TECHNICAL USE SHEET

VectoBac® WG

Biological Larvicide



For Organic Production

VectoBac® WG (also known as WDG) Biological Larvicide is a water-dispersible granule formulation of *Bacillus thuringiensis* subsp. *israelensis* strain AM65-52 for control of mosquito larvae. The product has a potency of 3,000 International Toxin Units (ITU) per milligram against *Aedes aegypti* larvae. It is designed for use in aqueous spray mixes and for direct application to water containers. VectoBac WG was the first biological larvicide to complete the World Health Organization Pesticide Evaluation Scheme.







Consisting of only *Bti* strain AM65-52 and food-grade (U.S. EPA list 4) inert ingredients, VectoBac WG has received approval for application in organic crops (U.S.: Organic Materials Review Institute [OMRI] and National Organic Program [NOP] certified) and sensitive habitats in various countries around the world. This versatile formulation allows a variety of application modes and uses for mosquito control.

Container species such as *Aedes aegypti* and *Aedes albopictus* are a major source of concern for mosquito abatement agencies across the globe due to their high vectorial capacity. In addition, adulticiding these species can be quite difficult because of their preference for host seeking and oviposition in the daytime. Various application methods of VectoBac WG complement integrated vector management (IVM) programs that are aimed at reducing these species that have the capacity to transmit dengue, chikungunya, and yellow fever, as well as other arboviruses.

FEATURES	BENEFITS
• Biological larvicide • Highly specific activity on mosquitoes	• Not harmful to non-target organism populations
• Water-dispersible granule	• Aqueous spray or direct application
• High-potency dry formulation	• Increased shelf life • Decreased weight to transport
• Mixes easily in water	• Sprays easily through many equipment types
• First biological larvicide to complete the WHO Pesticide Evaluation Scheme	• Consistent, quality product that aligns with international health standards for public health
• Effective in direct application for residual control of container mosquitoes	• Application flexibility for effectively managing dengue and chikungunya disease vectors
• Effective in ground and aerial spray application as aerosol or mist droplets for wide-area control of container mosquitoes	
• Quickly kills mosquito larvae (2–24 hours)	• Results visible quickly in field

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Protecting Life's Potential

General Application Rates



For general mosquito control, VectoBac WG can be applied as an aqueous spray using conventional ground and aerial application equipment to habitats with sparse or no vegetation. Rate selected should be based on habitat, larval population/stage, and/or environmental conditions.

For effective mosquito control an application rate range of 1.75–7.0 oz/acre (50–200 g/acre; 125–500 g/hectare) is required.

Polluted water (such as sewage lagoons and animal waste lagoons) requires an application rate range of 7.0–14.0 oz/acre (200–400 g/acre; 0.5–1.0 kg/hectare). Use higher rate range in polluted water and when late 3rd and early 4th instar larvae predominate, mosquito populations are high, or algae is abundant.

General Mixing Instructions

Gradually add the desired quantity of VectoBac WG to half the final intended volume of water in a mix tank while under agitation, then add additional water to produce the final spray volume. The concentration of the final spray mix will depend on weather, spray equipment, and mosquito habitat characteristics. Start the mechanical or manual agitation to provide moderate circulation of water before adding the VectoBac WG. Backpack and compressed air sprayers may be agitated by shaking after adding VectoBac WG to the water in the sprayer. VectoBac WG suspends readily in water and will stay suspended over normal application periods. Brief recirculation may be necessary if the spray mixture has sat for several hours or longer. Do not mix more VectoBac WG than can be used in a 48-hour period.

Rapid mixing of highly concentrated suspensions for aerial application targeting container mosquitoes may require the use of a venturi inductor system. Consult your Valent Health representative regarding sources for this equipment.

AVOID CONTINUOUS AGITATION OF THE SPRAY MIXTURE DURING SPRAYING. For ground spraying, apply 1.75–14 oz/acre (50–400 g/acre; 123–988 g/ha) of VectoBac WG in 1–100 gallons of water per acre (10–950 liters/ha) using hand-pump, air blast, mist blower, or other spray equipment. For aerial application, apply 1.75–14 oz/acre (50-400 g/acre; 123–988 g/ha) of VectoBac WG in 0.25–10 gallons of water per acre (2.4–93.5 liters/ha) through fixed wing or helicopter aircraft equipped with either conventional boom and nozzle system or rotary atomizers to provide uniform coverage of the target area.

Container Mosquito Applications—Wide Area Spray (Ground Vehicle and Aircraft)

These types of applications for control of container *Aedes* are highly specialized. For ground (truck) applications, this approach has only just recently been implemented operationally in Southeast Asia, with the U.S. and Europe currently in the development phase.





GROUND (VEHICLE-MOUNTED SPRAYING)

Tests are currently being conducted by mosquito control professionals globally on how to best apply VectoBac WG through truck-mounted spray equipment. Several tests are showing promise, and results are expected in the near future. Several factors make larviciding for container mosquitoes different from standard ULV adulticiding. The objective of ULV adulticiding is to release an airborne cloud of very small droplets of insecticide that will impinge upon flying mosquitoes and deliver a toxic dose to the insect by contact. When spraying microbial larvicides for container mosquito control, the objective is to disperse droplets of larvicide across a targeted area that will then fall into containers and deliver a sufficient dose to kill mosquito larvae that are filter feeding in the water. Selection of spray equipment to achieve appropriate droplet spectra for specific environmental conditions is a complex matter. Density of structures and vegetation in the targeted area as well as atmospheric conditions need to be considered. Please contact your local Valent Health technical specialist for additional assistance regarding this approach.

