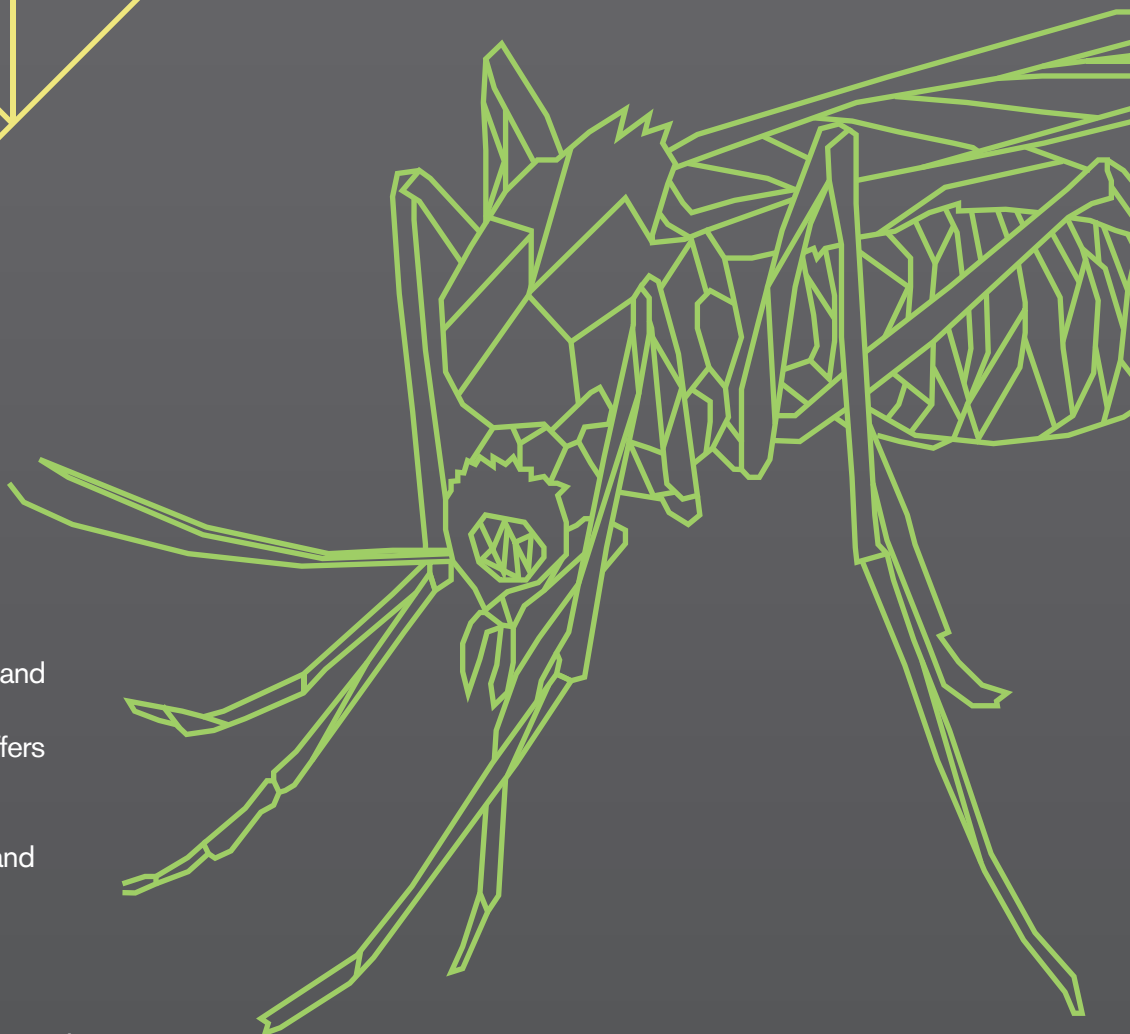


PREPARE TO PREVAIL:

MOSQUITO ACTION PLAN



No two mosquito habitats are alike—and neither are the ways you treat them. Fortunately, Central Life Sciences offers mosquito abatement professionals the most comprehensive line of environmentally sensitive larvicides and adulticides available in the industry.

