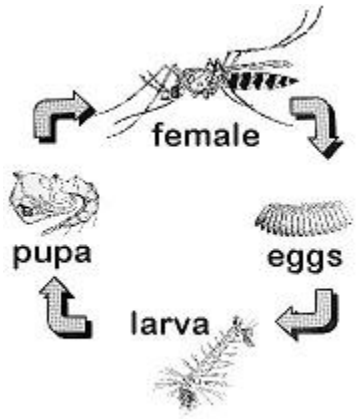
# WHAT YOU SHOULD KNOW ABOUT MOSQUITO CONTROL AND PESTICIDES

Mosquitoes can be a nuisance and cause allergic reactions in people when they bite. Some mosquitoes in California may carry germs that can cause serious disease in humans and animals. For these reasons there are government programs that control mosquitoes.

## Life Cycle of a Mosquito

Mosquitoes need water to live. They lay their eggs near or on standing water. The egg hatches into a larva in the water. The larva becomes a pupa, and then finally becomes a flying adult mosquito, usually in 1 to 3 weeks. The adult female mosquito then needs to bite an animal or human for blood so that she can produce eggs and repeat the life cycle.




Mosquito control programs use many ways to control mosquitoes. They try to get rid of standing water in cities and in the country where mosquitoes will lay eggs. They add mosquito-eating fish to ponds to eat the larvae and pupae. Mosquito control programs also use pesticides to kill mosquitoes.

## Pesticides

A pesticide is a material used to kill a certain pest. There are mosquito pesticides that are either used in water to kill mosquito larvae and pupae, or in the air to kill adult mosquitoes. The portions of the pesticide products that are poisonous to the mosquito are the active ingredients. Mosquito pesticides used in California are regulated by the government to ensure that they are safe to use around humans, animals, and in the environment.

There are several different pesticides used in California to control mosquitoes. The reason for this is because if the same pesticide is used for a long time, mosquitoes can become less sensitive to that pesticide and will not die as easily when sprayed. By occasionally changing the type of pesticide used, mosquito control programs can help maintain their effectiveness. Switching pesticides to preserve their effectiveness is often called "rotating" pesticides.

The pesticides that are put into water to kill mosquito larvae and pupae before they become adults are called **larvicides** or **pupacides**. Most of these products are designed to kill only mosquitoes and pose very little risk to other insects or animals when applied properly.

**Adulticides**

Adulticides are pesticides that kill adult mosquitoes before they can bite people and make them sick. Adulticides are typically applied by spraying the product as a mist of very small drops or a "fog". Mosquitoes that come into contact with the fog are killed. The amount of pesticide needed to kill adult mosquitoes is very small; typically less than 1 ounce of active ingredient is applied per acre. Mosquito spraying is usually done in the evening after sunset or in the morning before sunrise, when most mosquitoes are flying instead of resting.

Although it is not necessary, people who are concerned about exposure to a pesticide, such as those with chemical sensitivity or breathing conditions such as asthma, can reduce their potential for exposure by staying indoors during the application period (typically nighttime).

**Common Larvicides Used in California:**

1. **Bacillus thuringiensis israelensis** and **Bacillus sphaericus,** commonly called Bti and Bs for short, are larvicides made from naturally-occurring bacteria. For ease of application, these active ingredients are typically mixed with clay, ground-up corn cob, or placed into a liquid carrier.

   How they work: When these products are put into water where mosquito larvae are found, the larvae eat the bacteria. The bacteria destroy the guts of the larvae causing them to die. These bacteria do not hurt people or pets, even if consumed, because the digestive systems of people and pets are much different than mosquitoes.

2. **Methoprene** is a man-made larvicide that is similar to a chemical normally found inside mosquito larvae that controls their development. Methoprene is mixed with clay into a solid product or is diluted in a liquid carrier.

   How it works: When methoprene is put into water, it stops larvae from developing into adult mosquitoes. This product has no effect on people or pets at the amounts used for mosquito control.

3. **Surface Films** are products made from oil or alcohols that spread out and form a thin layer over the surface of the water where mosquito larvae or pupae are present.

   How they work: Mosquito larvae and pupae have air tubes that they use to breathe at the surface of the water. Surface films suffocate the mosquito larva or pupa by

preventing their air tubes from acquiring oxygen at the water's surface. These products are not poisonous to humans, and pets are not harmed by drinking from a pond sprayed with these products.

**Common Adulticides Used in California:**

1. **Pyrethrins** are chemicals taken from chrysanthemum flowers that are poisonous to insects. The sun destroys pyrethrins very fast, so when they are used in mosquito control, most of the chemicals are gone within an hour when exposed to sunlight.

   How they work: Pyrethrins block parts of the mosquito's nervous system causing death. Some people can be sensitive to pyrethrins and may feel a tight or tingly feeling under their skin, soreness around their eyelids, or a scratchy throat if they are exposed.

2. **Pyrethroids** are man-made chemicals similar to pyrethrins. Pyrethoids last longer in sunlight than pyrethrins (up to a couple of days).

   How they work: Pyrethroids work very similar to pyrethrins to kill adult mosquitoes. Fish are sensitive to pyrethroids and can die if pyrethroids accidentally get into the water in higher concentrations.

3. **Piperonyl Butoxide** or **PBO** is a chemical that has little effectiveness as a pesticide by itself, but when it is added to products containing pyrethrins or pyrethroids it makes them work better.

   How it works: When PBO is mixed with mosquito spray, it makes it harder for the mosquito to get rid of the pesticide from their body. When PBO is used, less active ingredient is needed to kill mosquitoes. There is no harm to humans and/or pets when PBO is used in mosquito spraying.

4. **Organophosphates** are man-made chemicals used to kill many kinds of insect pests. In California, only two types of organophosphates are used to kill mosquitoes: malathion and naled.

   How they work: Organophosphates kill mosquitoes by blocking the movement of information through the mosquito's nervous system. Organophosphates can be used in areas where pyrethroids are not allowed and can be more effective than pyrethrins and pyrethroids in some conditions. People that come into contact with large amounts of these chemicals may experience headaches, become dizzy, feel sick to their stomach, or even die. Coming into contact with small amounts of these chemicals from mosquito spraying does not harm people or pets because the body gets rid of them quickly.