



Back to the Future

Communities are doused with pesticides in response to West Nile Virus outbreak

Jay Feldman and Nichelle Harriott

The raining down of pesticides has taken communities across the U.S. by storm. While these programs no longer use DDT, this type of blanket spraying with hazardous pesticides and its associated adverse effects on the public's health and the environment were decried 50 years ago this year in the publication of *Silent Spring* by Rachel Carson. And, so, we return to pest control approaches that have a proven track record of failure from an efficacy, public health, and environmental protection perspective. As of August, the Centers for Disease Control and Prevention (CDC) recorded 87 deaths and 1,993 cases of illness from West Nile virus (WNV) and urged communities to bring out the sprays. Dozens of communities across the U.S. have now doused their communities, while proclaiming the safety of their methods. However, the spray tactics, with ground and air assaults, has been called into question by health advocates and researchers who have studied the most effective and protective means of preventing the transmission of the virus.

The public health concern is that widespread spraying for adult mosquitoes (adulticiding) is not the most effective control method, and it introduces additional short- and long-term public health hazards on top of those posed by West Nile virus. Many experts believe that those people most vulnerable to the effects of West Nile virus and those with elevated risk factors for pesticide poisoning are one in the same. Because the pesticides that are being used in these spray programs, typically synthetic pyrethroids with a synergist like piperonyl butoxide (PBO), are nervous system and respiratory poisons associated with endocrine disrupting effects and, in some cases cancer, people with asthma, nervous and immune system illness, and other pre-existing conditions are at highest risk from exposure. Highly neurotoxic organophosphate pesticides are being used in some communities, despite having been taken off the market for most residential uses.

Despite the science on pesticides and the misleading information that officials often distribute in their communities, and the lack of spray program efficacy, the City of Dallas (Texas) posted on its website the following: "Aerial spraying is a very effective and safe way to kill adult mosquitoes in large, densely populated areas." After discounting health effects, the announcement goes on to indicate "for people concerned about exposure during aerial spraying" a number a precautionary steps that can be taken. These steps include ways to minimize exposure, but imply that there is no reason to be concerned or take precautionary action.

It is understandable that local, state, and federal officials want to act decisively, but that does not mean that the widespread use of hazardous pesticides is the best course of action. Communities that are most successful and smart about mosquito control engage in aggressive efforts to reduce and eliminate mosquito breeding areas in standing water around homes and buildings and throughout the community. Mosquito breeding can take place in stagnant water, from very small to larger pools –bottle caps, discarded automobile tires, planters, containers, rain gutters, drains, or under piles of leaves.

According to experts, the threat of WNV is best managed through an integrated program that does not expose vulnerable populations to pesticides, including children, pregnant women, the elderly and people with compromised immune or nervous systems. The most effective program to protect the public from WNV focuses on removing breeding areas, stopping mosquitoes at the larval stage, and mass public education on prevention and precaution. These preventive programs should be in place as standard practices at the community level, whether managing nuisance mosquitoes or those carrying and insect-borne disease. However, many communities instead have often neglected this public health re-

Avoid the Bite Least-Toxic Mosquito Repellents are Available and Safer to Use

Oil of Lemon Eucalyptus– CDC recommends oil of lemon eucalyptus repellents as a good alternative to DEET, which is highly toxic. This plant-based repellent provides protection similar to low concentration DEET products

Essential Oils– Garlic oil, cedar oil, neem oil and geranium are some least-toxic botanical pesticides that have some repellency action against insects. Others that can also be used are citrus oils, mint oil, pine oil, pepper extracts, and herbal extracts.

Citronella– The same ingredient in the candles that repels mosquitoes is also in some mosquito sprays

Picaridin– Derived from pepper, this is a repellent that CDC says provides comparable protection as DEET products with similar concentrations.

Products with these ingredients can be found in most health food stores and many retail outlets

sponsibility and then try to respond to crisis outbreaks of illness with relatively ineffective adulticiding spray programs.

How to Protect Yourself and Your Community
 With the rising concern about West Nile virus this year, important steps can be taken by your community for mosquito management without poisoning people and the environment that sustains us. Convincing community decision makers to adopt the best public health strategy requires a high degree of public involvement that cuts across the community, from residents, medical practitioners, scientists, to elected officials. Decision makers have to understand the range of issues associated with the most effective action and the most protective if the residents' health. To provide the basic background information that supports action, Beyond Pesticides has produced *Public Health Mosquito Management Strategy for Decision Makers and Communities* and a specific webpage to inform an effective course of action, www.beyondpesticides.org/mosquito/index.htm.

Below we summarize the key elements of moving forward with effective and protective programs.

An Effective Community-Based Approach
 Starting with a sound, cost-effective community mosquito man-

agement plan and program is critical to protecting people from WNV and pesticides.

