



# HOME & GARDEN

## Mosquito Management

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### Quick Facts...

Mosquitoes can transmit certain human diseases, deter tourism, and cause economic losses in cattle and other livestock.

Immature mosquitoes, or wrigglers, live in shallow water and feed on microorganisms.

The *Aedes* and *Culex/Culiseta* are two important types of mosquitoes in Colorado.

Larval management is the key to mosquito control.

Adult mosquitoes can be controlled with insecticide applications, but a community should agree on how to decide when treatments are necessary.

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Mosquitoes are a major insect pest problem in Colorado and may seriously deter outdoor activities and tourism. These insects cause economic losses in cattle and other livestock through blood loss, disease transmission and irritation. Mosquitoes also can transmit certain human diseases such as West Nile virus, Western Equine Encephalitis. The incidence of mosquito-transmitted disease in Colorado is closely monitored by public health agencies.

### Life History

Immature mosquitoes are worm-like larvae, known as wrigglers, that live in shallow water and feed mostly on microorganisms. They prefer areas protected from wave action by vegetation and floating objects. Irrigated pastures are a common mosquito habitat in Colorado. They rarely breed in moving water.

Only female adult mosquitoes feed on blood. Male mosquitoes feed on nectar and are not considered pests. Two important types of mosquitoes in Colorado are the *Aedes* and the *Culex/Culiseta*.

### *Aedes* Mosquitoes

Adult *Aedes* feed day and night. They can be extremely annoying but do not transmit any important human diseases in Colorado. *Aedes vexans* is a fierce biter commonly associated with irrigated areas in Colorado but is known to travel many miles to feed. Snowpool *Aedes*, which develop in temporary ponds that result from snow melt, often are serious pests in the high country.

*Aedes* wrigglers and pupae (Figure 1) are found in temporary standing water or flood water. The adults lay eggs on wet soil left by receding waters. Eggs hatch when water returns during flooding or irrigation. Young wrigglers grow rapidly and complete their development and begin biting seven to 10 days after a flood. Adults may feed for two weeks or more, which is a typical life span of an average adult mosquito.

At higher elevations, melting snow leaves small pools of water in the spring and early summer. Snowpool *Aedes* mosquitoes that have adapted to breed in snow-melt pools have one generation per year. Scattered and inaccessible breeding areas make control difficult. Snowpool mosquitoes can seriously affect recreational activities. At lower elevations, *Aedes* mosquitoes have several generations and occur throughout the warm months.

### *Culex/Culiseta* Mosquitoes

Mosquitoes in the *Culex/Culiseta* group feed only at night. The typical whining noise that mosquitoes are known for is made by the *Culex* mosquito. The *Culex tarsalis* and *Culex pipiens* mosquitoes transmit West Nile virus, Western Equine Encephalitis, and other diseases.

These mosquitoes pass the winter and other unfavorable periods as adults inside houses and other sheltered areas. In spring and summer, adults lay floating egg "rafts" on water (Figure 2). Wrigglers and pupae are found in permanent

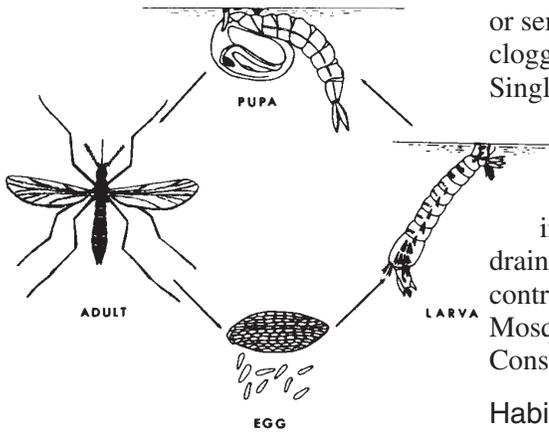


Figure 1: *Aedes* life cycle.

