EMERALD ASH BORER - *INFORMATION CONTACTS*

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MICHIGAN DEPARTMENT OF AGRICULTURE MICHIGAN DEPARTMENT OF NATURAL RESOURCES

MICHIGAN STATE UNIVERSITY U.S. DEPARTMENT OF AGRICULTURE APHIS AND FOREST SERVICE

Frequently Asked Questions - *Agrilus planipennis* - Emerald Ash Borer

1. **Where did this Emerald Ash Borer come from?** At this point no one knows specifically how it arrived in Michigan. It is an exotic pest species. The natural range of *Agrilus planipennis,* or the Emerald Ash Borer, is eastern Russia, Northern China, Japan, and Korea.

2. **What types of trees does the Emerald Ash Borer affect?** To the best of our knowledge it has only been found on ash trees, hence its name. Trees in wood lots as well as landscaped areas are affected. For the most part, affected trees appear to be at least 2 inches in diameter and larger.

3. **Where has it been found?** To date, infested trees have only been found in Livingston, Macomb, Oakland, Washtenaw and Wayne Counties. Additional infestations may be possible in adjacent parts of the state.

4. **What symptoms does a tree infested with the borer exhibit?** Infested trees exhibit top-down dieback typical of other phloem borers such as two-lined chestnut borer or bronze birch borer. It has been observed that one-third to one-half of the branches may die in one year. Most of the canopy will be dead in two years. Affected trees may have vertical splits in the bark 2-4 inches long. Often dense sprouting of shoots can been found arising from the trunk or roots. Although difficult to see, the adult beetles make a "D"-shaped exit hole in the bark, roughly 1/16 inch in diameter.

5. **What do Emerald Ash Borers look like?** The adult beetle is dark metallic green in color, ¾ inch in length and 1/16 inch wide.

6. **What is the life cycle of this borer?** The beetle appears to have a one-year life cycle. Adults begin emerging in late May with peak emergence in mid-June. Egg laying occurs soon after adult emergence. After hatching, the borer goes through several larval stages, overwinters as a larva, then pupates in late spring.

7. **How is this pest spread?** The ash borer can be spread through movement of infested trees or in logs and firewood. The borer is a good flier, although it is doubtful that it could fly long distances. Most likely, local spread would occur by movement of infested material and adult flight, while long distance spread would occur due to movement of infested material or other human activities.

8. **How long has the Emerald Ash Borer been in Michigan?** No one knows for sure. Experts feel that it may have been in the Detroit area as long as five years, based on the age of trees affected and when tree dieback was first observed.

9. **Does it only attack dying or stressed trees?** While many of the trees affected by this ash borer appear to have been stressed by drought, disease or poor soil, in many instances healthy trees were also infested and killed by the borer.

10. **What are other insects may attack ash trees?** It is not uncommon for diseases or dying trees to be attacked by secondary borers once the tree is weakened. Some of the secondary pests attacking ash include larvae of various native cerambycid beetles, clearwing moths or even certain Diptera species.

11. **What is being done on a statewide basis about this new pest?** An Emerald Ash Borer Task Force has been formed to address and respond to managing this pest and related issues. Task Force members include the Michigan Department of Agriculture, the Michigan Department of Natural Resources, Michigan State University, Michigan Technological University, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service and Forest Service, plus county and municipal officials.

12. **Who do I call to get more information on the Emerald Ash Borer or to report an infested tree?** Contact local offices of the Michigan Department of Agriculture, Michigan State University Extension Extension or the Michigan Department of Natural Resources. You may also contact the **Emerald Ash Borer Hotline toll-free at 1-866-325-0023**. Information will also be available on the State of Michigan web site at www.michigan.gov and using the *key word – emerald ash borer*.

13. **Who should the media contact regarding this pest?** Contact Sara Linsmeier-Wurfel, MDA Public Information Officer at 517-241-4282 or linsmeiers@michigan.gov. Calls will be handled and routed to the appropriate agencies and/or experts based upon requests.

