Health Canada Santé Canada

Canada

Consumer Product Safety

Bti - *Bacillus thuringiensis* subspecies *israelensis*

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(PDF Version - 48 K)

Bacillus thuringiensis subspecies *israelensis*, commonly referred to as Bti, is a bacterium found naturally in soils. Since 1982, it has been used successfully worldwide as a biological pest control agent to combat mosquitoes and black flies.

How does Bti work?

During the spore-forming stage of its life cycle, the Bti bacterium produces a protein crystal which is toxic only to mosquito and black fly larvae. These microscopic crystals are ingested by insect larvae when they are feeding. In the alkaline environment of the susceptible insect's digestive system, the crystals are dissolved and converted into toxic protein molecules that destroy the walls of the insect's stomach. The insect usually stops feeding within hours and dies within days.

Other subspecies of Bt are registered for use in Canada and these too work only on specific species of insects. For instance,Bt subspecies *tenebrionis* (Btt) is effective against Colorado potato beetles andBt subspecies *kurstaki* (Btk) works only against a group of insects called lepidopterans, which includes destructive tree pests such as gypsy moths, spruce budworms and forest tent caterpillars.

How is Bti used?

Bti is applied directly to the water where mosquito and black fly larvae are found. The bacteria are suspended in the water where the larvae will ingest it. None of the products containing Bti may be applied to treated, finished drinking water for human consumption.

Nearly all products containing Bti are Restricted class products used to control black fly and mosquito larvae in aquatic situations where the flow of water is not confined to a small area. Most provinces require that applicators be certified to use restricted class products. In some provinces, Bti use may also require a permit issued by the provincial pesticide regulatory authority.

Commercial class Bti products are also available, but can only be used to control black fly and mosquito larvae in private ponds and farm dugouts where no outflow beyond the property limits exists. Bti is also used to control fungus gnat larvae in greenhouse ornamental plants.

Are there health concerns related to the use of Bti?

Bti poses little threat to human health through either handling products directly or being exposed to them indirectly, e.g. during a provincial or municipal mosquito control program. To activate Bti toxins, alkaline conditions that exist only in certain insects' digestive systems must be present. The acidic stomachs of humans and animals do not activate Bti toxins. There have been no documented cases involving toxicity or endocrine disruption potential to humans or other mammals over the many years of use in Canada and around the world. Studies have shown that even if Bti spores are ingested or inhaled, they are eliminated without any adverse health effects.

Registered products containing Bti are primarily intended for use by trained applicators in federal, provincial and municipal mosquito and black fly programs. Label restrictions for these products permit the application only to the aquatic sites where mosquito and black fly larvae are found, and not to treated, finished drinking water. Following a review of human health risk assessments, Health Canada has determined that products containing Bti do not pose any health risks to humans and other mammals.

Based on the lack of human health risk and long history of safe use associated with Bti and other varieties ofBt, the PMRA has no human health and safety concerns with the application of registered products containingBt to bodies of water that will be used for human consumption. The direct application of Bti to treated, finished drinking water, however, is not considered acceptable practice by the PMRA.

How can you be sure that Bti is not affecting health or the environment?

Different varieties ofBt, including Bti, have been widely used in insect control programs in Canada and the US for many years and have demonstrated a remarkable safety record. The weight of scientific evidence indicates that Bti is non-infectious and non-toxic to humans and other mammals and poses little risk at dosage levels permitted in insect control programs. While adverse effects have been observed in individuals of some non-target aquatic insect species, no lasting impact on the populations of these species has been shown from use of Bti.

For more information about pest control products, contact Health Canada's Pest Management Information Service at 1-800-267-6315 or at (613) 736-3799 (outside of Canada).

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