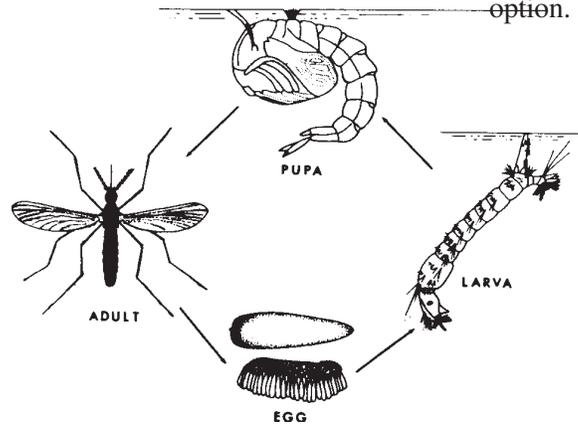


Figure 2: *Culex/Culiseta* life cycle.

or semipermanent standing water, which includes wading pools, bird baths and clogged gutters. Development from egg to adult usually takes 10 to 14 days. Single and multigeneration species occur in Colorado.

## Managing Mosquito Larvae

The key to mosquito control is larval management. Larvae occur in specific areas and can be controlled by modifying the habitat through drainage, or with insecticides applied to larval breeding sites. Treatments provide control before the biting adults appear and disperse from the breeding sites. Mosquito control measures must be cost effective and environmentally sound. Consider alternatives before application of conventional chemical insecticides.

### Habitat Modification

Eliminating breeding sites, or habitat modification, is an effective and long-term solution. Sites can be drained or removed. However, mosquitoes can breed in important wetlands, so habitat modification may not always be an option.

Irrigated agriculture is widespread in Colorado and irrigation systems can be sources of mosquitoes. Farm impoundments, seepage from irrigation pipe, standing water in control structures, irrigated pastures and clogged ditches are all potential mosquito breeding areas. To control mosquitoes on irrigated farms:

1. control seepage,
2. schedule water delivery to avoid excess watering,
3. reduce or eliminate vegetation and debris in ditches and other water containment structures, and
4. eliminate mosquito habitats in impoundments. Fill or drain water-holding areas, and fill or deepen shallow areas preferred by mosquito larvae.

### Natural Predators

Fish, dragonfly nymphs and diving beetles are natural predators of mosquito larvae, while dragonflies, birds and bats feed on adults. The mosquito-eating fish *Gambusia* (closely related to guppies) can be reared in large numbers and released in mosquito breeding sites. *Gambusia* feed on many kinds of insect larvae, but prefer wrigglers and other top feeders. Although *Gambusia* are not used extensively in Colorado, some strains can survive our climate and become effective long-term controls of mosquito larvae in some habitats. Mosquito fish have to be released annually in habitats that do not have year-round water. Consult the Colorado Division of Wildlife restrictions and regulations on *Gambusia* before using this mosquito control method.

### Insecticides

Microbial insecticides, especially the bacterial product known as Bti (*Bacillus thuringiensis israeliensis*), can be as effective as chemical insecticides. Bti is toxic only to mosquito and midge larvae. It is not hazardous to nontarget organisms but can reduce midge populations that serve as fish food.

“Soft” chemical insecticides, such as the insect growth regulator methoprene, are toxic only to insects and other arthropods. They are similar to certain insect hormones and create imbalances in the levels of hormones needed for proper mosquito growth and development. They do not directly harm fish or other wildlife but can reduce the amount of available food.

Mosquito larvae also can be controlled by the application of larvicidal oils or chemical insecticides to the water where they occur or are suspected to occur. Remember, several alternatives to conventional chemical larvicides have been developed because of concerns about applying chemicals to water that might be used for drinking or that contains fish and other aquatic life.

