

Mosquito Control for Landscape Professionals

Culex, Aedes, Culiseta, Ochlerotatus, Anopheles, and others

Host/Site

Mosquitoes are not a plant pest but pose a health risk to gardeners and others who work outdoors, now that West Nile virus has been identified in Washington. West Nile virus is maintained in wild birds; mosquitoes can spread the virus from infected birds to people through bites. The majority of those bitten by a West Nile virus-infected mosquito will experience no symptoms (about 80%) or relatively mild illness (about 20%); only about 1 in 150 people get the more severe form of the disease. Mosquitoes may breed in ponds, birdbaths, buckets, old tires, crumpled plastic sheeting, or other sources of standing water. This fact sheet is intended to help the landscape industry reduce mosquito habitat and protect workers from potentially harmful bites.

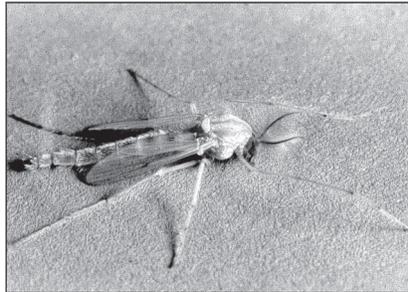
Identification/Appearance

Egg, larva, and pupa stages of most mosquito species are found on or near the surface of standing water. Identification of egg masses (rafts) requires a magnifying glass. The worm-like larvae (wigglers) go through several growth stages and can reach 1/2-inch in length before pupating; they are usually found just under the surface. Pupae (tumblers) are similar in appearance to larvae but are enlarged at one end and form a comma-shape. When looking for mosquito larva, remember that they will dive to the bottom if disturbed by movement or your shadow.

Adults are about 3/16 to 1/2 inch long and are sometimes confused with other insects that fly around the yard or are attracted to porch lights, such as fungus gnats, certain midges, and crane fly adults. None of these bite humans. Crane flies are much larger, and have no value as mosquito hunters. Gnats and midges (see photo) are similar in size to mosquitoes but lack the long proboscis for sucking blood.

Life Cycle

Mosquitoes pass through four stages: egg, larva, pupa, and adult. Females lay eggs on the surface of still water or on moist soil that periodically floods. Larvae and pupae develop in the water. The time from egg to adult is at least one to four weeks, depending on species,



Top: Landscape features such as birdbaths can breed mosquitoes if not emptied weekly. Photo by Mary Robson. Bottom: Chironomid midge is one of several insects that may be confused with mosquitoes. Photo courtesy Ken Gray Collection.

water temperature, and weather conditions. Mosquitoes are more active in warmer months, but in Western Washington they can remain dormant during winter. Adult females require blood meals before laying eggs, making them vectors for disease organisms such as West Nile virus. For most species, dusk and dawn are the most active periods when biting is most severe.

Natural Enemies

Mosquitoes are a food source for many species of fish, birds, bats, frogs, dragonflies, and other animals. Fish and bats in particular can be employed to control mosquitoes under certain circumstances (see Biological Controls).

Monitoring

Scouting for mosquito habitat is the most important monitoring practice. Look for the sources of standing water listed under Cultural/Physical controls and take appropriate actions to manage or eliminate them or suggest that clients do so. Presence of visible larvae in standing water indicates that action should be taken immediately. Observation of adult mosquito ac-

tivity or occurrence of bites indicates the need for appropriate protective clothing and perhaps chemical repellents. It may also mean that more attention should be directed to habitat management activities.

In Washington state, county health departments are monitoring West Nile virus by recording sightings of dead birds, especially crows, jays, ravens, magpies, hawks, and eagles. These birds are the most likely to die of West Nile virus infection. In King County, call Public Health at 206-205-4394 if you find a dead bird within the county. For more details, see the website at <http://www.metrokc.gov/health/westnile>.

Action Threshold

No action threshold is necessary for habitat control, which should be done to the extent possible in all residential landscapes. Mosquito control districts use thresholds to determine specific control actions, but these thresholds are not relevant for landscapers who will not be applying pesticides for mosquito control.