Mosquito Abatement Districts: The First Line of Mosquito Defense

The more than 700 mosquito abatement districts and numerous other government agencies in the United States charged with protecting the public from threats posed by mosquitoes – including West Nile virus, encephalitis and Dengue fever – are facing significant battles on several fronts. Managing mosquito populations, set across thousands of acres and in a variety of settings, is not an easy task considering the inherent challenges this highly mobile pest presents and the ever fluctuating budget landscape.

Mosquito abatement districts perform extensive surveillance work identifying peaks and valleys in mosquito populations, treating known mosquito breeding areas and monitoring for potentially deadly diseases that mosquitoes can transmit.

“A good mosquito abatement district knows when the peaks and valleys are likely to occur with mosquitoes,” says Doug VanGundy, senior director of research and development for Central Life Sciences. *“They have their finger on the pulse of mosquito activity in their area.”* According to the Centers for Disease Control (CDC), most people in the United States are infected from June through September, and the number of these infections usually peaks in mid-August.

Surveillance data show that the U.S. has experienced outbreaks of West Nile virus every summer in the U.S. since 1999. Many factors impact when and where outbreaks occur, such as weather, numbers of mosquitoes that spread the virus and human behavior. Seasonal outbreaks often occur in local areas that can vary from year to year.

The three major mosquito species mosquito abatement districts and government public health officials are confronted with include:

- Various species of *Culex* mosquitoes including the northern house mosquito, *Culex pipiens*, a major disease vector that inhabits standing water, and *Culex quinquefasciatus*, the southern house mosquito.
- The salt marsh mosquito, *Aedes taeniorhynchus*, typically found along coastlines from North Carolina to Florida.
- Container-breeding mosquitoes that are commonly found in stagnant water in tree stumps, old tires, clogged gutters, old tin cans, and anything else that will hold water.

Proven Options Help Districts

While mosquito abatement districts have endured budget shortfalls and serious outbreaks of West Nile virus, one constant they have been able to rely on is a comprehensive product lineup from Central Life Sciences.

Central Life Sciences' Altosid[®], FourStar[®], Zenivex[®], Perm-X[™] and Pyronyl[™] product lines provide mosquito abatement districts with proven technology that delivers results and respects the environment.

“Mosquito abatement districts and public health departments are very conscious of the environmental impact associated with the products they use,” says John Neberz, business manager for the Central Mosquito Control division of Central Life Sciences.

Altosid[®] extended control larvicide can be applied to areas of standing water for effective control of mosquitoes with no impact on non-target species. FourStar[®] microbial larvicides kill mosquito larvae before they become adults by using naturally occurring bacteria.

Zenivex[®] adulticide (active ingredient: Etofenprox) is an ultra-low volume liquid insecticide with a reduced-risk classification from the U.S. EPA. Additionally, Pyronyl[™] and Perm-X[™] adulticides are available in several convenient formulations that can be used in a variety of applications to control mosquitoes. Due to the varying landscape challenges mosquito abatement districts face when treating thousands of acres, product adaptability and flexibility is important.

For example, Altosid[®] formulations can be used in roadside ditches, pasture land or fields where intermittent flooding and periods of dryness occur. *“The product's ability to deliver effective dosages in a wet/dry down situation speaks to its long residual,”* says Central Life Sciences' VanGundy. With multiple modes of delivery available to mosquito control professionals, Zenivex[®] adulticide delivers quick and permanent knockdown of adult mosquitoes. And in a market where pyrethroid-based products are in the majority, the unique formulation of Zenivex[®] adulticide is also an attractive alternative.

The Future?

While already a critical service ensuring public health, the need for effective mosquito control is likely to only increase in importance in coming years as the threat of mosquito borne diseases expands. Chikungunya, a virus previously limited to Asia and Africa, saw its first recorded U.S. cases in 2013 with numbers already growing by 2014. Though still rare, confirmed cases of Dengue fever have also started to appear in the U.S. Though experts can't predict what levels these new threats might reach, the potential of Chikungunya and Dengue along with the continued presence of West Nile Virus will likely make the role of mosquito abatement districts and public health departments more important than ever in coming years.

