Midge Suppression Pilot Program

Helpful Information and FAQs

Why is Maryland treating Baltimore County for Midges?
In response to concerns from citizens and businesses in the Back River area, Governor Larry Hogan issued an Executive Order creating a midge supression pilot program directed by the Maryland Department of Agriculture (MDA) in conjunction with Maryland Department of Natural Resources (DNR). The pilot program will be implemented this summer (2017) on the Back River in Baltimore County.

Program Objectives
The objective of this pilot program is to test the feasibility of Back River midge control and determine the impact of *Bacillus thuringiensis israelensis (Bti)* in controlling midge populations in the area. The pilot program will also aim to determine the most cost effective dosage and frequency of *Bti* treatments in the area.

Planned Treatment Method
Bacillus thuringiensis israelensis (Bti) will be applied by boat using an apparatus designed specifically for midge control. *Bti* is a naturally occurring soil bacterium that has been demonstrated to be non-toxic to humans, mammals, birds, fish and most invertebrates. While the schedule is subject to change, the preliminary schedule is for five monthly treatments: August-October 2017, and May-June 2018.

Treatment Areas
Staff from MDA and DNR have worked together to identify a 260-acre section of the Back River in Essex where midge populations have become a major nuisance.

What product will be used?
The insecticide that will be used for this project is Bactimos WG. The active ingredient is *Bti*.

Is Bti safe?
The pesticide, Bactimos WG, was chosen because of its effectiveness for this use and because it is only harmful to a very limited variety of organisms including midge larvae, black fly larvae, mosquito larvae and a few other aquatic Dipteran (flies) insects. It is not harmful to humans, fish, crabs or other aquatic invertebrates. More Information

Monitoring
Maryland Department of Natural Resources biologists will conduct larval sampling and continuous adult sampling using light traps. DNR will also track midge complaints in the area. For more information, contact Maryland Department of Natural Resources (Access.DNR@maryland.gov).

Spray Notification
The Maryland Department of Agriculture will manage the aquatic spray contract and issue spray notifications.

What are Midges?
Non-biting midge flies or chironomids commonly occur in inland and coastal natural and man-made bodies of water. These midges are commonly known as “blind mosquitoes” because they are mosquito-like but do not bite. Midges are also called “fuzzy bills” because of the male’s bushy antennae. These aquatic insects are tolerant of a wide range of environmental conditions. Chironomid midges are found in swift moving streams, deep slow moving rivers, stagnant ditches, and in lakes and ponds that are rich in decomposing organic matter. The presence of certain chironomid midges is often used as an indicator of water quality.

Bodies of water in urban and suburban areas are subjected to intensive human use through residential, recreational and agricultural activities. Through runoff, these ponds and lakes often become exceedingly rich in nutrients. Consequently, the variety of organisms in such habitats is usually low with just a few pollution tolerant species developing large populations. Some species of chironomid midges that are tolerant of low dissolved oxygen conditions often are a major component of the bottom invertebrate organisms of urban and suburban lakes, ponds and storm water retention ponds. (*Credit: North Carolina State Extension*)

What is Bti - Bacillus thuringiensis israelensis?

Bacillus thuringiensis subsp. *israelensis* (*Bti*) is a naturally occurring soil bacteria used as a microbial insecticide to control the spread of vector-borne diseases, protect public health, and manage insect pest species. *Bti* was first discovered in a stagnant pond in Israel in 1976 (Margalit and Dean 1985). Initial testing of *Bti* revealed acute toxicity to mosquitoes (Goldberg and Margalit 1977) and black flies (Undeen and Nagel 1978). Further research demonstrated that *Bti* is nontoxic to humans, mammals, birds, beneficial insects, fish, plants, and most aquatic organisms (EPA 1998 *Bti* EG2215 Factsheet). *Bti* an ideal pesticide with greatly reduced environmental impacts in comparison to man-made chemical insecticides. In addition, *Bti* is species specific, breaks down rapidly, limited non-target impacts (de Barjac and Sutherland 1990), There are 26 *Bti* products in the United States with some of the following trade Names: Vectobac, Teknar, Aquabac, Bactimos, LarvX, etc.

***Bti* application for midge control**

Bti is applied by via boat spraying at a safe rate specified by the United States Environmental Protection Agency in the form of liquid. *Bti* is currently being used in several states to control midges and black flies. *Bti* is also currently being used to suppress mosquito populations throughout Maryland.

How *Bti* impacts midges

Midges must actively ingest *Bti* in order for the material to be effective. *Bti* is a spore-forming bacterium that produces protoxins in the form of parasporal protein crystals. *Bti* works best in midges with alkaline guts because the protoxins become activated into highly toxic delta-endotoxins. The endotoxins cause a rapid breakdown in the lining of the midgut and necrosis of skeletal muscles, resulting in paralysis and mortality of target insect pests. *Bti* is nontoxic to other non-target species due to their acidic digestive system.

Non-target impacts of *Bti*

Research has demonstrated that *Bti* is nontoxic to humans, mammals, birds, fish (trout and bluegill), and most invertebrates when properly applied (EPA 1998 Reregistration Eligibility Decision). Data from a large number of studies indicate that *Bti* can be used in a carefully managed treatment program to selectively control insect pest and vector species with minimal adverse environmental impacts (Jackson et al. 2002), (Laird et al. 1990).

Further Reading

- de Barjac H. and D.J. Sutherland (eds.). 1990. Bacterial control of mosquitoes and black flies: Biochemistry, genetics and applications of Bacillus thuringiensis israelensis and Bacillus sphaericus. Rutgers University Press, New Brunswick, NJ. 349 pp.
- Environmental Protection Agency (EPA). 1998. EPA Bacillus thuringiensis subspecies israelensis stain EG2215 Factsheet; available from http://www.epa.gov/pesticides/ biopesticides/ingredients/factsheets/factsheet_006476.htm.; Internet.
- Environmental Protection Agency (EPA). 1998. EPA Reregistration Eligibility Decision (RED) Bacillus thuringiensis EPA738-R-98-004; available from http://www.epa.gov/oppsrrd1/REDs/ 0247.pdf
- Goldberg, L.J. and J. Margalit. 1977. A bacterial spore demonstrating rapid larvicidal activity activity against Anopheles sergentii, Uranotaenia unguiculata, Culex univitattus, Aedes aegypti and Culex pipiens complex. Mosquito News 37: 355-358.
- Jackson, J.K., R.J. Horwitz and B.W. Sweeney. 2002. Effects of Bacillus thuringiensis israelensis on black flies and nontarget macroinvertebrates and fish in a large river. Transactions of the American Fisheries Society 131: 910-930.
- Laird, M., L.A. Lacey and E.W. Davidson (eds.). 1990. Safety of Microbial Insecticides. CRC Press, Inc. Boca Raton, Florida. 259 pp.

For more information, visit the Maryland Department of Agriculture's Midge Suppression Pilot Program Webpage:

http://mda.maryland.gov/plants-pests/Pages/Midge-Program.aspx