



# Emerald Ash Borer

*Agrilus planipennis*, Fairmaire 1888

Alberta Regulation:  
Alberta Pest Act



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## Overview:

Emerald Ash Borer (EAB) is a jewel beetle in the Buprestidae family. They are native to East Asia and Eastern Russia having been accidentally introduced in North America from infested wood packaging material and the movement of firewood.<sup>2</sup> Since its detection in Detroit, Michigan and Windsor, Ontario in 2002, it has rapidly spread despite early efforts to contain it. Tens of millions of ash trees in the genus *Fraxinus* have perished resulting in considerable ecologic and economic impacts.<sup>6</sup> This wood-boring beetle kills up to 99% of ash trees within 8-10 years of establishment.<sup>6</sup> EAB has been detected in 36 states and six provinces except Alberta, Saskatchewan, Prince Edward Island and Newfoundland.<sup>2</sup>

## Identification:

**Adults:** Adults have a long, bright metallic green body measuring 8.5-14 mm long and 3-3.5 mm wide. They have large compound eyes, a flat head, short antennae and a coppery-red abdomen beneath each elytron.<sup>5</sup> Female adult beetles are larger than males in length and abdomen width.<sup>4</sup> Males are identified by their pubescent protrusion from the anterior thoracic segment. Adult beetles can fly up to 10 km.

**Larvae:** There are four larval stages that are creamy white with bell-shaped sections. The last instar is 26-36 mm long.<sup>1</sup>

## Ecology:

EAB only attacks true ash trees, *Fraxinus*, but not mountain ash (*Sorbus* spp). All North American ash except Blue ash (*F. quadrangulata*) are susceptible to EAB. Adult females lay as many as 40-90 eggs, measuring approximately 1mm, in the cracks and crevices on the bark of host ash trees. Eggs will hatch in 1-2 weeks with the first instar larvae boring into the vascular tissues of its host. Three instars follow and often create the characteristic S-shaped galleries within the inner bark and outer sapwood. This activity "girdles the tree", disrupting the flow of water, carbohydrates and photosynthates.<sup>7</sup>

Adult emergence usually occurs in Canada from late May to July.<sup>3</sup> A characteristic D-shaped exit hole, measuring roughly 1/8" wide is created. Adults begin maturation feeding on ash leaf margins for approximately two weeks. Female beetles require roughly 10-14 days of feeding to fully mature before mating begins.<sup>8</sup> The effects of feeding are nominal on overall tree health.

Once infestation thresholds are reached, tree mortality is assured. Historical observations indicate infestations are usually not detected until two to five years after colonizing the host tree.<sup>10</sup> Signs of an

infestation include D-shaped exit holes, serpentine feeding galleries, larvae under the bark, and insect presence. Tree girdling symptoms such as gradual canopy thinning from the top-down, chlorosis (yellowing of leaves), branch dieback, vertical bark splitting, flecking of outer bark from woodpecker activity, and epicormic shoots.

## Economic Impacts:

Costs associated with EAB infestations are significant.<sup>11</sup> Early detection and future management plans may tax local resources with required tree removals, treatment strategies, replacement plans, and wood processing costs. These costs are in addition to ongoing asset maintenance plans. As of 2012, the Canadian Food Inspection Agency had already spent over \$30 million to manage the invasive of EAB and had cut over 30,000 trees to slow the spread of the beetle in Ontario.<sup>6</sup> Additional economic impacts include stormwater management, private and public property values, and tourism.

## Environmental Impacts:

Ash trees are essential to climate regulation, carbon sequestration and particulate absorption. They play a crucial role in maintaining resilient ecosystems

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with diverse pollinators and habitats, promoting biodiversity, and aid in nutrient cycling.

## Sociological Impacts:

Open green spaces and urban park systems along with traditional, cultural and recreational locations play an important role in community wellbeing.

## Prevention:

Containment has been challenging due to pest invasion ecology and difficulty detecting this pest. The movement of infested wood products and firewood has enabled EAB to cross vast distances and become established on both coasts of Canada and the USA. This has prompted multiple public service announcements against the transportation of firewood.

Monitoring for pest presence involves the use of various types of traps installed high in the tree canopy where infestations typically begin. Branch sampling is another early detection tool where larval galleries can be observed via peeling branches with draw knives.<sup>8</sup>

## Control:

**Chemical:** Trunk injections of regulated systemic insecticides containing azadirachtin and imidacloprid can provide temporary protection against pest infestations.<sup>8</sup> Multiple applications are required to sustain effective levels. Injections are not recommended until an infestation is discovered.

**Mechanical:** Removal and disposal of infested ash trees can reduce population densities.<sup>8</sup> This increases response time for the prioritization of specific management and treatment strategies.<sup>9</sup>

**Biological:** Various parasitic wasps have been released with success in dampening successful egg hatching as well as interrupting larval development.<sup>8</sup> However, not all infested jurisdictions meet the criteria for biological control, especially in areas where drying, infested ash cannot be left standing due to safety concerns.



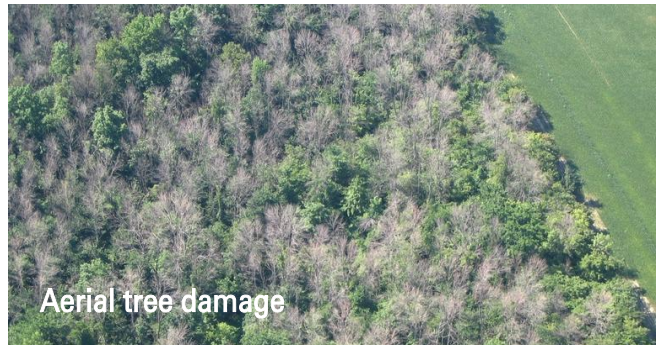
Larvae

Kenneth R. Law, USDA APHIS PPQ, Bugwood.org



D-shaped exit hole

Troy Kimoto, CFIA



Aerial tree damage

Troy Kimoto, CFIA

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