

WEST NILE VIRUS AND YOUR COMMUNITY

A FACTSHEET FROM MIDWEST PESTICIDE ACTION CENTER



Midwest Pesticide Action Center advocates the use of the most effective, least toxic methods to reduce the risks to humans of mosquito borne illness.

Integrated Pest Management

Integrated Pest Management (IPM) is a proven method of pest control that emphasizes simple, inexpensive prevention practices that cause the least harm to people and the environment. For mos-

quitoes, this involves **eliminating breeding areas** and **reducing their contact with people**. Ecological approaches can also be used to reduce mosquito populations, (i.e. attracting mosquito predators with native plants and using mosquito eating fish).

Remaining **breeding sites are treated** with the least toxic pesticides targeted at killing mosquito larvae (*larvaciding*).

Resident and community cooperation is essential to making an IPM program work. In Illinois, most mosquito management is handled either by municipalities or by **Mosquito Abatement Districts (MADs)**. To find out who treats your area, call your city or township office.

What is West Nile Virus?

West Nile Virus (WNV) is a mosquito-borne infection that can cause West Nile encephalitis (inflammation of the brain). Mosquitoes get the infection by biting infected birds. People are infected by the bite of an infected mosquito. WNV was first detected in the United States in 1999 and Chicago saw its first human cases of WNV in 2002.

Did You Know?

- › Children and adults with respiratory problems, such as asthma, are particularly vulnerable to pesticides.
- › Children have a 50% higher incidence of leukemia if their mothers are exposed to pesticides in the home up to three months before a pregnancy, during or after it.



Common pesticides pose potential threats to human and environmental health.

- › Children under age two have 10 times the adult risk of developing cancer after pesticides and other chemical exposure; ages 3-15 have triple the risk.

- › Children have a greater risk of developing asthma by age five after pesticide exposure within the first year of life. Chicago has one of the highest national death rates from asthma.

Why Not Spray?

According to the U.S. Centers for Disease Control and Prevention, and the American Mosquito Control Association, the airborne spraying of pesticides to kill adult mosquitoes (*adulticiding*) should only be used as a **last resort**. Adulticiding is expensive, less effective, and can be harmful to both human health and the environment.

Adulticiding usually consists of spraying or fogging a pesticide from a truck or plane. The pesticide only kills those insects flying in the spray. Mosquitoes behind buildings and under vegetation or other cover are not affected. However, pesticide residues are left behind on items left outdoors, such as children's toys and furniture - and may be tracked inside on shoes. Since adulticiding also kills insects that eat mosquitoes, it may be even less effective in the long term.

Mosquito Management Products

Below are the common products and methods used to reduce mosquitoes in a community. Urge your town or Mosquito Abatement District to use the less hazardous products at the top of the list. Mosquitoes can develop resistance to chemical pesticides, so preventative measures can help ensure that these chemicals will work when we need them.



ENCOURAGE PREDATORS

Native plantings, such as prairie grass and flowers, will attract predators that are looking to feed on insects. Residents can encourage these predators, such as birds or dragonflies, by landscaping their home with native plants. Putting up birdhouses or birdfeeders will also attract predatory birds. A dragonfly can eat up to 100 mosquitoes for one meal!

LESS HAZARDOUS

LARVICIDES

Larviciding is the use of chemical or biological controls to eliminate mosquito larvae before they hatch into adults.

Bacteria, such as B.t.i. (*Bacillus thuringiensis israeliensis*) is a strain of bacteria that kills mosquito larvae by damaging the gut wall. It is generally considered the least hazardous pesticide to use because it is fairly selective for these water-breeding insects, and it can be applied in a much more targeted fashion than adulticide sprays. However, B.t.i. can irritate the skin and eyes, and people with impaired immune systems may be affected. Inert ingredients in B.t.i. formulations may also be hazardous. (Swadener, 1994)

Insect growth regulators, such as “Altosid” (active ingredient methoprene) is one commonly used product that works by preventing insects from developing into adults. Insect growth regulators are considered less hazardous than adulticides because they have fairly selective action in insect growth. However, methoprene can harm beneficial insects, including those that prey on mosquitoes and has been linked to the widespread incidence of frog deformities (Montague, 1998), raising serious questions about how selective its toxicity actually is.