MICHIGAN DEPARTMENT OF AGRICULTURE
PESTICIDE AND PLANT PEST MANAGEMENT DIVISION
EMERALD ASH BORER INTERIOR QUARANTINE

WHEREAS, the Director, Michigan Department of Agriculture, having found that an exotic pest, known as the emerald ash borer, Coleoptera: Buprestidae: *Agrilus planipennis,* has been detected in this state and has a limited distribution at this time; and

WHEREAS the emerald ash borer has been found infesting and killing ash, *Fraxinus* spp. trees in Livingston, Macomb, Oakland, Washtenaw and Wayne Counties; and

WHEREAS, ash trees are a valuable resource for the nursery, landscaping and timber industries in Michigan; and

WHEREAS, the Secretary of Agriculture of the United States has not issued a quarantine regulating this pest;

NOW, THEREFORE, the Director of the Michigan Department of Agriculture by the authority of Section 6 of Act No. 72 of the Public Acts of 1945, as amended, and Quarantine Regulation No. 620, does promulgate this quarantine to prevent the further spread of this pest and sets forth: definitions, regulated articles, regulated areas, conditions of movement, violations and penalties, and special exemptions. This quarantine shall become effective on July 16, 2002 and will remain in effect until rescinded by the Director.

I. DEFINITIONS.

The following terms shall be construed to mean:

(A) DIRECTOR means the Director of the Michigan Department of Agriculture or his or her authorized representative.

(B) INSPECTOR means an employee of the Department of Agriculture authorized to enforce the provisions of this quarantine

(C) INFESTATION means the presence of the ash borer or the existence of the circumstances that make it reasonable to believe that the ash borer is present.

(D) CERTIFICATE and CERTIFICATE OF INSPECTION mean a document issued or authorized to be issued by the Director, including state-issued certificates of quarantine compliance, state phytosanitary certificates and multiple-use quarantine certificates, to allow the movement of regulated articles to any destination.

(E) COMPLIANCE AGREEMENT means a written agreement between a person moving regulated articles and the Department of Agriculture wherein the former agrees to comply with the requirements of the agreement

(F) PERSON means an individual, society, association, partnership, corporation or other organized entities.

(G) MOVED (MOVE, MOVEMENT) means shipped, offered for shipment, received for transportation, transported, carried, or allowed to be moved or shipped.

II. REGULATED ARTICLES.

(A) The emerald ash borer, Coleoptera: Buprestidae: *Agrilus planipennis.,* in any living stage of development.

(B) Entire ash trees.

(C) Ash limbs and branches or cut ash firewood.

(D) Logs or untreated ash lumber with bark attached.

(E) Uncomposted ash chips and uncomposted ash bark chips larger than 1 inch in diameter.

(F) Any article, product or means of conveyance when it is determined by the Director to present the risk of spread of the emerald ash borer, Coleoptera: Buprestidae: *Agrilus planipennis.*

III. REGULATED AREAS.

(A) The entirety of Livingston, Macomb, Oakland, Washtenaw, and Wayne Counties shall be considered regulated areas on the basis of confirmed presence of the emerald ash borer, Coleoptera: Buprestidae: *Agrilus planipennis*

IV. CONDITIONS OF MOVEMENT OF REGULATED ARTICLES.

(A) Movement of the regulated articles from any regulated area to any destination outside the regulated area is prohibited, except under the following conditions:

1. A thorough examination of all regulated articles and treatment methods must take place. A certificate of inspection may be issued based upon the determination by the inspector, grower, or shipper authorized to conduct such inspection under a Compliance Agreement, that no life stages of emerald ash borer, Coleoptera: Buprestidae: *Agrilus planipennis* are present; based on conditions or treatments administered in accordance with methods approved by the Director.

2. The certificate of inspection shall be attached to the regulated articles, and shall remain on the regulated articles until such articles reach their final destination, except when the certificate of inspection is attached to the shipping document and the regulated article is adequately described on the shipping document or on the certificate of inspection.

(B) All regulated articles originating outside the regulated area may move through the regulated area without a certificate of inspection for this pest, under the following conditions:

1. Passage through the regulated area is made during the period of August 1 through April 30 or when the ambient air temperature is below 40 degrees F. and passage is made without stopping except to refuel or for traffic conditions; or during the period of May 1 through July 31 when the temperature is 40 degrees F. or higher if the articles are shipped in an enclosed vehicle or is completely enclosed by a covering adequate to prevent access by the emerald ash borer, Coleoptera: Buprestidae: *Agrilus planipennis.*

2. The point of origin of the regulated article must be indicated on the bill of lading or shipping documents.

(C) Regulated articles originating outside any regulated area which are moved into the regulated area and exposed to potential infestation by emerald ash borer, Coleoptera: Buprestidae: *Agrilus planipennis,* shall be considered to have originated from a regulated area. These regulated articles may only be moved from the regulated area under the conditions noted in IV (A) above.

