

Branching out

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Protecting ash trees from the emerald ash borer

Woodpecker activity on ash trees in the winter may not seem worrisome; however, it may be a sign that a beetle is hiding under the bark. Could it be the emerald ash borer?

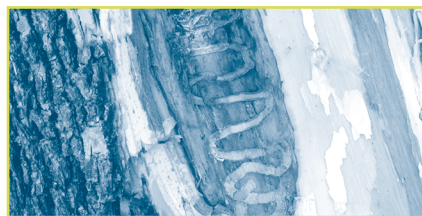
The emerald ash borer (*Agrilus planipennis*) is a splendid metallic blue-green beetle belonging to the order Coleoptera. However, beneath its attractive exterior lurks an exotic pest that poses a threat to millions of ash trees across Canada. In Quebec, the emerald ash borer was first detected near Carignan, in the Montérégie region, in June 2008 by the Canadian Food Inspection Agency (CFIA). Researchers at the Canadian Forest Service (CFS) have undertaken studies in collaboration with the Institut national de la recherche scientifique–Institut Armand-Frappier (INRS–IAF) in order to identify natural control methods for this pest introduced from Asia.



Photo: D.B. Lyons (CFS)

The insect's life cycle

Despite the lack of data on emerald ash borer biology in Quebec, researchers believe that the first female beetles begin laying their eggs in bark crevices on the trunk and branches of ash trees in late June. About 10 days after the eggs are laid, the tiny larvae emerge and burrow into the bark. From June to October, the larvae excavate meandering galleries under the bark, all the while feeding on the inner bark (phloem) and the outer sapwood. The larvae have a slender, creamy white body with bell-shaped segments.



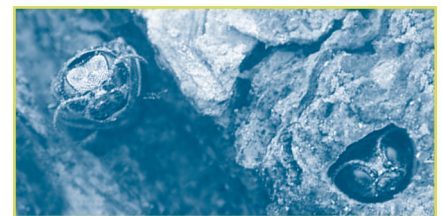
S-shaped galleries.

Photo: Edward Czerwinski (Ontario Ministry of Natural Resources)

Emerald ash borer larvae overwinter between the sapwood and the bark. Mature larvae pupate in the spring and gradually transform into adults. Two weeks later, the adult beetles emerge through D-shaped exit holes in the bark.

Under attack

It is at the larval stage that the emerald ash borer causes damage and kills ash trees. By feeding on the layer of live cells under the bark, the larvae cause a gradual dieback of the tree crown over a period of a few years. The tree may respond to the attack by producing epicormic shoots and stump sprouts.



Adults emerging from the bark.

Photo: Leah Bauer (USDA Forest Service & Michigan State University)



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An abundant seed crop may also be produced. The bark in areas overlying larval galleries is usually deformed and there are spots, swelling and cracking. The adult beetles feed on the foliage of ash trees but cause little damage.

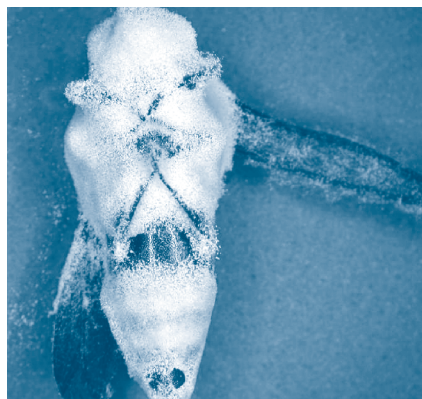
Control methods

It is not possible to completely eradicate emerald ash borer populations. By the time the signs of an infestation are detected on trees, the first adult insects have been gone for a whole year! Furthermore, the emerald ash borer, like many other exotic pests, has few natural enemies in its new environment. Since it is difficult to control emerald ash borer populations once they become established, it is important to halt the spread of the pest and reduce its numbers.

To help keep emerald ash borer populations in check, CFS researchers have developed a systemic insecticide called TreeAzin4 that is transported in the sap. The active ingredient is an extract from the neem tree, a species native to India. Registration of this insecticide was approved in Canada for temporary use in 2008 and 2009 given the urgency of the situation.

Entomopathogenic fungi represent another avenue of research for the CFS and the INRS-IAF with respect to natural control methods. To identify entomopathogenic fungi that attack a specific insect pest, it is necessary to conduct research in the target insect's natural habitat. Researchers then isolate and grow the fungi in the laboratory in order to narrow the choice down to the most virulent strain with the greatest host specificity. The mode of action of entomopathogenic fungi can be likened to that of contact insecticides. A fungal spore lands on the

insect and then germinates. The fungus penetrates the insect's body and starts producing enzymes. It eventually kills the emerald ash borer by feeding on it.



Emerald ash borer attacked by an entomopathogenic fungus (Beauveria bassiana).
Photo: George Kyei-Poku (CFS)

How the public can help

Successful control of the emerald ash borer requires the co-operation of the general public. The public can report signs of an infestation to the CFIA. Canadian Forest Service and Institut Armand-Frappier researchers are continuing their efforts to find ways to control the emerald ash borer.

USEFUL LINKS:

CFIA:

<http://www.inspection.gc.ca>

Forest invasive alien species of Canada:

<http://www.exoticpests.gc.ca>

Insects and diseases of Canada's forests:

<http://imfc.cfl.scf.rncan.gc.ca/accueil-home-eng.html>

FOR MORE INFORMATION, PLEASE CONTACT:

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Biologist examining an ash log.
Photo: Robert Lavallée (CFS)

Firewood: a pathway for dispersal

The emerald ash borer can fly an estimated 8 to 10 metres per day, which works out to a maximum of 2.5 kilometres during the insect's adult life. Long-distance dispersal of the pest is therefore tied to human activity. In 2008, the CFIA launched a campaign to increase public awareness of the risks associated with the movement of firewood. Since the emerald ash borer spends most of its life under the bark of ash trees, the CFIA recommends that people only buy and burn local firewood.



For more information:

<http://www.inspection.gc.ca/english/plaveg/for/prod/firebroche.shtml>

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