Many states have mosquito control districts that are tasked with monitoring and controlling mosquito populations come the summer months. From the months of May through September, it is often common to see trucks and low flying aircraft fogging and spraying in areas prone to mosquitoes. These chemicals, which target adult flying mosquitoes, include pyrethroids like permethrin and resmethrin, and organophosphates like naled and malathion, and synergists like piperonyl butoxide. [See box below]

Why is aerial spraying and fogging of pesticides not effective? The frequency of pesticide applications required for aerial/fogging applications to be effective, combined with the public health risk caused as a result of these applications makes aerial mosquito spraying campaigns among the least effective strategies both in terms of cost and public safety. According to Cornell University entomologist David Pimentel, PhD, it is estimated that less than 0.0001% of the pesticide applied actually reaches the target mosquito. A study from the Harvard School of Public Health found that aerosol plumes fail to contact the target mosquitoes, and concludes that such insecticidal aerosols may not effectively reduce mosquito populations and the potential for disease transmis-

Commonly Used Mosquito Pesticides

Chemical	Type	Neurotoxic	Skin Sensitizer	Environmental Contaminant	Wildlife Effects	Cancer	Endocrine Disruption	Reproductive/Developmental Effects
<i>Bacillus thuringiensis israelensis</i> (Bti)	Bacterial larvicide				X☠			
Permethrin	Synthetic pyrethroid	X☠	X☠	X☠	X☠	X☠	X☠	X☠
Piperonyl Butoxide (PBO)	Synergist	X☠	X☠		X☠	X☠	X☠	X☠
Sumithrin/Phenothrin	Synthetic pyrethroid	X☠					X☠	
Resmethrin	Synthetic pyrethroid				X☠		X☠	X☠
Malathion	Organophosphate	X☠	X☠	X☠	X☠	X☠	X☠	X☠
Naled	Organophosphate	X☠	X☠	X☠	X☠			

Synthetic pyrethroids are neurotoxins, have irritant and/or sensitizing properties, and are linked to endocrine disruption. They are extremely toxic to aquatic organisms, moderately toxic to birds, Piperonyl butoxide (PBO) is one of the most commonly used synergist added to pesticide products to increase the potency. PBO is highly toxic, weakens the immune system, adversely affects reproductive function, causes liver and kidney damage and is a possible human carcinogen. PBO is relatively short-lived in the environment.

Organophosphate pesticides are nerve poisons, affect neurodevelopment, weaken the immune system, impair respiratory function, and are associated with increased risk of leukemia.

sion. This means that the vast majority of the chemical is allowed to enter the air and environment to trigger asthma responses, rashes, headaches, nausea, and neurological effects in the communities where spraying is the norm, in addition to contaminating water supplies and endangering non-target insects such as pollinators, birds and fish.

Acton Steps

A program involving regular monitoring along with the use of least-toxic control methods, education, and the elimination of habitats for larval mosquitoes have sustainable, long-term effects against mosquito populations. What follows can be implemented at the community level to combat mosquito populations.

Clean up

- Ensure continuous flow of water in streams by eliminating border vegetation that produces habitat for mosquito development.
- Drain or fill back-water pools and swamps where stagnant water accumulates.
- Remove overgrown vegetation and debris from along the banks of the lakes and ponds to discourage mosquito breeding. Such bodies of water should have a steep clean shoreline with as little vegetation as possible to prevent vegetation from causing stagnant pools of water.

Monitoring

- State officials and the relevant authorities should monitor mosquito population levels and habitat availability to determine how to proceed before resorting to chemical controls.

Natural Predators

- Use indigenous fish populations to eat mosquito larvae in shallow waters and ornamental pools. Certain freshwater fish, such as mosquitofish, fat-head minnows, killifish, and bluegill can eat their weight in mosquito larvae. These predatory fish are used successfully in the marshes in New York, New Jersey and other parts of the U.S.



Mosquito Mist: No Easy Way to Mosquito Control

Misters have been growing in popularity because they are perceived as a convenient and easy application method to control mosquitoes. Mosquito misters inject a super-fine, semi-continuous mist of pesticide into the air to target mosquitoes. Often these products are expensive to purchase and install, running into the thousands of dollars. However, consumers may be getting more than they bargain for.

Regulation

Firstly, regulations for these systems may vary from state to state. Some states may forbid the use of certain pesticides, or any pesticides at all in these systems in residential areas. Some states may require signs to be posted, while others may not regulate their use at all. Misting system components are considered “application equipment” and therefore are not regulated by EPA. EPA does, however, regulate the pesticide formulations accompanying mister systems. Thus far, the pesticides permethrin, pyrethrins and the synergist piperonyl butoxide, are used in misting systems and have been approved for use in these systems.