(D) Movement of regulated articles from any regulated area through any non-regulated area to a regulated destination is prohibited without a certificate of inspection for this pest, except under the following conditions:

1. Passage through a non-regulated area is made during the period of August 1 through April 30 and the passage is made without stopping except for refueling or for traffic conditions; or during the period of May 1 through July 31 if the articles are shipped in an enclosed vehicle or completely enclosed by a covering adequate to prevent the escape of any emerald ash borer, Coleoptera: Buprestidae: *Agrilus planipennis*

2. The county and state of origin and the final destination of the regulated articles must be indicated on the bill of lading or shipping documents.

(E) The bill of lading or shipping documents accompanying any shipment of regulated articles within or through Michigan shall indicate the county and state of origin of the regulated articles.

V. VIOLATIONS AND PENALTIES.

(A) Any regulated article from the quarantined area, moved within Michigan in violation of this quarantine shall be removed from the non-regulated area immediately or destroyed at the option and expense of the owner or owners, under the direction of the Director.

(B) Any violation of this quarantine is subject to the full authority of Act No. 72, Public Acts of 1945, as amended.

VI. SPECIAL EXEMPTIONS.

The Director may allow, with written approval, the movement of emerald ash borer, Coleoptera: Buprestidae: *Agrilus planipennis*, into or within Michigan for research purposes.

Dated *July 16, 2002* at Lansing, Michigan

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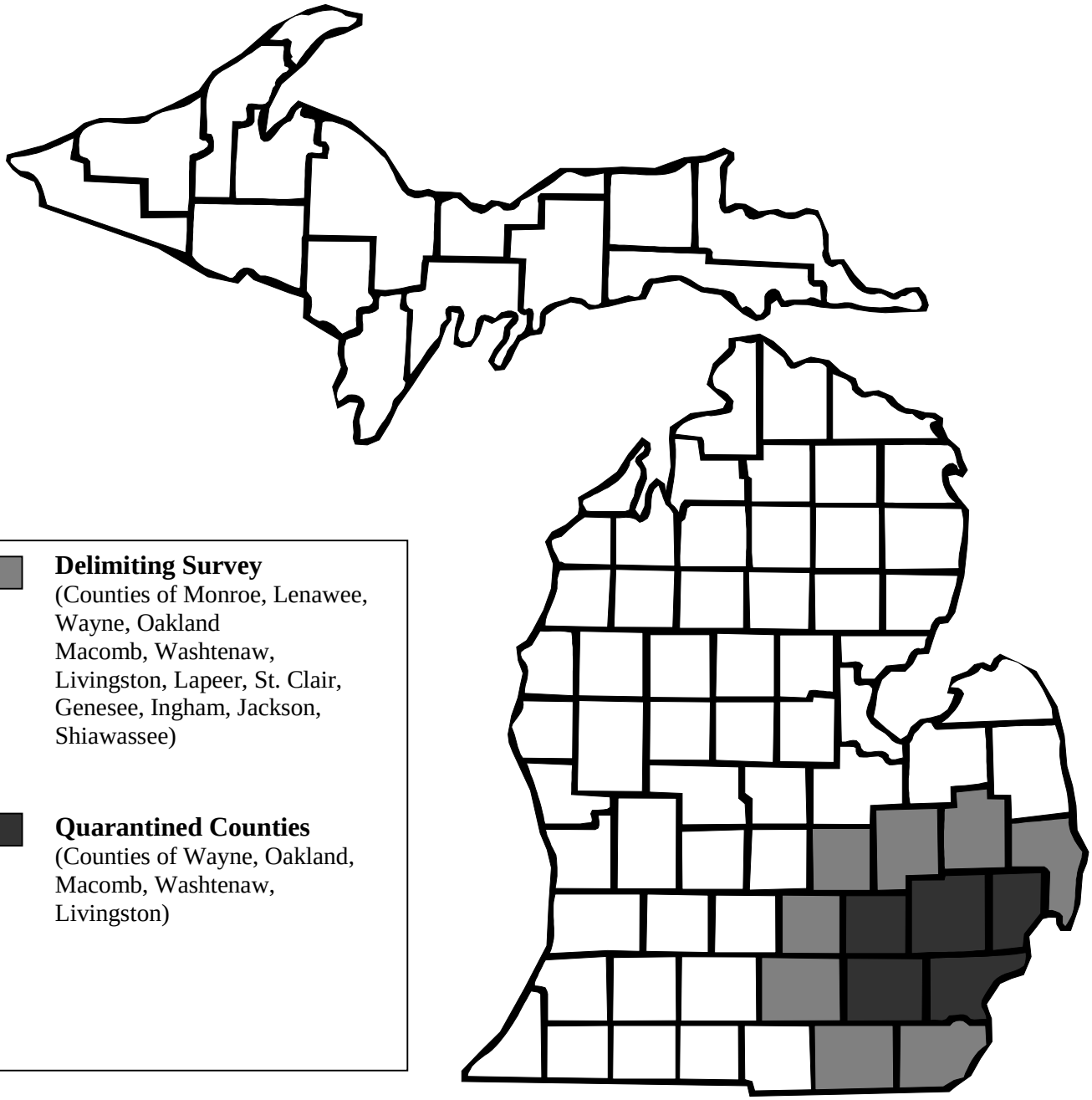
Dan Wyant, Director

