

# Managing West Nile Virus Safely

## Communities choose safer, more effective prevention approaches

The **City of Fort Worth and Tarrant County Texas** (pop. 1,620,479) have taken a strong stand against “adulticiding,” spraying pesticides to kill adult mosquitoes. The policy, enacted in 1991, is described as a “let’s do-it-together plan,” with several reasons justifying their anti-adulticiding stance.

*“First, spraying chemicals in its streets will not rid the city of mosquitoes. The chemical must make contact with the insect to kill it, making it difficult to destroy mosquitoes hiding in grass, bushes, trees or backyards. Moreover, the chemicals have no residual effects and do nothing to kill mosquito larva thriving in stagnant water. Second, spraying for mosquitoes may give residents a false sense of security. The risk of someone being infected with West Nile might then increase if fewer people decide not to use insect repellents before working or playing outdoors. Third, adding harmful chemicals to the environment can have unwanted secondary effects to both air and water. Lastly, thousands of Fort Worth residents living with respiratory problems, such as asthma, would be in danger of an onset of symptoms.*

*Until such time when the pros of spraying outweigh the cons, Fort Worth and Tarrant County will continue to promote the importance of the residents’ role in preventing mosquitoes at their source—stagnant water—and in protecting themselves from mosquitoes by wearing appropriate clothing and insect repellent outdoors.”* (Policy adopted in 1991 as posted on the city’s website.)

Control of mosquitoes is generally most efficiently accomplished by eliminating mosquitoes in the immature stages, larval and pupae, not in the flying adult stage. “Ground spraying with ultra low volume (ULV) sprays is a waste of money,” says noted entomologist and Cornell University professor David Pimentel, PhD, “Most ground spraying is political and has very little to do with effective mosquito control.” Further, scientific studies link the pesticides used to combat adult mosquitoes to effects on the central nervous, cardiovascular and respiratory systems and long-term health effects such as cancer and disruption of the endocrine (hormonal) system, even at very low doses.

### Managing mosquito habitat

A more sensible, integrated pest management (IPM) approach starts with source reduction, altering or eliminating the mosquito larval habitat and breeding grounds (stagnant water.) This involves community sanitation and standing water management - tire removal, de-snagging waterways, catch basin cleaning, and container removal. In a sound IPM program, the focus shifts to larviciding only when source reduction is not feasible.

### Focus on larval stage

The Fort Worth and Tarrant County health departments conduct surveillance for mosquito-borne illnesses and breeding

sites. They focus control measures on public education and larviciding with the biological pesticides *Bacillus thuringiensis israelensis* (Bti) and *Bacillus sphaericus* (B. sphaericus), bacterial spores which are ingested by the larvae, causing rupturing of the larval gut. They also release gambusia fish (mosquito-eating fish native to Texas) for larval control.

### Localities minimize community spraying

After reviewing the potential effectiveness of spraying as well as weighing the risks of the virus with the risks of pesticide exposure, the **City of Lyndhurst, Ohio** (pop. 14,600), a suburb of Cleveland, passed an ordinance in July 2003 prohibiting **Cuyahoga County** from spraying adulticide in its city to control the spread of West Nile virus (WNV). Today, Cuyahoga County also focuses its countywide efforts on larviciding.

According to Joe Lynch, vector control agent for Cuyahoga County, they do surveillance and larviciding for the entire county and would resort to adulticiding only under the thresholds for WNV infected mosquito pools, birds or humans established by the State of Ohio and Centers for Disease Control (CDC). The county is also working on better notification plans to alert the public to a spray event. In Shaker Heights, Ohio, also part of Cuyahoga County, the prevention program, based on breeding site elimination and larviciding, successfully decreased the number of mosquitoes from 128 per trap in 2001 to an average of six mosquitoes per trap in 2002.

**Cincinnati** and the surrounding **County of Hamilton, Ohio** (pop. 806,652) also do not spray adulticides and rely heavily on surveillance. The Hamilton County General Health District traps mosquitoes and sends them to the Ohio Department of Health for testing. Once a positive pool of mosquitoes is identified, Health District staff canvas a half-mile radius near where the mosquitoes were collected, look for areas of standing water, apply mosquito larvicide dunks where needed, make sure swimming pools are operating properly, and advise residents on precautions they can take to avoid bites.

In **Charlotte, Mecklenburg County, North Carolina** (pop. 796,372), where containers in urban areas are identified as the most common cause for mosquito problems, the County restricts spraying of pesticides, citing a number of reasons. “One reason is that “fogging” does not control emerging mosquito populations as effectively as larviciding. Adulticiding only works against adult mosquitoes and once the next generation hatches, the problem returns, sometimes as soon as a few days after “fogging.” A second reason is that in highly urbanized settings, adulticiding is most effective by aerial application (at a cost of \$750,000) which the county is not equipped to provide. There are also concerns with killing non-target insects and human pesticide sensitivity.”