PESTICIDES

Adulticiding is the spraying of pesticides to kill the short-lived adult mosquito population. Pesticides used for adulticiding can harm beneficial insects, birds, fish, toads, and bats, all of which serve as natural controls for mosquitoes. This is the most expensive, least effective method of mosquito control and should only be used as a last resort.

Synthetic pyrethroids, such as resmethrin or permethrin act on the nerve cells by disrupting the transmission of impulses down the cell. They are considered less toxic than organophosphates because they are more readily broken down in the human body. They are acutely toxic to fish and other beneficial aquatic insects. Additionally, “inert” ingredients in some pyrethroid formulations are known or suspected carcinogens. (Mueller-Beilschmidt, 1990)

Organophosphates such as chlorpyrifos or malathion, are often used in truck spraying applications. These compounds interfere with the breakdown of the chemical acetylcholinesterase that transports messages from one nerve cell to another. Organophosphates are acutely toxic to vertebrates although they break down within a few months. Little is known about the neurological effects of long-term, low-dose, repeated exposure (The Pesticides Trust, 1996), but it may result in cumulative poisoning and may effect neurodevelopment and growth in children. (Eskenazi, Bradman, and Castorina, 1999)

MORE HAZARDOUS

What If I Don't Want My House to Be Sprayed or Fogged?

Your options depend on what community you live in. In Illinois, there is no state law that requires notification or that gives individuals or municipalities the right to be exempt from pesticide spraying. Some towns will not spray around your home if you request that it be skipped. Other towns are reluctant to do this, because it complicates logistics or because they're concerned that unsprayed areas will harbor mosquitoes. Call your town or Mosquito Abatement District and ask if they have a program for "*delisting*" residents who do not want their property sprayed.

Some towns will allow residents to *register for notice*, which means they will call you when they are going to spray or fog. During the application, you can shut your windows, bring in the children's toys, and keep your children and pets inside to reduce exposure. Request enough notice so that you have time to take these steps.



What Individuals Can Do

Managing mosquitoes around the home is essential to a good IPM program, and can greatly reduce the need for pesticide applications. You can also become involved by encouraging your town or mosquito abatement district to put more effort into monitoring, eliminating breeding sites, larvaciding, and educating residents to reduce adulticiding. Below you will find a list of some additional things you can do that will reduce the mosquito population.

1 Eliminate standing water where mosquitoes may be breeding.

Areas to check include:

- › Flat roofs, such as car ports, without adequate drainage
- › Clogged gutters (periodically clean)
- › Leaky faucets
- › Hollow tree stump or tree rot hole
- › Trash and discarded debris
- › Pool covers, neglected swimming pools, hot tub, or children's wading pool
- › Birdbaths (clean weekly), ornamental ponds (stock with fish)
- › Toys, garden equipment, plant pots, buckets, water barrels (cover with fine-meshed screen), or other containers that can hold water
- › Pet bowls (change daily)
- › Uncovered boat or boat cover that collects water
- › Tire swings (drill hole in the bottom)

Life Cycle of the Culex Mosquito

In the United States West Nile Virus is primarily associated with the Culex mosquitoes. Only female mosquitoes take blood meals. Adult females may live 2-4 weeks or more, depending on climate, species, predation, and a host of other factors. Like other insects, mosquitoes are cold blooded. They are most active at 80°F, become lethargic at 60°F, and can't function below 50°F.

All mosquitoes go through a complicated life cycle called "complete metamorphosis" which consists of four distinct stages: egg, larva, pupa, and adult. The length of time that each stage lasts depends on a number of variables with temperature having the greatest impact.

Eggs are laid in "rafts" on standing bodies of water. The eggs require one to two days in water before hatching into larvae.

