

National Pest Alert

West Nile Virus in North America

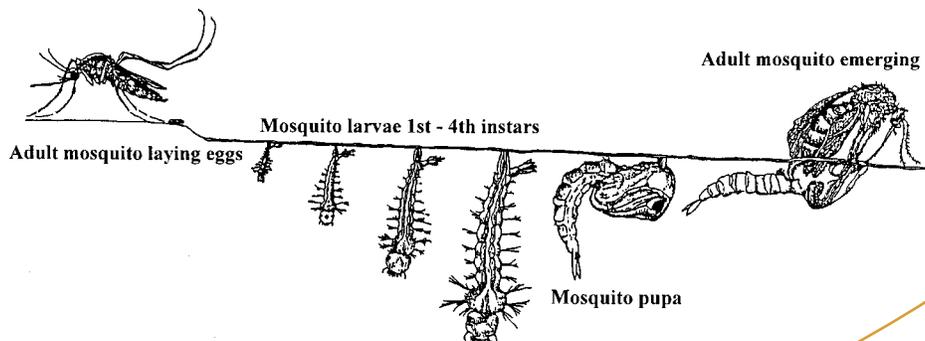
West Nile encephalitis, a mosquito-transmitted disease, was first documented in North America during the summer of 1999, when an outbreak occurred in New York City. Since that time, cases of West Nile virus (WNV) infection have been confirmed in northeastern, north central, and southern regions of the United States, and the virus is expected to spread throughout North America. As of December, 2001, there were 149 confirmed human cases of WNV, including 18 fatalities.

Of 738 cases of clinical WNV infection reported in horses (from 130 counties in 20 states), 651 cases were verified through diagnostic testing at the National Veterinary Services Laboratories of the U.S. Department of Agriculture—Animal and Plant Health Inspection Service, and 156 horses have died or were euthanized. An equine vaccine is available in some states through licensed veterinarians.

The strain of WNV circulating in the United States causes significant mortality in exotic and native bird species, especially in the American crow (*Corvus brachyrhynchos*). Dead birds serve as an early warning that the virus may be active in your area, and these deaths should be reported to your local health department.

Origin of WNV

WNV was first isolated in 1937 in the West Nile province of Uganda, Africa, and can adversely affect humans, birds, and other animals in Africa, eastern Europe, western Asia, and the Middle East. Epidemics have occurred in Africa, Europe, and the Middle East, most recently in Israel during 2000.



Virus Transmission

WNV is transmitted by infected mosquitoes, primarily *Culex*, *Aedes*, and *Ochlerotatus* spp. *C. pipiens*, the northern house mosquito, is a common household mosquito and the primary vector of WNV. Mosquitoes become infected after biting infected wild birds that serve as the primary host of the virus. The virus undergoes a reproductive cycle inside the mosquito, in which it must pass through the midgut wall, multiply in many tissues, and accumulate in the salivary glands of the mosquito. Mosquitoes salivate every time they bite, and they are capable of transmitting the virus 10 to 14 days after feeding on an infected bird, so bites after that time are infectious.

Mosquito Life Cycle

Mosquitoes are classified into the order Diptera (true flies) and have four distinct life stages (egg, larva, pupa, and adult). Female mosquitoes lay their eggs on water or moist substrates such as soil and the interior walls of treeholes, cans, and old tires that are likely to be flooded by water. Most larvae hatch within 48 hours and the larvae and pupae live in water. The adult mosquito emerges from the pupal case and rests on the water's surface until its body dries and its exoskeleton hardens. Female mosquitoes require a blood meal before they can lay eggs, so only female mosquitoes bite. They bite every few days during their entire adult lives, which may last several weeks.



Mosquito Prevention and Control

Homeowners can most effectively reduce the number of mosquitoes around their homes and neighborhoods by eliminating the standing water in which mosquitoes grow and breed.

- Dispose of any refuse that can hold water, such as tin cans, containers, and in particular, used tires. Tires have become the most important mosquito-breeding sites in the country.
- Drill holes in the bottoms of recycling containers and check uncovered junk piles.
- Clean clogged roof gutters every year, and check storm drains, leaky outdoor faucets, and window wells.
- Empty accumulated water from wheelbarrows, boats, cargo trailers, pet dishes, toys, and ceramic pots. If possible, turn these items over when not in use.
- Do not allow water to stagnate in birdbaths, ornamental pools, water gardens, and swimming pools or their covers. Ornamental pools can be aerated or stocked with fish. Swimming pools should be cleaned and chlorinated when not in use.
- Alter the landscape of your property to eliminate standing water. *Keep in mind that during warm weather, mosquitoes can breed in any puddle of water.*
- Larvicides are highly effective in controlling immature mosquitoes and should be considered when standing water cannot be eliminated.



Male (left) and female (right) Culex mosquitoes.

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Protect Yourself from Bites

Even though your property may lack mosquito-breeding sites, mosquitoes can travel 2 to 3 miles from their breeding site in search of a blood meal. Therefore, it may be necessary to supplement larval control with other control measures directed at adult mosquitoes. The following tips can help to reduce your risk of being bitten by a mosquito:

- Make sure window and door screens are “bug tight.”
- Use the proper type of light outside: incandescent lights attract mosquitoes, whereas fluorescent lights neither attract nor repel mosquitoes.
- Stay indoors at dawn, dusk, and in the early evening when mosquitoes are most active. If you must go outdoors, wear a long-sleeved shirt and long pants.
- Insect repellents when applied (sparingly) to exposed skin deter mosquitoes from biting. Spray thin clothing with repellent

because mosquitoes can bite through thin clothing. The American Academy of Pediatrics recommends that repellents used on children contain no more than 10 percent DEET, the active ingredient in mosquito repellents. Be sure to follow all directions on product labels.

Symptoms of West Nile Encephalitis

Most humans infected with WNV have no symptoms. A small percentage of individuals infected develop mild symptoms that include fever, headaches, body aches, swollen lymph glands, and a body rash. Encephalitis develops in less than 1 percent of infected people, with severe symptoms that include headache, high fever, neck stiffness, disorientation, tremors, convulsions, paralysis, and coma. If you experience these symptoms, contact a physician or hospital immediately. Occasionally, death can occur. The elderly are most at risk of death due to encephalitis.

The U.S. Geological Survey and the Centers for Disease Control and Prevention are tracking the distribution of the virus in birds, mosquitoes, humans, and other animals. State health departments and university extension personnel may have mosquito control and WNV detection programs for your state.



Used tires provide ideal mosquito breeding sites.

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For more information about WNV, mosquito control recommendations, and state resources visit our Web site at <http://www.ncpmc.org/NewsAlerts/westnilevirus.html>.

This publication was produced and distributed in cooperation with the USDA CSREES Regional Integrated Pest Management Program and the Pest Management Centers. For more information regarding the development of this document, please contact Susan T. Ratcliffe at sratclif@uiuc.edu or by phone at (217) 333-9656.

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