How Do Mosquito Abatement Districts Get the Job Done?

The hundreds of mosquito abatement districts across the United States use integrated mosquito management methods – endorsed by the Centers for Disease Control and Prevention and U.S. EPA – that are designed to attack mosquitoes at each stage of their life cycle. When the source of the mosquito infestation cannot be controlled using larvicides, through water management, cultural measures (i.e. eliminating conducive conditions such as standing water or tire piles, etc.) or in the case of imminent disease such as West Nile virus, the EPA and CDC have emphasized the need for application of adulticides by certified applicators. A successful mosquito management program typically includes the following elements:

- Larval and adult mosquito sampling
- Source reduction
- Biological control using native or introduced predators and parasites of mosquitoes
- Application of appropriate larvicides and adulticides when indicated by surveillance
- Resistance monitoring
- Disease surveillance in mosquitoes, birds, horses and humans
- Public education (Source: American Mosquito Control Association)



Mosquitoes: Masters of Adaptation and Survival

When consumers needed a fast, easy solution to control mosquitoes in their backyard or on their person, they usually turned to products containing DEET. From sprays to lotions to wristbands, a product having the DEET scent was sure to fend off mosquitoes. However, a recent study released by the London School of Hygiene & Tropical Medicine revealed that some mosquitoes and flies may carry a genetic alteration in their aroma receptors that makes them insensitive to the DEET scent.

Researcher Dr. James Logan reviewed changes in the *Aedes aegypti* mosquito's response following exposure to DEET. What Dr. Logan discovered was that a slight exposure to DEET was enough to make some of the mosquitoes less sensitive to the commonly used repellent.

During the study, mosquitoes that were initially turned off by the scent three hours later showed no signs of being chased away while seeking out attractants like human skin and heat.

After attaching electrodes to the mosquitoes' antennae, researchers believe the sensitivity to DEET's scent lessened over time but they couldn't pinpoint why. Dr. Logan says the research's findings should not stop consumers from reaching for a DEET-based insect repellent to prevent unwelcome encounters with mosquitoes.

(Note: Picaridin is an alternative to DEET.) Further research to find out how long the desensitizing effects last after the initial contact with DEET is planned.

Stay tuned.

Mosquito Abatement Districts Take on Challenges of NPDES

Mosquito control professionals not only have their hands full with implementing effective control programs to protect residents from annoying and harmful mosquitoes, they also are dealing with potentially burdensome regulatory requirements.

The National Pollutant Discharge Elimination System (NPDES) falls under the Clean Water Act that monitors nonagricultural sources of storm water discharges that potentially could harm the quality of our nation's waters.

NPDES came about following a 2009 court ruling mandating the U.S. EPA and states to develop NPDES permits for the application of mosquito control pesticides. The EPA issued its General Pesticide NPDES permit in the fall of 2011.

The crux of the NPDES issue is that it requires mosquito abatement districts to obtain a permit for mosquito pesticide applications. If districts do not obtain the permits, they are exposing themselves and individual employees to the risk of being sued under the citizen's suit provisions of the Clean Water Act.

Concerns over litigation, as well as increased costs and piles of duplicative paperwork with few if any environmental benefits, have some districts scratching their heads.

"While the overall cost of compliance in terms of dollars is not huge for districts, except in California, it does stretch already thin resources, resources that might be more judiciously spent on other efforts that have a greater impact on reducing mosquito populations," says Joe Conlon, a technical adviser for the American Mosquito Control Association.

In 2015, bi-partisan legislation was introduced in the U.S. House of Representatives and the Senate aimed at relieving mosquito abatement districts and other professional pesticide applicators, including pest management professionals, from the burdensome and duplicative administrative process. Supporters of both bills claim that the extra requirements provide no additional environmental protection for water while delaying the application of pesticides that can help prevent the spread of disease.