MICHIGAN DEPARTMENT OF AGRICULTURE
PESTICIDE AND PLANT PEST MANAGEMENT DIVISION

EMERALD ASH BORER



Delimiting Survey
(Counties of Monroe, Lenawee, Wayne, Oakland Macomb, Washtenaw, Livingston, Lapeer, St. Clair, Genesee, Ingham, Jackson, Shiawassee)

Quarantined Counties
(Counties of Wayne, Oakland, Macomb, Washtenaw, Livingston)

Local Contacts:

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Michigan Department of AGRICULTURE **NEWS RELEASE**

FOR IMMEDIATE RELEASE
July 16, 2002

CONTACT: Sara Linsmeier-Wurfel, MDA
517/241-4282 or linsmeiers@michigan.gov

New exotic pest identified in Michigan's Ash trees; State issues quarantine to control, prevent its spread

Media availability session to be held tomorrow in Northville

Michigan and federal officials today announced the discovery and identification of a new exotic pest from Asia – *Agrilus planipennis* or the Emerald Ash Borer – in five Southeast Michigan counties that affects ash trees. In response, state agriculture officials have issued a quarantine on all ash trees and timber products in the affected counties to help prevent and control the spread of this pest. Under this quarantine, ash trees, branches, logs, and firewood may not be moved outside the affected area unless certified for movement by the Michigan Department of Agriculture (MDA).

A media availability session will be held on **Wednesday, July 17** at **10 a.m.** in **Northville** to discuss the state's response plan and provide a firsthand look at this pest and its damage. *(Please see attached media advisory for specific details and directions.)*

The Emerald Ash Borer, a pest belonging to a group of insects known as metallic wood-boring beetles, is not native to Michigan or anywhere in the United States. It was officially identified last week by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) with assistance from Asian entomologists.

According to Ken Rauscher, director of MDA's Pesticide and Plant Pest Management Division, the state has initiated its Invasive Species Emergency Response Plan, which included the creation of a Emerald Ash Borer Task Force. The Task Force has conducted detection surveys over the past two weeks to determine the borer's range and extent of damage. To date, it has been identified in Livingston, Macomb, Oakland, Washtenaw, and Wayne counties and infestations have been limited to species of ash trees, either white, green or black ash.

"With the strong cooperation and pooling of expertise between our federal, state, university and local partners, we are confident that Michigan is doing everything possible to control and prevent the spread of this new invasive species and minimize the impact on the state's ash trees and nursery and landscape industries," Rauscher said.

Task Force members include MDA, the Michigan Department of Natural Resources, Michigan State University, Michigan Technological University, and the U.S. Department of Agriculture APHIS and Forest Service.

(More)

Homeowners and landscapers in Southeast Michigan have been plagued by loss of ash trees for the past couple of years. Specialists initially determined much of the problem was due to a combination of disease, drought, and poor soils. This new insect is likely another reason for the ash trees' decline.

