

WALS™



A Valent BioSciences Co-Innovation



WALS™ is a revolutionary biorational application strategy for controlling mosquito larvae in cryptic containers and can play a critical role within an Integrated Vector Management (IVM) program.

WALS utilizes cutting-edge insecticide formulation technology and a specially designed application system to deliver the highly effective and target-specific biorational mosquito larvicide VectoBac® WDG (Bti strain AM65-52) – one of the lowest risk, environmentally compatible biorational products available to public health professionals today.

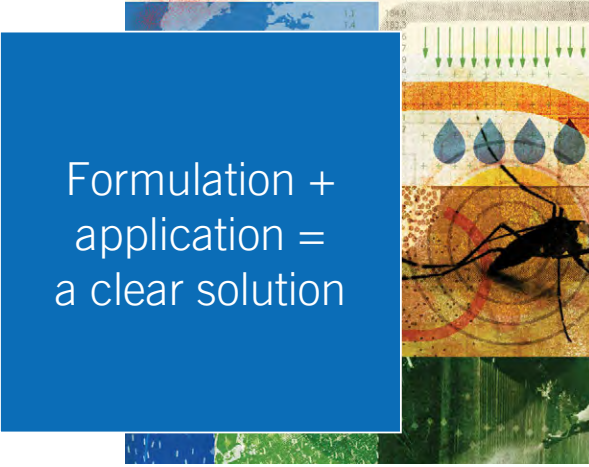
Specifically designed to control container mosquito larvae that inhabit cryptic habitats, WALS was developed in direct response to the challenges posed by the diversity and sheer number of container habitats across the globe. To effectively control container mosquito populations, public health professionals must be able to deliver an effective active ingredient into thousands of diffuse, hard-to-reach mosquito larval habitats, many of them not visible to surveillance teams.

WALS research began in Asia as a response to the onset of chemical insecticide resistance among container mosquito populations. The initial focus was on developing countries with endemic dengue, but use of the platform has expanded globally in *Aedes* vector control programs to prevent dengue, Zika, and chikungunya virus transmission. More recently,

programs have adopted WALS to control other container-inhabiting mosquitoes such as *Culex* spp.

Most notably, WALS using VectoBac WDG played a seminal role in Florida's historic accomplishment of stopping the Zika virus-transmission cycle in Miami-Dade County's 2016 outbreak. After seven decades of confinement within the Eastern Hemisphere, Zika virus – which has been shown to cause infant microcephaly – spread rapidly across six continents and 86 countries and territories. The arrival of imported Zika virus in south Florida was vigorously treated with several interventions, but its transmission was only stopped after the introduction of WALS to affected areas.

Pioneered and developed through international partnerships between public health professionals and Valent BioSciences, WALS has undergone intensive operational development and large-scale, multi-year field trials for more than 20 years. Its targets include at least 8 species of container mosquitoes, including *Aedes aegypti* (the primary vector responsible for transmission of dengue, chikungunya, yellow fever, and Zika virus) and *Culex quinquefasciatus/pipiens* (the primary vector responsible for West Nile virus).



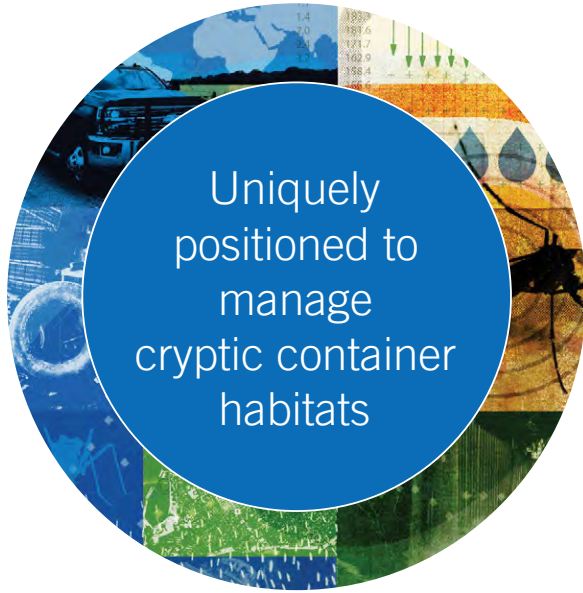
WALS employs VectoBac WDG, the first bacterial larvicide to complete the World Health Organization Pesticide Evaluation Scheme (WHOPES). It is a water-dispersible granule formulation of *Bacillus thuringiensis* subsp. *israelensis* (strain AM65-52) with a potency of 3,000 International Toxin Units (ITU) per milligram. This formulation of Bti is ideal for cryptic habitat larvicide application strategies.