Larvae or wigglers, molt three times during ten to twelve days before pupating.

Pupae or tumblers metamorphose over one to two days into adults.

Adults emerge from their pupal cases approximately twelve to sixteen days after laid as eggs.

After mating, the female requires a blood meal in order to produce over 250 eggs. It takes her three to four days to digest blood and produce eggs. Females transmit diseases when they live long enough to spread infection from the first blood meal victim to the second blood meal victim. Only a very small percentage of females live this long. Culex mosquitoes are generally weak fliers and don't move far from their larval habitat, although they have been known to fly up to two miles.

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2 Encourage natural predators such as birds by putting up bird houses or feeders and landscaping with native plants.

3 Prevent Contact with Mosquitoes

- › Make sure screens and weather stripping are providing a good seal.
- › Use yellow, non-attractive light bulbs at entrances or around buildings.

4 Prevent Mosquito Bites

- › Wear light-colored clothing when outdoors at dusk in the summer time (mosquitoes are naturally attracted to dark-colored animals).
- › Apply natural repellent such as citronella or eucalyptus oil. There are many effective alternatives to DEET.
- › If you choose to use commercial repellent containing DEET, be aware that it may be hazardous to human health - especially children's health. Avoid applying it directly to skin, and use a formula containing 6% or less for children. Do not apply DEET to your face and wash hands after application.

Resources

Products for home-owner mosquito IPM are available from:

Gardens Alive!

<http://www.gardensalive.com>
812/537-8650

The Natural Gardener

<http://www.naturalgardeneraustin.com>
800/320-0724

Natural Insect Control

<http://www.natural-insect-control.com>
905/382-2904

BioControl Network

<http://www.biconet.com>

Gardener's Supply Company

<http://www.gardeners.com>
888/833-1412



References

Chicago Department of Public Health

Eskenazi, B., Bradman, A., and Castorina R. 1999. Exposures to children to organophosphate pesticides and their potential adverse health effects. *Env. Health Perspectives* 107, Supp. 3: 409-419.

EXTOXNET. 1999. Fact sheets on individual pesticides prepared for the Extension Toxicology Network, available from Oregon State University Extension Service, <http://ace.orst.edu/info/extoxnet>.

Floore, Tom. 2002 "Mosquito Information," American Mosquito Control Association. www.mosquito.org

League of Women Voters. 1996. Improving mosquito management. Lake Michigan Interleague Group Information Guide 1 (Revised).

Lumpkin, J. R. 1992. Arboviral encephalitis. *Healthbeat*, Illinois Dept. Pub. Health, August.

Metcalf, R. L. 1988. Personal communication.

Montague, P. 1998. Another pesticide surprise. *Rachel's Env. and Health Weekly* 623.

Mueller-Beilschmidt, D. 1990. Toxicology and environmental fate of synthetic pyrethroids. *J. of Pesticide Reform* 10 (3).

Olkowski, W., Daar, S., Olkowski, H. 1994. *Common Sense Pest Control*. Taunton Press, Newton, MA.

The Pasco County Mosquito Control District. Mosquito Life History. www.Pasco-mosquito.org/life_history.htm

Quarles, William. 2001 "Sprays for Adult Mosquitoes-A Failed Technology?" *Common Sense Pest Control* 17 (2) Berkeley, CA.

Rutgers Entomology, 2001 "FAQ's on Mosquitoes" www.rci.rutgers.edu/insects/mosfaq.htm

Swadener, C. 1994. *Bacillus thuringiensis* (B.t.). *J. of Pesticide Reform* 14 (3): 13-20.

The Pesticides Trust. 1996. Organophosphate insecticides fact sheet. *Pesticides News* 34.

Beyond Pesticides

<http://www.beyondpesticides.org>

Centers for Disease Control

<http://www.cdc.gov>

A dragonfly can eat up to 100 mosquitoes for one meal!

For more information contact: **Midwest Pesticide Action Center**, Chicago, Illinois Tel: 773/878-7378

Web: www.midwestpesticideaction.org