Emerald Ash Borer (EAB)

A Toronto Master Gardeners Guide

Beautiful but deadly, the invasive Emerald Ash Borer has become a serious pest of native and European ash trees (*Fraxinus* spp.) in Toronto and vicinity.
Photo: David Cappaert/Michigan State University

The Emerald Ash Borer (*Agrilus planipennis*) is a wood-boring beetle native to Asia that feeds and kills Ash trees (*Fraxinus* genus). The beetle's larva bores through the bark into the cambium creating serpentine galleries where it feeds on the phloem, interrupting the flow of water and nutrients into the tree and eventually leading to its death.

Background Information

The beetle was first discovered in Canada in Windsor in 2003 and, in the City of Toronto, in 2007. Infestations spread rapidly from tree to tree. Once the tree becomes a target, it is expected to die within 2-3 years. City officials forecast that most of Toronto's estimated 860,000 Ash trees will be dead by 2017, while the numbers outside the GTA are much larger. Although eradication is not feasible, some trees can be successfully inoculated if treated during the early stage of infestation.

Plants affected

All species of Ashes (genus: *Fraxinus*), regardless of size, age or health, are affected by the beetle. Common ashes found in Toronto include: white ash (*Fraxinus americana* L.), green or red ash (*Fraxinus pennsylvanica* Marsh.), black ash (*Fraxinus nigra* Marsh.) and European black ash (*Fraxinus excelsior* L.). Other susceptible native ash species are the rarer blue ash (*Fraxinus quadrangulata* Michx.) and very rare pumpkin ash (*Fraxinus profunda* Bush), both found in extreme southwestern Ontario.

In its native environment, the EAB also infest other three species of trees including *Ulmus*, *Pterocarya* and *Juglans* species. However, there have been no reported North American infestations other than that of *Fraxinus* species (Canadian Food Inspection Agency, 2010).

Characteristics

The EAB is easily recognized by its metallic green, elongated body and kidney-shaped dark eyes. It measures 8.5 to 14 millimeters (approximately ½ inch) in length and approximately 3.5 millimeters (1/8 inch) in width. Larvae, found under

the bark, are creamy white and flat with distinctive bell-shaped segments reaching up to 30 millimeters (1 inch) and brown head.

Life Cycle & Habits

EAB mating occurs during the late spring to late summer (late June to late August) and a female will lay approximately 60-90 eggs within small openings in the Ash bark (Roberts, 2012). Once the eggs hatch, the larval insects emerge, then burrow and feed their way through the tree's cambium layers. The larva grows and molts four times before becoming a pupa. In the spring of the following year the larvae pupate into a sexually mature form, before emerging as beetles in late May and exiting its host tree via a 'D-shaped' 3-4mm exit hole. Adults can be seen feeding on the margin of ash leaves. The adult only survives on average three to four weeks and then die, before which mating occurs, to renew the cycle.

Signs & Symptoms of EAB

The first step is to make sure you confirm you have an Ash tree. Ash trees are recognized by its ridged, diamond-patterned bark (on mature trees), opposite branches, pinnately compound leaves with 5-11 leaflets ending in a single terminal leaflet. In the fall, long and narrow clusters of 'oar-shaped' seeds appear. The following documentation may help with tree identification: http://www.emeraldashborer.info/documents/E-2892Ash1.pdf

Once tree identification is certain, step away from the tree and look for signs of crown or branch dieback, crown thinning, premature leaf yellowing or branches growing at the base of the trunk (epicormic shoots – suckers or water sprouts). Next, closely inspect bark for 'D' exit holes, 'S' galleries under vertical cracks in the bark, increased woodpecker activity, shaggy bark from squirrel's activity, feeding notches in leaves and/or heavy seed production.

For a visual identification guide, please refer to the following publication by the Canadian Forestry Services: http://cfs.nrcan.gc.ca/pubwarehouse/pdfs/26856.pdf

Management & Control Strategies

I. Individuals:

Having the knowledge to recognize the early signs of EAB infestation, can help tremendously with its management strategy. Please be aware that other conditions may cause similar symptoms on trees and therefore, you need a qualified arborist to confirm the presence of EAB.

If you think a City tree is infested by EAB, report to your municipal authorities (in Toronto, call 311). If the tree is in private property, you can call a certified arborist to examine the extent of the damage and determine whether or not it is too late for inoculation.

Infested trees need to be managed either by pesticide injections or by tree removal.

Inoculation: If assessed promptly, a healthy tree can be treated with insecticide injections of TreeAzin™, a registered pesticide with Health Canada Regulatory agency. This bio-chemical functions as a growth disruptor interrupting the EAB molting cycle, killing feeding larvae, and interfering with EAB reproduction.

You may want to consider professional treatment if your tree is in good overall health and with limited level of infestation; if it has a good diameter to withstand injections and, if it is of great value to you. This vaccine will protect for a period of two years when further inoculations may be required if the insect still poses a danger in the area.

Tree Removal: In cases where the damage is too extensive or, the situation too hazardous, removal may be the only solution. In this case, hire a qualified and insured arborist, making sure you get written specifications on the scope of the job.

Pro-active solutions: In order to prevent further spread of EAB, avoid moving wood materials out of the EAB regulated zone; in Canada: http://www.inspection.gc.ca/plants/plant-pests-invasive-species/insects/emerald-ash-borer/areas-regulated/eng/1347625322705/1367860339942

Tree replacement and/or new planting: As the city's tree coverage will decrease due to EAB, it is important that we plant a variety of native trees (excluding Ashes for the time being) to rebuild its canopy.

Treatment to preserve ash trees used in association with tree monitoring, and removal/replacement of unhealthy or dead ash trees will allow retention of a healthy canopy and the value of urban forests.

II. Municipally:

Many municipalities have placed prism traps to monitor first signs of infestation and estimate population numbers. Please note, that these are only used as indicators and are not effective in the prevention or elimination of EAB.

The City of Toronto has been monitoring and keeping inventory of many Ash trees in the streetscapes and in certain public parks. An aluminum green sprayed tag in your City tree indicates that the tree has been added to the database for monitoring purposes.

A future loss of Ash trees has the potential to lead to a significant decline in the ecosystem services provided by Ash trees including environmental benefits such as: wildlife habitat, carbon sequestration, pollutant absorption, canopy /shade coverage, clean air production, social benefits of aesthetic value and recreation and, the economic value for the use of Ash trees as a natural resource.

References

City of Toronto: https://www.toronto.ca/services-payments/water-environment/trees/
City of York: http://www.york.ca/wps/portal/yorkhome/environment/yr/forests/emeraldashborer/theemeraldashborer
Natural Resources Canada: http://www.nrcan.gc.ca/forests/fire-insects-disturbances/top-insects/13377
Canadian Food Inspection Agency: http://www.inspection.gc.ca/plants/plant-protection/insects/emerald-ash-borer/eng/1337273882117/1337273975030
Ontario Ministry of Natural Resources & Forestry: https://www.ontario.ca/page/emerald-ash-borer
Leaf: http://www.yourleaf.org/emerald-ash-borer
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