Around the world, mosquito abatement programs are highly focused on container mosquito species because of their high vectorial capacity. Effective control is a challenge. The use of adulticide space sprays to control these species is hampered by widespread resistance to synthetic mosquito adulticides. Adding to the challenge, atmospheric conditions during daylight hours – when these mosquitoes are most active – are not conducive to space-spraying adulticides.

The VectoBac WDG formulation is ideal for WALS programs. Once sprayed, water evaporates from the drops until a terminal drop size is reached and evaporation ceases. Since VectoBac WDG does not evaporate from the drops, there is no loss of the Bti protoxin. Depending on the need, VectoBac WDG can be applied in ground-based WALS programs using backpack or vehicle-mounted sprayers. For larger scale operations, VectoBac WDG can be used in an aerial application with fixed-wing or rotor wing aircraft.

Application

PLATFORM	UTILITY	EQUIPMENT	REMARKS
Backpack Sprayers	Targeted coverage of hot spots and wide area coverage of small areas	Power Backpack Blowers capable of generating fine to very fine drop spectra	Targeted within properties or clusters of houses.
Vehicle-mounted Sprayers	Wide area coverage of urban and suburban areas	Modified cold fogger and air blast machines capable of generating fine to very fine drop spectra	Spray passes limited to streets for application; highly dependent on wind for drop distribution
Aerial Application	Rapid coverage of large blocks	Helicopters and fixed-wing with atomizers capable of generating fine to very fine drop spectra	Not dependent on streets or property access



Several characteristics uniquely position WALs as a value-added option for public health professionals to manage container mosquitoes. WALs with VectoBac WDG meets the efficacy performance standards required by public health organizations with a biorational solution that is non-toxic to humans and has negligible environmental side-effects. This is critical when treating residential areas that contain an indeterminate number of small, often cryptic and expansive mosquito larval habitats.

Features and Benefits

FEATURES	BENEFITS
Biorational	Not harmful to non-target populations
Efficacy	Controls container mosquito populations at levels acceptable to public health organizations
Formulation	Storage stability and ease of use; results in a terminal spray drop size at which evaporation ceases – no loss of Bti protoxin occurs due to evaporation
Droplet size	Extremely fine to fine (EF/VF/F) size classification (ASABE S572.1 Standard), the required droplet range to both drift through air but also to drop down into containers
Coverage	The ability to reach mosquito larvae in small, cryptic containers (e.g. plastic trash, tires, rain gutters/drains, flower pots, tree holes, bromeliads, etc.)



Mode of application

Container mosquito larvae can occupy a wide range of small, cryptic habitats, from the crown of a palm tree to ground-level containers such as flower pots, plastic trash, pet bowls, and more. WALs fully covers habitats across this three-dimensional space, reaching larvae wherever they inhabit. WALs requires a unique droplet size range in the extremely fine to fine (EF/MF/F) size range (ASABE S572.1 Standard), which can drift through areas such as neighborhood backyards where inaccessible containers may be abundant but, at the same time, drop down without drifting beyond the target spray area.

Depending on the target location, WALs can be employed through a variety of methods for specific habitats: Backpack sprays for targeted coverage of hot spots and small residential areas, vehicle-mounted sprayers for wide-area coverage of large residential areas, and aerial application for rapid coverage of very large blocks.