For more information visit:

[www.ext.colostate.edu/westnile/mosquito\\_mgt.html](http://www.ext.colostate.edu/westnile/mosquito_mgt.html)

[www.ext.colostate.edu/westnile/faq.html](http://www.ext.colostate.edu/westnile/faq.html)

## **Questions to Ask Before Applying Mosquito Insecticides**

### **What is the identity of the pest?**

*There are many insects that look like mosquitoes. Some mosquitoes do not feed on humans or transmit diseases. Different species have different larval habitats.*

### **When should the pesticide be applied?**

*Adulticide and larvicide applications should not be automatic. Establish treatment thresholds and make applications only after counts of adults or larvae exceed these thresholds. To count larvae, collect them in white dippers in which they can be easily seen. Adults can be monitored with special light traps.*

### **Where should the pesticide be applied?**

*Apply only to areas where mosquitoes are present. Target these areas by mapping breeding sites and adult resting sites.*

### **What pesticide should be used?**

*Several insecticides are registered for use against mosquito larvae. Each has advantages and drawbacks. There are also several insecticides registered for adult mosquitoes. Caution: Adulticides may not be registered for use on food crops. Applications in residential areas can result in illegal residues on produce from home gardens.*

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## **Managing Adult Mosquitoes**

If larval control fails, adult mosquito control may be necessary. Adult control generally is done with insecticide applications using ground equipment or aircraft. Mosquitoes are strong fliers, so adult control is most effective if it is done over a large area or on a community basis. Because of the environmental hazards associated with wide-area insecticide applications, it is important for the community to agree on the criteria used to decide when a treatment is necessary.

Some communities decide to spray when there is a threat of mosquito-transmitted disease. Others base their decisions on tourism considerations. Whatever the criteria, it is important to avoid routine spraying that does not take into account the amount of actual mosquito activity and the life cycle of the insect. This results in needless, expensive applications that may result in environmental contamination.

Although mosquitoes can be serious pests in Colorado, there are several effective means of controlling them in the community and around the home. Mosquito management is most effective when all available control measures are integrated into a community-wide mosquito management program.

## **Mosquito Management Around the Home**

- Eliminate standing water in low spots, ditches, gutters and similar areas.
- Empty weekly or remove things that collect rainwater (bird baths, old tires).
- Mosquito netting and tight screens can provide mosquito-free areas.
- Some mosquitoes are attracted to lights. Reduce unnecessary lighting to make yards less attractive.
- “Bug zappers” do not reduce mosquito landing or biting. They attract and kill many insects but few are mosquitoes that attack humans. Many of the insects killed are beneficial because they feed on garden pests.
- Ultrasonic devices, such as those that claim to mimic dragonflies, do not affect mosquito activity.
- Light-colored clothing is less attractive to adult mosquitoes. Tightly woven fabrics give some protection against biting.
- Citronella and “Avon Skin So Soft” can be used for short periods of relief. Some naphthalene products (such as “Mosquito Beater”) can be broadcast in yards for temporary relief from adult mosquitoes.
- Adult mosquitoes rest in shrubbery and other shaded areas during the day. These areas can be treated with approved insecticides. Foggers for flying insects can also be used, but will provide only short-term relief. Various aerosol insecticides are available for controlling mosquitoes indoors.

## **DEET**

DEET is considered the most effective mosquito repellent. There is concern about undesirable side effects on young children and others who might be unusually sensitive to this chemical. Side effects have been associated mostly with heavy use to avoid transmission of Lyme disease by ticks. The risk must be balanced against the benefits provided by its insect and tick repellency. The Environmental Protection Agency has issued precautions for DEET use:

- Apply only to exposed skin and clothing, not to skin under clothes.
- Avoid frequent reapplication or skin saturation.
- Do not apply to cuts, wounds or irritated skin.
- Keep away from eyes and mouth.
- Do not apply to hands of young children.
- For children, use products with concentrations less than 20 percent.
- Do not spray directly over face.
- Avoid breathing DEET aerosol sprays.
- Wash treated skin and clothing after returning indoors.