



FOR YOUR INFORMATION

Larvicides for Mosquito Control

**EPA evaluates and
licenses pesticides**

The Environmental Protection Agency (EPA) evaluates and registers (licenses) pesticides to ensure they can be used safely. These pesticides include products used in the mosquito control programs which states and communities have established. To evaluate any pesticide, EPA assesses a wide variety of tests to determine whether a pesticide has the potential to cause adverse effects on humans, wildlife, fish and plants, including endangered species and non-target organisms.

**mosquito officials
select control
measures that best
suit local conditions**

Officials responsible for mosquito control programs make decisions to use pesticides based on an evaluation of the risks to the general public from diseases transmitted by mosquitoes or on an evaluation of the nuisance level that communities can tolerate from a mosquito infestation. Based on surveillance and monitoring, mosquito control officials select specific pesticides and other control measures that best suit local conditions in order to achieve effective control of mosquitoes with the least impact on human health and the environment. It is especially important to conduct effective mosquito prevention programs by eliminating breeding habitats or applying pesticides to control the early life stages of the mosquito. Prevention programs, such as elimination of any standing water that could serve as a breeding site, help reduce the adult mosquito population and the need to apply other pesticides for adult mosquito control. Since no pesticide can be considered 100% safe, pesticide applicators and the general public should always exercise care and follow specified safety precautions during use to reduce risks. This fact sheet provides basic information on larvicides, a type of pesticide used in mosquito control programs.

What are Larvicides?

**larvicides kill insect
larvae**

The mosquito goes through four distinct stages during its life cycle: egg, larva, pupa, and adult (see box). Larvicides kill insect larvae. Larvicides include

biological insecticides, such as the microbial larvicides *Bacillus sphaericus* and *Bacillus thuringiensis israelensis*. Larvicides include other chemicals used for controlling mosquito larvae, such as temephos, methoprene, oils, and monomolecular films. Larvicide treatment of breeding habitats help reduce the adult mosquito population in nearby areas.

How are Larvicides Used in Mosquito Control?

larvicides are used as one of several tools in mosquito control

State and local agencies in charge of mosquito control typically employ a variety of techniques in an Integrated Pest Management (IPM) approach, which include *surveillance*, *source reduction*, *larviciding* and *adulticiding*, to control mosquito populations. Since mosquitoes must have water to breed, source reduction aims to cut down opportunities for breeding, and can be as simple as turning over trapped water in a container to large-scale engineering and management of marsh water. Larviciding involves applying chemicals to habitats to kill pre-adult mosquitoes. Larviciding can reduce overall pesticide usage in a control program by reducing or eliminating the need for ground or aerial application of chemicals to kill adult mosquitoes.

What are Microbial Larvicides?

microbial larvicides are bacteria that are registered as pesticides

Microbial larvicides are bacteria that are registered as pesticides for control of mosquito larvae in outdoor areas such as irrigation ditches, flood water, standing ponds, woodland pools, pastures, tidal water, fresh or saltwater marshes, and storm water retention areas. Duration of effectiveness depends primarily on the mosquito species, the environmental conditions, the formulation of the product, and water quality. Microbial larvicides may be used along with other mosquito control measures in an integrated pest management (IPM) program. The microbial larvicides used for mosquito control are *Bacillus thuringiensis israelensis* (Bti) and *Bacillus sphaericus* (Bs).

Mosquito Life Cycle

egg - hatch when exposed to water;

larva - (pl. - larvae) lives in the water; molts several times; most species surface to breathe air;

pupa - (pl. - pupae) non-feeding stage just prior to emerging as adult;

adult - flies short time after emerging and after its body parts have hardened.

Microbial larvicides are harmful to insects but not mammals

- ***Bacillus thuringiensis israelensis (Bti)*** is a naturally occurring soil bacterium registered for control of mosquito larvae. *Bti* was first registered by EPA as an insecticide in 1983. Mosquito larvae eat the *Bti* product which is made up of the dormant spore form of the bacterium and an associated pure toxin. The toxin disrupts the gut in the mosquito by binding to receptor cells present in insects, but not in mammals. There are 25 *Bti* products registered for use in the United States. Aquabac, Teknar, Vectobac, and LarvX are examples of common trade names for the mosquito control products.
- ***Bacillus sphaericus*** is a naturally occurring bacterium that is found throughout the world. *Bacillus sphaericus* was initially registered by EPA in 1991 for use against various kinds of mosquito larvae. Mosquito larvae ingest the bacteria, and as with *Bti*, the toxin disrupts the gut in the mosquito by binding to receptor cells present in insects, but not in mammals. VectoLex CG and WDG are registered *B. sphaericus* products, and are effective for approximately one to four weeks after application.

Microbial larvicides do not pose concerns for human health or the environment when used according to product labels

Do Microbial Larvicides Pose Risk to Human Health?

The microbial pesticides have undergone extensive testing prior to registration. They are essentially nontoxic to humans, so there are no concerns for human health effects with *Bti*, or *B. sphaericus*, when they are used according to label directions.

Do Microbial Larvicides Pose Risks to Wildlife or the Environment?

Extensive testing shows that microbial larvicides do not pose risk to wildlife, non-target species or the environment.