According to Bob Lee, Director of Weed and Pest and Vector Control Program for **Cheyenne, Wyoming** (pop. 54,374), 98%

of the program efforts are focused on larviciding with a mix of Bti and *B.sphaericus* through aerial and ground spraying at an effective cost of \$6/acre per air, and \$2-3.50 by land applications. His department has an aggressive mosquito surveillance program before and after the applications, and they work in cooperation with Cheyenne and State Health Department, which deliver community education materials.

“When we find West Nile present in mosquito pools here in **Washington, D.C.**,” says Peggy Keller, Chief of the Bureau

of Community Hygiene and Animal Disease Prevention in the District of Columbia Department of Health, “We don’t spray. We’ve learned that the best way to protect the public from both the virus and the pesticides is to intensify our larviciding program and distribute outreach and education information that emphasizes prevention and protection techniques to the public in the surrounding area.”

For a chart on common mosquito control pesticides see [www.beyondpesticides.org/mosquito](http://www.beyondpesticides.org/mosquito) or contact Beyond Pesticides.

## Mosquito Madness: How to repel mosquitoes safely

With summer here, and the bugs out in full force, along with some very itchy arms and legs, thoughts turn to mosquitoes—and how to avoid them. The first step in avoiding mosquitoes is prevention. Remove any standing water where mosquitoes can breed around the home and the schoolyard, such as plant pots, leaky hoses, empty buckets, toys, and old tires.

The best way to avoid mosquitoes, especially in the evening when they are most active, is to wear long pants and long sleeves. Burning citronella candles outside also helps repel mosquitoes. Since these two options are not always possible, mosquito sprays can sometimes be a good alternative. Many common mosquito sprays can contain toxic ingredients, however, so it is important to consider all of the options and read labels carefully before buying or spraying the repellents.

### Some least-toxic mosquito sprays include:

- **Oil of Lemon Eucalyptus:** The Centers for Disease Control (CDC) recommends lemon eucalyptus oil repellents as a good alternative to DEET. The scented oil of lemon eucalyptus masks both carbon dioxide and lactic acid exhalations that alert mosquitoes to our presence, essentially hiding humans from detection. According to CDC, this plant-based mosquito repellent provides protection time similar to low concentration DEET products. (Repel Lemon Eucalyptus Insect Repellent-[www.repel.com](http://www.repel.com)).
- **Essential oils:** Pesticides made with essential oils are derived from plants that are known to have insecticidal properties. Some essential oils used in repellents include Cedarwood, Soybean Oil ([www.biteblocker.com](http://www.biteblocker.com)), and **Geraniol** (MosquitoGuard – [www.wildroots.com](http://www.wildroots.com), Bite Stop – [www.bitestop.com](http://www.bitestop.com), Bugband – [www.bugband.net](http://www.bugband.net)). When compared with products like Citronella, Geraniol proved to be 100% more effective. Against products containing 10% Deet, Geraniol proved to be more effective.
- **Citronella sprays:** The same ingredient in candles that repels mosquitoes also is in some mosquito sprays, including the repellent Natrapel ([www.tendercorp.com](http://www.tendercorp.com)).

- **Picaridin** (KBR 3023), derived from pepper, is a newly registered repellent that CDC claims provides comparable protection to DEET products with similar concentrations (Cutter Advanced – [www.cutterinsectrepellent.com/](http://www.cutterinsectrepellent.com/)). The limited data available on this product suggests that it has low potential for toxicity.
- Some repellents include many of these ingredients, including: Quantum Buzz Away Mosquito Repellent ([www.quantumhealth.com](http://www.quantumhealth.com)), All Terrain (<http://www.allterrainco.com/>), Avon Skin-So-Soft, and Herbal Armour.

With all these repellents, be sure to reapply often (following the directions on the label) to repel the mosquitoes most effectively.

### Be sure to avoid:

- **Pesticide-impregnated clothing**, such as Buzz Off clothing, which is impregnated with the synthetic pyrethroid permethrin. Permethrin is a possible carcinogen and a suspected endocrine disruptor. Endocrine disruptors interfere with normal hormone function and can contribute to breast and testicular cancer, birth defects, learning disorders, and other problems. Animal studies also indicate that small amounts of permethrin may cause immunotoxicity, or corruption of the immune system.
- **Products containing DEET**, which is quickly absorbed through the skin and has caused effects including severe skin reactions including large blisters and burning sensations. Laboratory studies have found that DEET can cause neurological damage, including brain damage in children. EPA requires that child safety claims be removed from all end-use product labels, as they are misleading. DEET labels must inform users of precautions that are realistically impossible to follow, including: (i) not applying the product near children’s hands or face, over cuts, wounds and irritated skin; and (ii) thoroughly washing all treated skin with soap and water after returning indoors.