

# Emerald Ash Borer

## *Agrilus planipennis*



### Background

The emerald ash borer (EAB) was first found in Massachusetts in August 2012 in the town of Dalton. The destructive beetle poses a threat to ash trees statewide, EAB infest all ash species (*Fraxinus* spp.). Common native hosts in Massachusetts are white ash, green ash, and black ash. Ash trees can be found throughout state, but the highest densities are in Berkshire County.

### Life Cycle and Identification

The EAB undergoes four distinct life stages: egg, larvae, pupae, and adult (beetle). In Massachusetts, EAB will typically complete one generation in one year, however, life cycles can exhibit variation in new infestations with low population density.

Eggs are laid on the bark of ash trees by female beetles from May to September; eggs are laid between layers of bark or in cracks and crevices for protection. Eggs are very small (~1/32 inch), flat ovals, that are initially white colored but develop into a reddish brown. Eggs take approximately two weeks to hatch.



Photo: Debbie Miller, USDA Forest Service

Emerging larvae will tunnel below the bark and into the outer cambium layer of the tree. Here the larvae will feed upon the nutrient rich phloem. The larvae form S-shaped galleries as they feed, they increase in size as the larvae grows.



Photo: Pennsylvania Department of Conservation and Natural Resources - Forestry

EAB larvae can be identified by their brown head, white flat body and ten bell shaped body segments. Larvae will undergo 4 instars, reaching a final size of about 1-1.25 inches long. Larvae continue feeding until November when the mature larvae will overwinter in a J shaped pupation chamber.

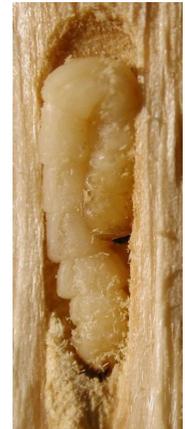


Photo: Houping Liu, Michigan State University

These mature larvae overwintering in pupal chambers will begin pupation in the spring, typically starting in late April- early May. Pupation will take approximately two weeks to complete.

When adult beetles are ready to emerge they



Photo: Houping Liu, Michigan State University

will chew out through the bark and create D shaped exit holes.

Adult beetles begin to emerge in late May-June and continue through August (initial emergence at 400-500 GDD base 50°F, with peak emergence by 1000 GDD). EAB adults will feed on ash foliage but minimal damage to the ash trees occur in this feeding stage.

Adults will mate about 1 week after emergence and females will typically lay 30-100 eggs.

Adult beetles are about 0.5 inches long and can be identified by their iridescent jewel green color with a coppery, purple reddish dorsal surface color visible under the wings. It is possible to find active beetles until the first hard frost.



Photo: David Cappaert

## Identifying Infestations

EAB introduction sites are usually infested for 3 to 5 years before there is noticeable tree mortality. Early stages of infestation in a tree will focus in the canopy and upper trunk, but as the population density grows, EAB will infest the lower trunk. Tree damage and eventual mortality is caused by the larval feeding. The EAB larval galleries disrupt the translocation of water and nutrients through the tree. Extensive cambium feeding will eventually girdle an ash tree, causing mortality.



Photo: Mass DCR Forest Health

As EAB disrupts a tree's nutrient movement, canopy dieback will be noticeable. Leaves will become discolored, the canopy will thin, and



eventually upper branches of the tree will begin to die. The ash tree may also begin to produce epicormic shoots; these are new growth sprouts low on the trunk, below the disruptive feeding galleries. The bark may begin to split above the S-shaped galleries.

Additionally, EAB infested trees can often be identified by heavy woodpecker feeding.

Woodpecker feeding can cause easily recognizable damage: in the upper canopy they can cause blanding, exposure of the light colored inner bark, and flecking, the appearance that strips of bark have been removed.

EAB will infest any species of ash that is greater than 2.5 inch diameter. EAB are attracted to pheromones produced by stressed trees, but they will infest both healthy and stressed ash trees.



Photo: Tawny Simiski, Umass Extension

## Management

EAB populations are challenging to eradicate once established due to the difficulty to detect EAB presence until populations densities are high and the ability of the beetle to travel long distances to new host trees. A natural EAB population front moves approximately 2 miles per year.

Under federal regulations, the entire state of Massachusetts is quarantined in an effort to slow the national spread of the EAB. The interstate movement of all hardwood species firewood and nursery stock, green lumber and other plant material of any ash species is restricted. Though EAB is already present in multiple counties in Massachusetts, a conscious effort to prevent the movement of ash materials will stop this destructive insect from infecting ash stands in new locations in our state. In Massachusetts' state parks, the transportation of any firewood into or out of a campground is prohibited.

The Massachusetts DCR Forest Health Program is working with USDA APHIS to establish biocontrol species in multiple locations in the state. Three EAB specific parasitoids are utilized to control the spreading invader's populations: *Oobius agrili*, *Tetrastichus planipennisi*, and *Spathius galinae*. The goal is to develop a biocontrol population that can minimize EAB population to manageable levels and allow ash species to develop resistance.

Individuals with concern for ash trees on their property can consult a certified arborist. Preventative pesticide treatments can be used for individual trees in close proximity to known infestations. However, pesticide application should be performed by a licensed pesticide applicator; pesticide applications do carry risks to the native insect community.

### For more information:

#### DCR Forest Health Program

Phone: (413) 253-1798 x204

Website: <http://www.mass.gov/dcr/forest-health>

#### MDAR Pesticide Program

Phone: (617)626-1700

Website: <http://www.mass.gov/eea/agencies/agr/pesticides/>

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