

NEW! boreGONE!®

Adult Emerald Ash Borer bio insect control technical information



boreGONE! protects the beauty, health and value of forest canopy from devastation by invasive Emerald Ash Borer (EAB). EAB now infests 22 states, 2 provinces in Canada and it continues to spread. It has killed an estimated 70 million ash trees and the remaining 7.5 billion ash trees in N. America are at risk. Native ash are found in forests and widely used as street trees. EAB now causes an estimated \$2 billion in annual economic damage in the U.S.

boreGONE! bio-insecticide

Suppresses adult EAB populations before they mate and lay eggs

Economical option for ash dense sites

Tree size does not affect performance

No acute toxicity to bees or parasitic wasps

BT, a time tested tool for forest insect control

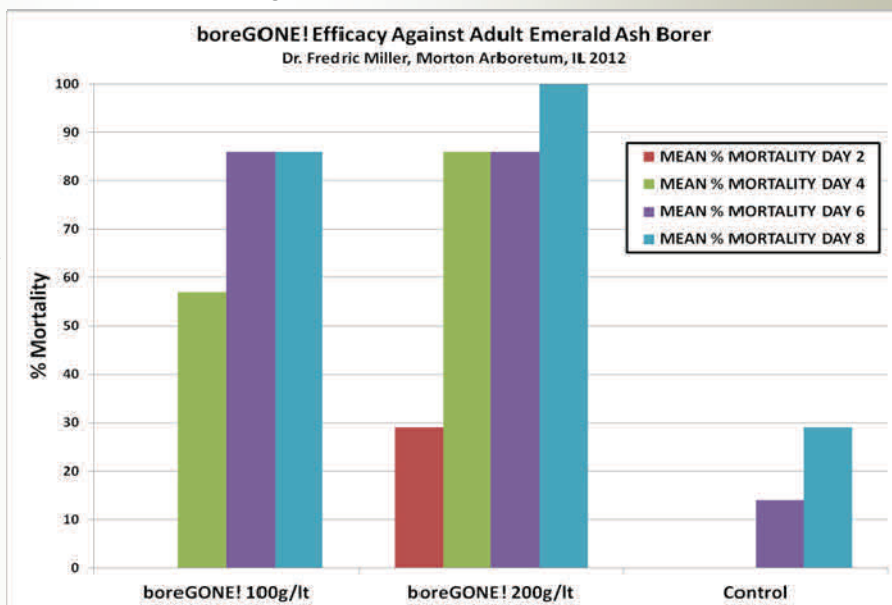
About Phyllom BioProducts: Phyllom is a US based R and D company that discovers, develops, registers, and produces natural bio insect controls for forest, landscape, turf and crop care markets. Phyllom has developed a new beneficial *Bacillus thuringiensis* (BT) strain for the market. Phyllom's products are based on a patented strain of *Bacillus thuringiensis galleriae* ("BTG"). This BT strain has exceptional activity against certain beetles and is unique in that it is active against both adult and larva stages of beetles when the active protein is ingested.

Bacillus thuringiensis galleriae

Used by organic gardeners, mosquito control districts and foresters for decades, *Bacillus thuringiensis* (BT) is natural and widespread in nature, thriving in soil and sediments. The insect toxicity of BT is attributable to crystalline proteins (Cry proteins) produced during spore formation. Each BT strain produces a unique Cry protein. Each Unique Cry protein is toxic to specific groups of insects. Phyllom's BT galleriae strain produces Cry proteins which are toxic to certain species of insects in the order Coleoptera (beetles). BT must be ingested by insects for control. Once ingested, the insect's digestive enzymes cleave the BT protein to form a stable insect toxin. The protein then progresses through the insect's digestive system, where the protein causes the formation of pores, which leads to toxicity as manifested by the cessation of insect feeding and gut paralysis, followed by the formation of midgut lesions and then leading to the death of the Emerald Ash Borer.

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boreGONE! was tested against adults of the Emerald Ash Borer (*Agrilus planipennis*) on potted green ash at the Morton Arboretum, Lisle, IL. The high rate gave 100% cumulative mortality after 8 days.



Application Timing

To help prevent or slow tree and forest mortality and to manage adult beetle populations, apply **boreGONE!** from after adult emergence to during the peak of adult flight for the targeted tree species as determined by degree day models, pest surveys or pest trapping programs. Repeat as often as needed to reduce beetle populations to threshold levels through the season. Consult with local, state and federal foresters and arborists or cooperative extension to access information related to predictive models and or surveys which predict the best timing of applications against Emerald Ash Borer.

Examples of Emerald Ash Borer regional degree day model information are shown on the following links:

<http://uspest.org/risk/models>

<http://www.oardc.ohio-state.edu/gdd/>

boreGONE! aerial spray deposit on ash leaf



boreGONE! is an H₂O dispersible formula containing 76.5% active ingredient. It is to be mixed with water and sprayed using hand-held, commercial ground or aerial application equipment. Upon full EPA registration, it is expected that **boreGONE!** will meet requirements of the USDA National Organic Program (NOP) for use in production of organic crops. All **boreGONE!** inert ingredients were selected from those commonly used in food applications.

No harmful effects against mammals, birds or fish

EPA registration tests & decades of BT use against forest and municipal insect pests lead to the conclusion that *Bacillus thuringiensis* bio-insecticides are not likely to cause harm to man or the environment when used according to directions.

Compatible with EAB parasitic wasp release

The toxicity of *Bacillus thuringiensis galleriae* to EAB parasitoid wasps was evaluated by the USDA Forest Service/Michigan State University*. Wasps were exposed to *Bacillus thuringiensis* paste suspended in honey at 0.4 micrograms protein toxin per microliter honey, and % survival was evaluated after 7 days exposure. Results, shown below, confirmed that the parasitoid wasps were unaffected by *Bacillus thuringiensis galleriae*.

Parasitoid	Family	Origin	Number of insects	% Survival
<i>Tetrastichus planipennisi</i>	Eulophidae	China	20	100%
<i>Spathius agrili</i>	Braconidae	China	20	100%
<i>Oobius agrili</i>	Encyrtidae	China	20	100%
<i>Atanycolus</i> spp.	Braconidae	Michigan	12	100%

*Dr Leah Bauer, Research Entomologist & Adjunct Associate Professor USDA Forest Service Northern Research Station & Dept. Entomology Michigan State University

Other Non-Target Insects

Tests have shown that *Bacillus thuringiensis galleriae* does not affect Honey Bees (*Apis mellifera*, Hymenoptera Apidae); ladybird beetles (*Hippodamia convergens*, Coleoptera, Coccinellidae); wireworms (*Melanotus communis*, Coleoptera Elateridae), silkworms (*Bombyx mori*, Lepidoptera, Bombycidae); nor was it toxic against cutworms (*Spodoptera litura*, Lepidoptera Noctuidae). No toxicity is expected against any Hymenopteran spp.

Please read and follow all **boreGONE!** EPA Experimental Use Permit conditions and label instructions.

For more information: www.PhyllomBioproducts.com, DaveMatthews@Phyllom.com, Tel. 858-349-2251