(continued/over)



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Cultural/Physical Controls

The most effective prevention and management activities are directed at breeding habitat in standing water. WSU Cooperative Extension's Bulletin PLS-121 (listed in references) suggests the following important strategies relevant to landscapes:

1. Remove standing water from construction puddles, seepage pools, lawn or landscaping depressions by drainage or filling with earth.
2. Check irrigation and drainage ditches for leaks or seepage and maintain free flow of water.
3. Grade newly developed land to prevent standing water.
4. Provide drainage away from premises for excess irrigation water, or collect in storage sump and reuse on land.
5. Manage weeds and excessive vegetation in areas where adult mosquitoes congregate (such as around small man-made bodies of water, ornamental pools, water retention ponds, lagoons, or reservoirs.)
6. Remove floating debris from ponds to reduce egg-laying sites.
7. Construct drainage holes on structures and containers that may trap water such as barrels.
8. Promote drainage of tires by drilling holes or by removal from site.
9. Recycle, destroy, flatten, or dispose of tin cans or any other artificial water containers.
10. Drain gutters and water from under homes.
11. Change water in bird baths, pet watering dishes, and livestock watering troughs once or twice a week. Stock ornamental pools with predacious fish.
12. Fill tree holes with sand or mortar, or develop drain holes so water cannot accumulate.
13. Pay particular attention to such gardening aids as sheets of discarded, crumpled polyethylene film or tarps.
14. Drain collected rainwater from pool tarps and hot tub/spa covers.

Also, fit rain barrels with mosquito-proof screening; dump water from watering cans, buckets, and wheelbarrows; watch for standing water in empty plant pots, saucers under pots, and water standing on the lids of compost bins or in equipment around potting sheds.

Biological Controls

Fish provide excellent mosquito control in ponds. In Washington state, contact the Department of Fish and Wildlife to find out if a permit is required for your pond. They will provide consultation, possibly inspect the pond, and provide a list of appropriate fish species, as well as a list of suppliers.

Bacillus thuringiensis israeliensis (B.t.i.) is available in several products for control of mosquito larvae. Two products (Mosquito Bits Quick Kill Mosquitoes™ and Summit Mosquito Dunks™) may be used for home garden mosquito control, but only if the water to be treated is fully contained and there is no possibility of flow to a natural water body or constructed drainage system. All other B.t.i. applications or products require both a commercial pesticide applicators license and a permit from the Department of Ecology. More information about permits is available at www.doh.was.gov/wnw or by calling the Washington Department of Health at 360-236-3364.

Chemical Controls

Chemical controls for mosquitoes are classified as either adulticides or larvacides. If chemical control is necessary, larvacides are preferred because they are less toxic and better target the pest. Methoprene is an insect growth regulator that prevents mosquitoes from maturing into adults. One Zodiac-brand product has been approved for home use in Washington. All other chemical controls, including oils, require the usual permits for aquatic applications. Adulticides are the last resort and are not recommended for home use. Commercial use of adulticides should only be made within a well-designed integrated pest management (IPM) program and then only as a last resort.

Mosquito repellents do not kill mosquitoes but keep them from biting. The most popular and effective products contain DEET. Higher DEET concentrations provide longer-lasting but not more complete protection. Products with 10-30% DEET should be adequate for most adults, depending on body chemistry and the type of outdoor activity. Products with greater than 30% DEET do not provide much added benefit. Non-DEET products will need to be applied more often. One that has been shown to be effective in tests is Bite Blocker.™

References

- Antonelli, A., T Murray, and C Daniels. Pest management for prevention and control of mosquitoes with special attention to West Nile Virus. WSU Cooperative Extension-Puyallup. PLS-121, February 2003. <http://pep.wsu.edu/pdf/pls121mosquito.pdf>
- Washington State Department of Ecology. Best management practices for mosquito control. Draft for public review, January 22, 2003.
- Centers for Disease Control and Prevention (CDC), West Nile Virus Home Page. <http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>
- Washington State Department of Health, West Nile Virus Web Site. <http://www.doh.wa.gov/ehp/ts/Zoo/WNV/WNV.html>
- Article on mosquitoes and repellants from the Annals of Internal Medicine. <http://www.acponline.org/journals/annals/01jun98/mosquito.htm#Note94>
- Chart comparing effectiveness of various repellants from the New England Journal of Medicine, posted by Texas Cooperative Extension. <http://bexar-tx.tamu.edu/IPM/Landscape/F2/InsectRepellents.htm>