector control districts, which provide services at no charge. Call your local district (see resources) if you would like a visit from a field technician or to report a mosquito problem or potential mosquito breeding source.

Mosquito larvae live and grow in ponds, objects containing standing water, treeholes, and other aquatic sites. When mosquito larvae are discovered in water bodies, they're often treated with mosquito fish or environmentally friendly bacteria that target just mosquitoes. Despite area-wide management, mosquitoes will continue to be a part of our environment. While their bites are annoying to humans, they provide food for fish, birds, and bats, and even pollinate flowers. It is impossible to eliminate mosquitoes. The goal of area-wide programs is to reduce their number to a tolerable level for humans.

For childcare providers, the two most important ways you can reduce mosquito bite problems is to reduce standing water that mosquitoes breed in and protect children from mosquitoes with screens and repellents.



Eliminate standing water to minimize mosquito breeding:

- The most effective mosquito management practices target the larval stage, which is when mosquitoes are in water. Any object that can hold water for more than a few days should be drained, discarded, filled with soil or cement, treated with a biological insecticide, or stocked with mosquito fish. Even small containers like cinder blocks, flower pot saucers, old tires or crotches of trees can provide a habitat for mosquito development if they remain filled with water for more than a few days.
- For ponds that cannot be drained, use mosquito fish. The mosquito fish has been used worldwide for mosquito control. These fish are most effectively used in small, man-made bodies of water that do not connect with natural waters. Never put fish in a natural pond, lake, creek, or river. They can be obtained from most mosquito vector control districts.
- Change water in pet dishes, watering troughs, and bird baths at least weekly.
- Avoid overwatering lawns and gardens, which can lead to standing water.
- Keep litter and garden debris out of street gutters.
- Clean rain gutters at least once a year to remove debris.
- Fill open tree holes with sand or mortar.
- Cut down tall grass and weeds in outside areas where mosquitoes rest during the day when it is hot and dry.

If mosquitoes are a problem in your program, take these steps to manage them:

- Make sure that windows and doors are covered by fine mesh screens that are in good repair.
- Avoid places where mosquito populations are high and avoid being out-of-doors at times of the day when mosquito activity is at its highest.
- Wear protective clothing outdoors.
- Use insect repellents if mosquitoes are really bothersome and you have to be outdoors. There are several effective repellents.

Picaridin is a repellent that has been used in Europe for years. Picaridin has been found to be as

effective as DEET and has fewer health risks. Unlike DEET, Picaridin is odorless, does not feel greasy or sticky and is less likely to irritate the skin.

Products containing DEET (N,N-diethyl-metoluamide) are also effective but may be more toxic at high doses. Some people dislike the odor and may find it irritating to the skin. DEET confuses the chemical receptors of mosquitoes, making it harder for the mosquito to find you. Special formulations for children contain low concentrations of DEET in an oil-based medium that slowly releases the compound and limits its absorption through the skin.

Other effective repellents include the biopesticides oil of lemon eucalyptus and IR3535, which are derived from natural materials.

Repellents are effective for only 4 hours or less depending on wind, high temperature, high humidity, and sweating.

- Outdoor insecticide sprays can provide temporary reduction of adult mosquitoes but have no lasting effect. They can also have harmful health effects.
- Don't use electric bug zappers because they kill beneficial and neutral insects, but very few mosquitoes.

Resources

University of California Statewide IPM Program: Mosquitoes <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7451.html>

Mosquito and Vector Control Association of California <http://mvecac.org/>

Active Ingredients found in Insect Repellents, http://www.epa.gov/pesticides/health/mosquitoes/ai_insectrp.htm

How to Use Insect Repellents Safely, <http://www.epa.gov/pesticides/health/mosquitoes/insectrp.htm>

CDC: Updated Information Regarding Mosquito Repellents, <http://www.cdc.gov/ncidod/dvbid/westnile/resources/uprepinfo.pdf>

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