AERIAL

In 2011, the Florida Keys Mosquito and Vector Control District (U.S.) implemented the world's first aerial larviciding program to control dengue vectors on a large scale. In 2010, the district developed the method in cooperation with Valent BioSciences and Helicopter Applicators Inc. in response to an ongoing dengue outbreak. The method has been optimized with support of REMSpC Spray Consulting. Applications are made using six Micronair® AU5000 rotary atomizers operating at 4,000–5,000 rpm on a Bell 206B helicopter. Treatments are made with a spray volume of 0.5 gallons per acre and a Vectobac WG dose of 0.5 lbs/acre. Two hundred-foot swaths are employed at an altitude of 100 feet and an airspeed of 80 mph. Offset spraying is employed during missions based on wind conditions and the AGDISP model applied by REMSpC. Early in 2011, the district began employing this method in conjunction with intensive ground efforts to control *Aedes aegypti* in Key West. Subsequent research by the district has shown adult population suppression is occurring as a result of the treatments, and *Aedes aegypti* populations are declining in Key West. Please contact your local Valent Health technical specialist for additional assistance regarding this approach.

Container Mosquito Applications—Wide Area Spray (Backpack)





Larval Habitat	VectoBac WG Application Method*	Application Equipment
Water reservoirs ≤ 50 L in volume capacity	**Ground spray**	**Ground spray equipment**
Container type: • Cement, earthen, plastic, metal, fiberglass • Concrete drainage system • Covered and uncovered drains • Roof gutters • Trash • Tires • Vegetation – leaf axils, tree holes, leaf litter • Natural pools with leaf litter	250–500 g/ha (1 ha = 10,000 m^2)	• Vehicle-mounted sprayers • Motorized backpack or shoulder-carried blowers • Hand-carried pump sprayers

* Consult your Valent Health technical specialist to determine optimal application methods to meet your program objectives.

Recommended Dilution Rates for VectoBac® WG per Hectare

Larval Habitat	VectoBac WG Application Method	Application Equipment
Covered concrete drains	150–200 L (high volume application)	Motorized backpack or shoulder-carried blowers
Uncovered concrete drains, roof gutters, sparse vegetation, containers, tires, etc.	30–60 L (moderate volume application)	Motorized backpack or shoulder-carried blowers
Trash, dense vegetation, leaf litter, etc.	15–30 L (low volume application)	Motorized backpack or shoulder-carried blowers
Wide open areas of larval habitat	7–10 L (ultra-low volume application)	Vehicle-mounted ULV sprayers

Ground aqueous spray mix applications should be targeted to natural and artificial larval habitats which are < 50 L (13.2 gallons) in volume capacity that are spread over a wide area such as covered and uncovered concrete drainage systems, trash accumulations, tires, roof gutters, and vegetation—leaf axils, tree holes, leaf litter, and ground pools. The recommended dosage in a spray mix is 250–500 g of VectoBac WG per hectare of target larval habitats. Large-scale studies in Asia Pacific have shown that optimal results for dengue vector control are observed with 400–500 g of VectoBac WG per hectare in a spray mix.

Motorized backpack sprayers are an effective tool for rapid coverage of small containers in an urban environment. However, calibration for these treatments is different from the approach used to target open standing water habitats. Conventional applications are made on a grid pattern. In conventional treatments, spray volume per unit area is easily calculated based on travel speed, flow rate and swath width. When spraying to target known and suspected accumulations of containers in urban and suburban areas, this approach may not be suitable due to clustered microhabitats and non-linear access to the target areas. One way to calculate the required volume prior to application is to conduct a “dress rehearsal” first with only water in the spray tank. Moving through typical target areas at a comfortable pace and spraying all likely container sources with water will provide a fairly accurate estimate of spray volume required. Product concentration in the spray mix can then be determined based on the size of the area and volume used. Tests conducted with motorized backpack blowers using VectoBac WG show that a droplet size in the 80–120 micron range produces the most effective swath in terms of distance while still being likely to fall into containers.

Container Mosquito Applications — Direct Placement





Larval Habitat	VectoBac WG Application Method*	Application Equipment
Water reservoirs ≥ 50L in volume capacity	**Direct application into containers**	**Calibrated scoop/spoon**
Container type:		
• Cement, earthen, plastic, metal, fiberglass	2–8g / 1,000 L	1 teaspoon/200 L (dose ~ 8g/1,000L)

* Consult your Valent Health technical specialist to determine optimal application methods to meet your program objectives.

Direct (undiluted) applications of VectoBac WG are used to treat water containers in many countries around the globe. Direct application is best suited for treatment of easily located containers with a volume > 50 liters (13.2 gallons), but can be used for smaller containers as well. This approach has delivered extended residual control for up to three months in a variety of container types. Examples of these containers include potable water reservoirs such as earthen or cement jars, plastic or metal drums, and fiberglass or cement tanks. Application rates of 2–8 g per 1000 liters (264 gallons) of container capacity (100–400 mg/50 L) should be used depending on habitat conditions and program objectives. Application may be made with a calibrated scoop or spoon. Monitor for efficacy and residual control by counting numbers of late instar and pupae in treated containers before and after treatment. Initial late instar/pupae reductions should be seen in 72 hours. Re-treatment interval should be based on program objectives. Consult Valent Health for additional technical assistance regarding this approach.

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Packaging

VectoBac® WG Biological Larvicide is available in the following package sizes:

- USA only
  - 1 lb (0.45 kg) HDPE plastic canisters, packaged 24 per case
  - 25 lb (11.3 kg) drums
- International only
  - 0.5 kg HDPE plastic canisters, packaged 24 per case
  - 25 kg drums

Check with your local distributor or Valent Health technical representative to see what packaging is available in your area.



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