S. 1500 – the "Sensible Environmental Protection Act (SEPA) – was co-sponsored by U.S. Senators Mike Crapo (R-Idaho), Claire McCaskill (D-Missouri) and 13 other original co-sponsors to eliminate the Clean Water Act permit requirements for mosquito control and other pesticide applications. In the House, H.R. 897 – the "Reducing Regulatory Burdens Act of 2015" – was sponsored by Rep. Bob Gibbs (R-Ohio). Both bills seek to clarify that pesticide regulations under FIFRA are sufficient to protect water, and additional regulation under the Clean Water Act are unnecessary.

As of this writing, both bills are under review.

PRODUCT PORTFOLIO

A SUPERIOR CLASS OF MOSQUITO CONTROL



Altosid® Liquid Larvicide SR-5
 Altosid® Liquid Larvicide Concentrate SR-20
 Altosid XR-G® granules
 Altosid SBG® granules
 Altosid® Pellets
 Altosid® Pellets WSP
 Altosid® 30-Day Briquets
 Altosid® XR Briquets

Altosid® larvicides help proactively prevent future mosquito infestations by targeting mosquitoes in the larval stage. Altosid® larvicides work in water and affect mosquito larvae on contact or through ingestion. Altosid® products are environmentally sound and have one of the lowest toxicity ratings in the mosquito control industry. The active ingredient, (S)-methoprene, is a target-specific insect growth regulator (IGR) that will not affect fish, waterfowl, mammals or beneficial predatory insects, making Altosid® larvicides ideal for use in sensitive areas.



Pyronyl™ Crop Spray
 Perm-X™ UL 4-4
 Perm-X™ UL 30-30
 Aqua Perm-X™ UL 30-30
 Perm-X™ UL 31-66

Pyronyl™ formulation concentrates can be used in a variety of applications to control mosquitoes in adult stages. Each formulation differs in its ratios of pyrethrin to piperonyl butoxide (PBO) to give users a rotation of consistently effective mosquito control. This improves the action of the insecticide providing effective knockdown at lower use rates.

Perm-X™ formulations are convenient, low-odor adulticides recommended for application as an Ultra Low Volume (ULV) Thermal or Non-thermal aerosol (Cold Fog) in residential, recreational, industrial, urban and other areas where mosquitoes are a problem. Perm-X™ formulations differ in their ratios of permethrin to PBO.



FourStar® SBG
 FourStar® MBG
 FourStar® CRG
 FourStar® WSP Granules
 FourStar® Briquets 45, 90, 180 Day

FourStar® microbial larvicides kill mosquito larvae before they become adults by using the naturally occurring bacteria *Bacillus sphaericus* (Bsph) and *Bacillus thuringiensis israelensis* (Bti). The products contain a patented "Dual Action" release technology that regulates the release of active ingredients to the water surface as well as throughout the water column to ensure a long residual and maximum coverage.



Zenivex® E4 RTU
 Zenivex® E20

Zenivex® mosquito adulticide provides quick, permanent knockdown and reliable control of adult mosquito populations. The active ingredient, Etofenprox, is a non-organophosphate, non-carbamate, non-ester pyrethroid with a small environmental footprint and a reduced-risk classification from the EPA. Zenivex® adulticide is available in two formulations with economical, low-use rates.



As an industry leader in mosquito control for over 35 years, Central Life Sciences believes mosquito management is bolstered by the use of insect growth regulators, biological microbials and adulticides. We offer the industry's most comprehensive lineup of products with a solution for any need or application.

Altosid® larvicide helps rid the air of mosquitoes up here...

...by preventing larvae from maturing down here.

The favored choice of mosquito control experts, Altosid® larvicide consistently provides the extended control you need, no matter where you need it. You can count on Altosid® larvicide to prevent the emergence of breeding, biting adults—without disrupting non-target organisms.

For peace of mind and long-term control, choose the original, proven solution: Altosid® larvicide. To learn more about the entire portfolio of Central Life Sciences® mosquito control products, visit CentralMosquitoControl.com or call 800.248.7763.



Altosid® larvicide is available in liquids, granules, briquets and pellets.