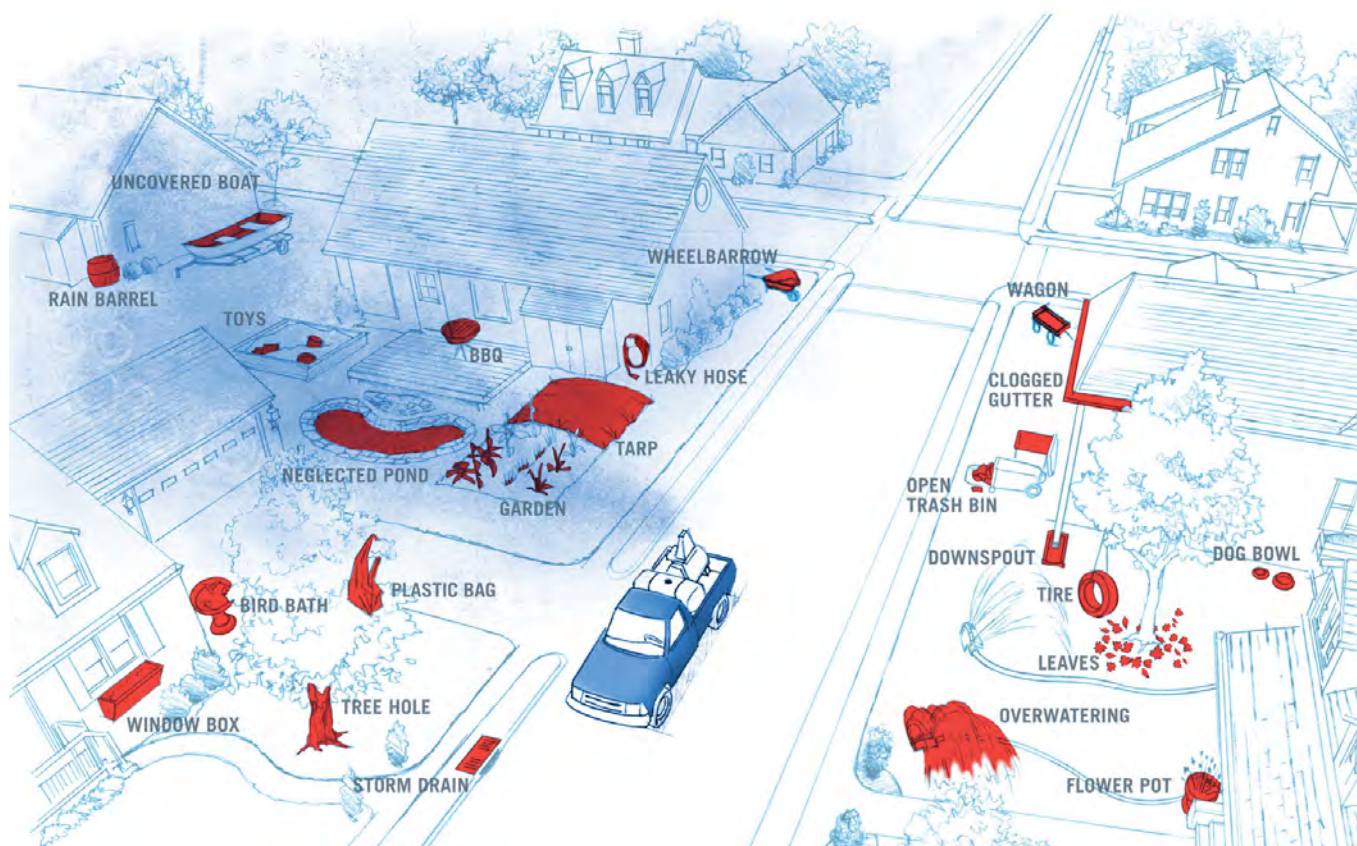
BACKPACK



VEHICLE



AERIAL





For more than two decades, WALs has undergone intensive operational development and large-scale, multi-year field trials. The technology was pioneered and developed through public and private partnerships between Valent BioSciences, innovative equipment partners, and mosquito abatement professionals around the world. Its proven track record positioned WALs and VectoBac WDG to be critical components in Florida’s historic accomplishment of stopping the Zika virus-transmission cycle in Miami-Dade County’s 2016 outbreak.

On August 15, 2016 the *Miami Herald* was among the first publications to report the dramatic effect of WALs and Vectobac WDG. Dr. Janet McCallister, a medical entomologist with the Centers for Disease Control and Prevention, was quoted as saying, “In areas without the larvicide [applied via the WALs approach], the adult populations are rebounding much quicker and much higher than in the area [treated] with both.”

20+

WALS has credentials that span more than 20 academic studies across the world – from the United States and South America to Southeast Asia and Australia.

10+

Published in more than 10 journals and reports, including:

- American Journal of Tropical Medicine and Hygiene
- PLOS One
- The Southeast Asian Journal of Tropical Medicine and Public Health
- Journal of the American Mosquito Control Association
- Proceeding and Papers of the Eighty-first Annual Conference of the Mosquito and Vector Control Association of California
- United States Department of Health and Human Services/Centers for Disease Control and Prevention

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And proven field support in 11 countries:

- Australia
- Brazil
- Cayman Islands
- El Salvador
- Italy
- Malaysia
- Mexico
- Singapore
- Spain
- Thailand
- United States



More than just a product

As a vector management strategy, WALs is explicitly designed to keep the public safe from infectious diseases carried by mosquitoes that inhabit numerous, small, cryptic container habitats. Ultimately, WALs is about saving lives by reducing mosquito vector populations to break the disease transmission cycle and reduce the risk of disease.

WALS is a custom combination of what has been tested and proven to work: a design-specific application system joined with a target-specific biorational mosquito larvicide.

Incorporating WALs as part of your IVM program means that you can be fully confident that you'll have the right tools in place to protect your district from the threat of infectious disease.

WALS delivers more than just a product – it delivers public health results.



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Public Health. Protecting Human Potential.

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