Emerald Ash Borer adults are dark metallic green in color, 1/2 inch in length and 1/16 inch wide. Larvae are creamy white in color and are found under the bark. Their appearance typically goes undetected until the trees show symptoms of being infested – usually the upper third of a tree will thin and then die back. This is usually followed by a large number of shoots or branches arising below the dead portions of the trunk.

Adult Emerald Ash Borer

Homeowners, landscapers, and arborists outside of Livingston, Macomb, Oakland, Washtenaw, and Wayne counties are encouraged to be on the lookout for this new exotic pest and report any signs or dying ash trees to the local MDA or MSU-E office, or via the state's toll-free **Emerald Ash Borer Hotline** at **866-325-0023.** More information on the ash borer can be found online at www.michigan.gov/mda and using the key word "ash borer."

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(This news release can also be viewed at www.michigan.gov/mda)

DRAFT

PEST ALERT
Emerald Ash Borer

Deborah G. McCullough
Associate Professor
Dept. of Entomology and Dept. of Forestry

and

David L. Roberts
Extension specialist and District horticulture agent

Michigan State University

A new, exotic beetle feeding on ash (*Fraxinus* sp.) trees was discovered in southeastern Michigan and identified in July 2002 as *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae). Larvae feed in the phloem and outer sapwood, producing galleries that eventually girdle and kill branches and entire trees. Evidence suggests that *A. planipennis* has been established in Michigan for at least five years. Surveys to determine the extent of the infested area are underway.

Identification

Adults are larger and a brighter green than any of the native North American species of *Agrilus* (Fig. 1). The slender, elongate adults are 7.5 to 13.5 mm long, and females are larger than males. The adult body is brassy or golden green overall, with darker, metallic, emerald green elytra. The top of the abdomen under the elytra is metallic coppery red (seen only when the wings are spread). The prothorax is slightly wider than the head but the same width as the base of the elytra. The back edges of the elytra are sinuate or wavy, and the top is sculptured with tiny, transverse wavy ridges. The surfaces of the elytra are granularly roughened. Tips of the elytra are rounded with small teeth along the edge.

Larvae reach a length of 10 to 14 mm, are cream-colored and dorso-ventrally flattened (Fig. 2). The brown head is mostly retracted into the prothorax and only the mouthparts are visible externally. The 10-segmented abdomen has a pair of brown, pincer-like appendages on the last segment.

Biology

The Emerald Ash Borer has a one year life cycle in southern Michigan but could require two years to complete a generation in colder regions. Adult emergence begins in mid to late May, peaks in early to mid June, and continues into late June (Fig. 3). Adult beetles are active during the day, particularly when conditions are warm and sunny. Most beetles remain in protected locations in

bark crevices or on foliage during rain, heavy cloud cover, high winds or temperatures above 32^{o}C (90^{o}F). Chinese reports indicate that beetles usually fly within 2 m of the ground. The likelihood of long distance flights is not known. Adults feed on up to 0.45 cm^{2} of foliage per day, leaving irregularly-shaped patches of leaf tissue with jagged edges.

Information from China indicates that male adults live an average of 13 days and females live about 21 to 22 days. Females can mate multiple times and oviposition begins 7 to 9 days after the initial mating. Females lay 65 to 90 eggs during their lifetime. Eggs are deposited individually on the bark surface or in bark crevices on the trunk or branches. In southeastern Michigan the oviposition period likely extends into mid to late July.

Eggs hatch in 7 to 10 days. After hatching, first instar larvae chew through the bark and into the cambial region. Larvae feed on phloem and the outer sapwood for several weeks and overwinter as fully developed larvae. The S-shaped feeding gallery winds back and forth, becoming progressively wider as the larva grows (Fig. 4). Galleries are packed with fine frass. Individual galleries usually extend over an area that is 20 to 30 cm in length, though the length of the affected area can range from 10 to 50 cm. In some areas, woodpeckers feed heavily on larvae.

Pupation begins in late April or early May. Pupation occurs in a shallow chamber that late stage larvae excavate in the sapwood. Newly eclosed adults may remain in the pupal chamber for 1 to 2 weeks before emerging head-first through a D-shaped exit hole that is 3-4 mm in diameter (Fig. 5).