Precautions for Using Mist

Misters pose unique dangers to human health due to inhalation and dermal absorption of the fine pesticide mist. This can lead to headaches, rashes and other allergic reactions, nausea, and a host of other acute and chronic symptoms. Beyond Pesticides does not recommend using misters for mosquito control. Other factors to be mindful of:

- Permethrin, pyrethrins, and piperonyl butoxide are toxic and endanger human and environmental health. These chemicals are not recommended for use as part of a long-term mosquito control plan in residential areas. Therefore, misters utilizing these chemicals should be avoided.
- If using a mister, use a least-toxic chemical product (e.g. oil of lemon eucalyptus etc.). Make sure the nozzles are directed to spray toward the target area and away from eating/cooking areas and any water body including swimming pools and fish ponds. Set nozzles to direct mist away from outside air conditioners or other home air intakes that can lead to indoor inhalation of mist.
- Mist will increase the probability of chemical drift, and pesticide residues may end up in homes, schools and other nearby areas. Chemical drift can travel far from the site where the mister is being used. Drift can cause chemical injury to crops, ornamental gardens, waterways and of course people, including children. *Important:* Keep in mind that some neighbors may object to drift of chemicals onto their property and have elevated risk factors.
- Mist should not be used when people, pets, or foods are present. Therefore, automatic timers should be set for times when people and pets are unlikely to be exposed.

- Recently, New Jersey introduced 10,000 tiny copepod crustaceans to eat mosquito larvae in ditches, pools and other areas of stagnant water. Louisiana has also been successful with copepods for larval control.

Least-toxic Larviciding Options

- *Bacillus thuringiensis israelensis* (Bt) is a biological larvicide that prevents mosquitoes from developing into breeding, biting adults. Available as a suspension or as dissolvable blocks or capsules for areas of pooling or stagnant water,

or for use in ornamental pools, Bt is a soil bacterium that is effective against mosquito larvae and numerous other insect pests. Bt lasts approximately 30 days in water.

Mosquito Repellents – Avoid permethrin and DEET

Mosquito repellents work by disorienting mosquitoes so that they are unable to find their blood-meal targets. There are many products with toxic ingredients on the market that once put on the skin or inhaled, can cause long term adverse health effects. Ingredients like permethrin and DEET are commonly formulated in

mosquito repellent aerosols and sprays. Permethrin is classified as “Likely to be Carcinogenic to Humans” and can affect both male and female reproductive systems. Dermal application of DEET and permethrin, alone or in combination, can lead to many physiological, pharmacological, and behavioral abnormalities, particularly motor deficits, and learning and memory dysfunction. Persons wearing permethrin-impregnated clothing have been found to have higher levels of pyrethroid metabolites in their urine due to high rates of dermal absorption of permethrin from the treated clothing. Based on this, it is advisable to avoid permethrin, and DEET-based products.

Beware of Toxic Promises Made by Private Mosquito Control Operators



Advertisement for Mosquito Squad Company in front of a playground

A recent *Washington Post* article featured ‘Mosquito Squad,’ a national franchise of about 100 outlets throughout the U.S. According to the article, customers pay \$400 to \$900 a year, depending on property size, to be sprayed for mosquitoes every three weeks between April and the end of September. The featured ‘Mosquito Squad’ of Washington DC and environs typically has its technicians don gas-powered backpacks and use 110-gallon containers for application. Interestingly, the *Post* article was accompanied by a photo of a Mosquito Squad applicator fitted with a respirator.

‘Mosquito Squad’ omits the term “pesticide” from its advertising, instead opting for the more benign terms “product” or “barrier spray” that “paralyzes and kills insects.” Little to no information is provided about the chemicals being used, or any potential human or environmental health impact. Given that spraying for mosquitoes is not effective, and mosquitoes usually disperse and reenter the treatment area, many consumers are kept on a pesticide treadmill from which there seems to be no escape.

Don't be fooled...

As typically done by many pest control operators, human health hazards associated with the products they used are downplayed. Oftentimes, the unsuspecting customer is told the product is completely “safe” and approved as “safe” by the EPA. However, do not be fooled! Pesticides should never be considered safe. Many, like permethrin and other synthetic pyrethroids, are misleadingly marketed as derived from natural sources, in this case from the chrysanthemum flower. This unfortunately does not mean the chemical is botanical or safer to use.

As the customer, it is your right to know what is being applied, the possible human and environmental effects, and to be provided with an ingredient list or the Material Safety Data Sheet (MSDS). More importantly, it is your right to refuse to be exposed to toxic substances being advertised as “safe.”

Before you hire a private pest control operator:

- Ask for the least-toxic alternative. If the company does not have one, then find one that does.
- Request product information such as ingredient lists or an MSDS. Some states require product information to be provided to consumers.
- If not provided, research potential human and environmental health effects of the products to be used. Visit Beyond Pesticides’ Pesticide Gateway for pesticides and alternatives, or call for help disseminating information.
- Ask what precautionary measures you should take prior to pesticide application. (e.g., removal of pets and children, close windows, remove or cover food and water supplies, etc.)
- Notify your neighbors of your pesticide application and post notification signs for the treatment area(s).
- Determine whether the reapplication schedule is right for you or even necessary.
- Ensure you minimize pesticide drift from your property. For example, pesticide application should not be done on a windy or rainy day.