Larvicide

What is a larvicide?

Larvicides are chemical or biological agents that are applied directly to mosquito-breeding sites. Larvicides control mosquito populations by preventing mosquito larvae from developing into adults. In general, the use of larvicides is preferred over the use of adulticides (adult mosquito control) because larvicides selectively target mosquito larvae and are a more environmentally acceptable control method. Larvicides can be easily applied directly to mosquito-breeding sites in late spring and early summer to reduce the number of emerging mosquitoes.

How can larvicides be used to control West Nile virus (WNv)?

Only certain types of mosquitoes are involved in the spread of WNv. *Culex* mosquitoes are a species that play a key role in the spread of WNv to birds.

The *Culex* mosquito favours artificial areas for breeding, like catch basins and areas you could find in your own backyard (e.g. bird baths, plant containers, rain gutters, wading pools). Larvicides are effective only at specific times in the mosquito larvae's development. Therefore the timing of the application is important.

By reducing the number of *Culex* mosquitoes, the spread of WNv among birds is reduced. Having fewer birds infected with the virus may reduce the risk of the infection being transmitted by infected mosquitoes to people.

Remember, reducing mosquito-breeding sites on your own property is also an important mosquito control measure.

How does the larviciding happen?

For public property, a permit to apply the larvicide has to be obtained from the Ministry of Environment. This permit is required to ensure that only properly trained people apply the products and that the areas being treated are carefully mapped and recorded. Only products that have been approved for this use by Health Canada Pest Management Regulatory Agency would be used.

There is also a requirement to notify the public prior to any larviciding application.

What products have been approved for larviciding?

The Ministry of Environment has approved three larvicides for use, with conditions, in WNv control. Methoprene is to be used in catch basins and sewage lagoons. *Bacillus sphaericus* can be used in catch basins and surface waters depending on the formulation chosen. *Bacillus thuringiensis israelensis* (Bti) can be used in storm water ponds, ditches and natural/wetland areas.

If surveillance data indicate that larviciding is necessary, then catch basins would be a priority area.

It is important to remember that larviciding is only one part of a mosquito control program. Although larvicides are effective where they are used, the purpose of larviciding catch basins for WNv control is to reduce the type of mosquitoes that spread the virus among birds. The use of larvicides will not eliminate all adult mosquitoes.

How will the decision to larvicide be made?

The health unit will be reviewing and analyzing WNv data. Should larviciding be needed, the health unit will discuss the timing of a larviciding program with the municipality.

What is methoprene?

Methoprene, in a pellet or briquet form, is a slow-release product that controls insect growth. Pellets last for about 21 days. Briquets last for about 90 days. Registered for use in Canada in 1977, methoprene is registered for the control of mosquito larvae.

Municipalities must also have a permit from the provincial pesticide regulatory authority to use methoprene.

Does the use of methoprene have an effect on human health and the environment?

Studies show methoprene is of low toxicity and poses little risk to people when used properly. Direct contact can cause mild eye and skin irritation, but there are no known serious health effects. Since methoprene is used in catch basins and sewage lagoons, there is no reason why people should come into contact with it.

Monitoring studies conducted by the Ministry of Environment have shown that methoprene is not detected in drinking water or surface water. Methoprene is applied in solid form so there is no exposure through the air.

Methoprene has low toxicity to birds and fish and is non-toxic to bees. It is toxic to some freshwater invertebrates, such as crayfish. Studies have shown that any impact on aquatic invertebrates was not permanent and the populations were able to recover.

What is Bti?

Bti is a naturally-occurring bacteria (*Bacillus thuringiensis israelensis*) used as a larvicide to kill mosquitoes during the larva stages of development. The bacterium is common in soils and aquatic environments. Bti is also used in the control of black flies.

What is the effect of Bti on the environment?

Bti only becomes toxic in the stomachs of mosquito larvae. Because of this, it does not affect

other insects, honeybees, fish, birds or mammals. The United States Environmental Protection Agency categorizes the risks posed by Bti strains non-existent. Bti breaks down quickly in the environment.

Studies on the effect of short and long-term use of Bti in wetlands are ongoing at the University of Western Ontario.

Is Bti harmful to humans?

There are no reports of serious short or long-term effects from inhaling or ingesting Bti. Mild skin and eye irritation have been reported from direct contact with this agent. Eating plants or drinking water exposed to Bti has not been shown to produce any ill effects in humans. The Bti toxin is only activated by the digestive systems of the mosquito or black fly and cannot be activated in the acid stomachs of mammals.

What is Bacillus sphaericus?

Bacillus sphaericus is a naturally occurring soil bacterium that targets mosquito larvae present in water. *B. sphaericus* spores are eaten by mosquito larvae and release toxins into the mosquito's gut. This disrupts the feeding cycle of the larvae.

Is B. sphaericus harmful to humans?

Human effects from exposure to *B. sphaericus* are very rare. Eye and skin irritation may occur so it's important to follow label directions for proper handling procedures.

What kind of effects does B. sphaericus have on the environment?

The non-toxic and non-pathogenic agent has very few environmental risks associated with its use. When the label directions are followed there does not appear to be harmful effects on mammals, birds, fish, insects or worms.

Is there a mosquito control product available for private property use?

The Ministry of the Environment recommends that homeowners focus on removing mosquito-breeding sites and to take personal protection to reduce the chances of being bitten by mosquitoes. However, private homeowners can hire a licensed exterminator to treat water **wholly contained on owners own property**. Information on the availability of products and regulations for use is available through the Ministry of Environment.

If you are a homeowner, you can purchase a domestic larvicide product containing Bti (*Bacillus thuringiensis israelensis*) or methoprene, available at MOE-licensed vendor outlets such as hardware stores and garden centres. These products may be applied only in water that is **wholly contained on the property and has no outflow** (this would exclude catch basins or flowing ditches). All label directions and precautions must be followed in applying the larvicide.

Where can I get more information?

The health unit is encouraging people to reduce mosquito-breeding sites and to take personal precautions as first steps to protect themselves against WNv. For more information call *Your Health Connection* at 705-721-7520 (1-877-721-7520) or visit the following websites:

Simcoe Muskoka District Health Unit
www.simcoemuskokahealth.org

Ministry of Environment
www.ene.gov.on.ca