Distribution and Hosts

The emerald ash borer is indigenous to Asia and is known to occur in China, Korea, Japan, Mongolia, the Russian Far East and Taiwan. A Chinese report indicates high populations of the borer occur primarily in *Fraxinus chinensis* and *F. rhynchophylla* forests. Other reported hosts in Asia include *F. mandshurica* var. *japonica*, *Ulmus davidiana* var. *japonica, Juglans mandshurica* var. *sieboldiana* and *Pterocarya rhoifolia*. In Michigan, this borer has been observed only on ash trees. It has killed green ash (*F. pennsylvanica*), white ash (*F. americana*) and black ash (*F. nigra*), as well as several horticultural varieties of ash.

Symptoms

Infestations of emerald ash borer can be difficult to detect until canopy dieback begins. Evidence of infestation includes D-shaped exit holes on branches and the trunk. Callus tissue produced by the tree in response to larval feeding may cause 5 to 10 cm long vertical splits (Fig. 6) to occur in the bark above the gallery. The distinct, frass-filled larval tunnels etch the outer sapwood and phloem of the trunk and branches (Fig. 7). An elliptical area of discolored

sapwood, likely a result of secondary infection by fungal pathogens, sometimes surrounds larval feeding galleries in live trees.

Infested branches in the canopy will die once they are girdled by the serpentine tunnels excavated by feeding larvae. Many trees seem to lose about 30 to 50% of the canopy in one year and the entire tree is often killed after 2-3 years of infestation (Fig. 8). There is frequently a profusion of epicormic shoots arising at the margin of live and dead tissue on the trunk. When trees die, dense root sprouting occurs.

Trees of various size and condition have been killed by emerald ash borer in Michigan. Larvae have successfully developed on trees as small as 5 cm in diameter, but pole-sized and sawtimber-sized trees have also been killed. Stress likely contributes to vulnerability of ash trees and recent summer droughts may have contributed to high emerald ash borer populations in southeastern Michigan. However, relatively vigorous trees in woodlots and urban trees under regular irrigation and fertilization regimes have been killed by this species.

References

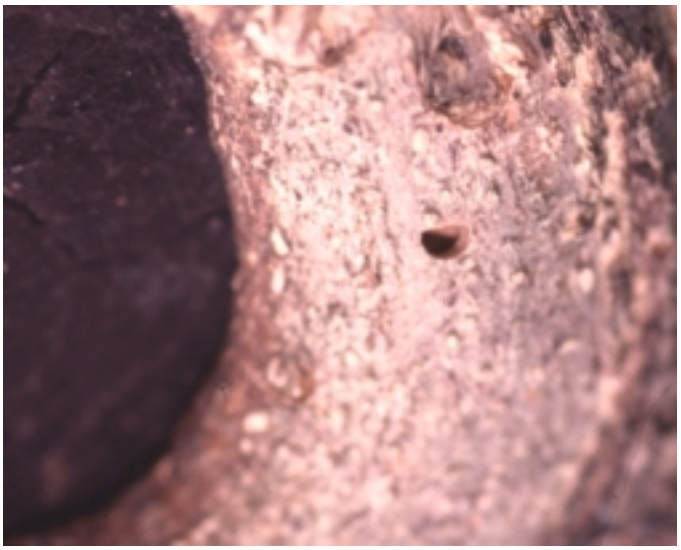
Xiao, G. (Ed.) 1991. Forest insects of China, 2nd ed. China Forestry Publishing House, Beijing, China. 1362 pp.

Jendek, E. 1998. *Agrilus planipennis* fact sheet. Pdf provided by Eduardo Jendek, Institute of Zoology, Slovak Academy of Sciences. Bratislava. Slovak Republic.

Photos

Fig. 1. Adult beetle.
Fig. 2 Late stage larva.
Fig. 3. Newly emerged emerald ash borer.
Fig. 4. Larval gallery.
Fig. 5. D-shaped exit hole.
Fig. 6. Vertical split in the bark above larval gallery.
Fig. 7. Green ash tree killed by emerald ash borer. Note D-shaped exit holes.
Fig. 8 Heavily infested ash trees.

(Photos by Howard Russell, Andrew Storer and authors)



MICHIGAN DEPARTMENT OF AGRICULTURE
PESTICIDE AND PLANT PEST
MANAGEMENT DIVISION
7-10-2002

EMERALD ASH BORER