Emerald Ash Borer

*Agrilus planipennis*

Photo: Leah Bauer, USDA Forest Service Northern Research Station, Bugwood.org, #5473689
Emerald Ash Borer

- Small beetle that feeds on ash trees
- Native to East Asia
- 2002: First detection in U.S. (Detroit, MI)
- Has killed tens of millions of ash trees in U.S.
- Threat to:
  - Forests
  - Landscapes
  - Industry (flooring, furniture, sporting equipment, etc.)
  - Tourism

Photos: (Main) - Daniel Herms, The Ohio State University, Bugwood.org, #1523071; (Inset) - Leah Bauer, USDA Forest Service Northern Research Station, Bugwood.org, #5473689
Distribution

Map courtesy of Pest Tracker, National Agricultural Pest Information System (NAPIS) and USDA APHIS quarantine announcements

- Sampled but not found
- Intercepted or detected, but not established
- Established by survey or consensus
Susceptible Plants

• Specific to ash trees (*Fraxinus* spp.), including:
  • green ash
  • black ash
  • white ash
  • pumpkin ash
  • blue ash
• Kills stressed and healthy trees

Healthy green ash tree

Photo: Joseph O'Brien, USDA Forest Service, Bugwood.org, #5038082
Identification: Eggs

- Eggs laid on tree bark
- Eggs are white when first laid, then turn amber
- Cluster of eggs

Photos: (Top Left) - Debbie Miller, USDA Forest Service, Bugwood.org, #5449381; (Top Right) - Debbie Miller, USDA Forest Service, Bugwood.org, #5449377; (Bottom) - David Cappaert, Michigan State University, Bugwood.org, #9009033
Identification: Larvae

- White and dorso-ventrally flattened
- Visible dark brown mouthparts
- 10 bell-shaped abdominal segments

Dark spines (urogomphi) on posterior tip

Photos: (Main) - David Cappaert, Michigan State University, Bugwood.org, #1460071; (Inset) - Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org, #5016063
Identification: Overwintering Larvae, Prepupae, and Pupae

Overwintering “J-shaped” larvae or prepupae

Pupa in pupal chamber in white ash tree

Pupa next to pupal chamber in white ash tree

Maturation of J-shaped larvae/prepupae to adult

Photos: (Left) - Houping Liu, Michigan State University, Bugwood.org, #5449382; (Top Left) - Kenneth R. Law, USDA APHIS PPQ, Bugwood.org, # 5471795; (Top Right) - Kenneth R. Law, USDA APHIS PPQ, Bugwood.org, # 5471797; (Bottom) - Debbie Miller, USDA Forest Service, Bugwood.org, # 5449379
Identification: Adults

- Bright, metallic, coppery green color
- Dorsal surface of abdomen is iridescent red
- Serrate antennae, arise from just below the eyes

Photo: David Cappaert, Michigan State University, Bugwood.org, #2106098 and #2100048 and Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org, #5382310
Life Cycle

Eggs

Larva

Pupa

Adults

Overwintering Larvae/Prepupae

Photos: (Clockwise from Top) - David Cappaert, Michigan State University, Bugwood.org, #9009033; Debbie Miller, USDA Forest Service, Bugwood.org, #54493778; Houping Liu, Michigan State University, Bugwood.org, #5449382; Kenneth R. Law, USDA APHIS PPQ, Bugwood.org, #5471797; David Cappaert, Michigan State University, Bugwood.org, #9009032
Damage

Bark splitting  Crown dieback  Epicormic shoots

Photos: (Left) - Michigan Department of Agriculture, Bugwood.org, #1241005; (Center) - Daniel Herms, The Ohio State University, Bugwood.org, #1523075; (Right) - Daniel Herms, The Ohio State University, Bugwood.org, #1523071
Damage

Woodpecker damage

D-shaped exit holes

Larval galleries

Photos: (Left) - David Cappaert, Michigan State University, Bugwood.org, #1372001; (Center) - David Cappaert, Michigan State University, Bugwood.org, #5110034 and Debbie Miller, USDA Forest Service, Bugwood.org, #5449376; (Right) - Edward Czerwinski, Ontario Ministry of Natural Resources, Bugwood.org, # 1439009
Monitoring and Management

Prevention is critical!

- Monitoring:
  Detection of infestation symptoms; use of panel traps

- Cultural control:
  Regulation of movement of ash wood materials; removal of infested trees

Photo: Kenneth R. Law, USDA APHIS PPQ, Bugwood.org, # 5471804
Monitoring and Management

• Chemical control:
  Use of trunk injections, soil drenches, protective cover sprays being explored

• Biological control:
  Three parasitoid species approved for release in U.S.

Photo: David Cappaert, Michigan State University, Bugwood.org, #9009080
Look-alike Species

*Agrilus planipennis*  
*Agrilus macer*  
*Temnoscheila virescens*

Photos:  
*(Left)* - Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org, #5016065 and David Cappaert, Michigan State University, Bugwood.org, #2100048;  
*(Center)* - Mike Quinn, TexasEnto.net, bugguide, (http://bugguide.net/node/view/290204;  
Look-alike Species

Agrilus planipennis  Buprestis decora  Chrysobothris azurea

Photos: (Left) - Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org, #5016065 and David Cappaert, Michigan State University, Bugwood.org, #2100048 (Center) – Scott Nelson, bugguide, http://bugguide.net/node/view/175260; (Right) - Joshua P. Basham, http://bugguide.net/node/view/595910.
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References


References


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