BUG BIZ
Pest Management and Insect Identification Series
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Agrilus planipennis, Emerald Ash Borer (Coleoptera: Buprestidae)

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Description

Agrilus planipennis is an invasive tree-boring beetle belonging to the jewel beetle family Buprestidae. The common name of this species, emerald ash borer (EAB), is due to its bright green, metallic color and ash tree host plants (*Fraxinus* spp.). Adult EAB beetles are approximately three-eighths of an inch to one-half of an inch (8.5-12 mm) long, and 0.06 inches (1.6 mm) wide. Their bodies are slender and are widest across the front of the hardened forewings (elytra) before gradually tapering toward the end of the abdomen. While they are indeed an iridescent green, they can also appear copper-colored when viewed at different angles. The elytra have a small spine at the tips, and the abdomen under the forewings is purple or magenta. The adults also have large black eyes and sawlike (serrate) antennae. EAB larva grow up to 1 inch (25 mm) in length, with flat, white bodies with a small brownish head. They have a somewhat serrate appearance, a pair of pincerlike appendages at the end of the abdomen and no legs.

Other green or metallic insects are often misidentified as EAB, including native species of Buprestidae, such as the bronze birch borer (*Agrilus anxius*) and two-lined chestnut borer (*Agrilus bilineatus*). These two species are smaller than EAB and lack the distinctive green coloration. The bronze birch borer is bronze, while the two-lined chestnut borer is blueish-black. EAB is one of at least 100 species within the family Buprestidae in Louisiana, so suspected EAB specimens should be examined by a specialist.

Life Cycle

EAB adults usually emerge from ash trees during late spring and begin feeding on ash leaves in the upper canopy. After approximately one week, mating begins with males identifying females using visual signals. Females can mate with more than one male during the mating season. Once mated, females lay up to 70 eggs in the cracks of ash tree bark during their six-week lifespan.

Adult emerald ash borer. David Cappaert, Bugwood.org.

Emerald ash borer serpentine feeding galleries. Art Wagner, USDA-APHIS, Bugwood.org.

Once the larvae hatch, they chew through the bark and begin feeding. The larvae molt four times before reaching maturity. When they are mature, they move to the outer bark and create a chamber. In the chamber, the larvae shorten and become J-shaped while overwintering. They usually pupate during the following spring and emerge as adults as temperatures increase. Younger larvae can also overwinter in their feeding tunnels but typically require an additional year to develop. The life cycle can take up to two years in cool climates, but EAB can complete development in one year in warmer areas like Louisiana.

Ecological Significance and Pest Status

EAB has been an invasive insect pest of ash trees (*Fraxinus* sp.) in the United States since 2002. The species is originally from East Asia and was probably introduced to the United States through wooden cargo containers. In its native habitat, it only attacks stressed trees because natural host plant resistance minimizes infestations in healthy trees. When it was introduced to the United States, EAB began infesting American ash trees, which lack resistance to the pest, making them the perfect hosts. Within the first years of its introduction, this pest killed an enormous amount of ash trees in Michigan. Since that time, EAB has invaded most of the East Coast and as far south as North Carolina and Georgia. It has also spread West to Colorado. It was first found in Arkansas during July 2014 and moved into north Louisiana during early 2015. The larvae of EAB feed on the outer vascular system (phloem) of ash trees, forming serpentine shaped galleries that disrupt sap and water flow though the tree. This eventually leads to the death of the tree. Some symptoms of EAB infestation in ash trees include yellow wilted leaves, characteristic D-shaped exit holes made by emerging adults, shoots growing from the roots or trunk of the tree, and abundant woodpecker holes. Adult EAB beetles also feed on the leaves of trees, but this does not cause severe damage.

Control

Avoiding the spread of EAB is the most effective way to protect ash trees. Therefore, inspecting ash logs before transporting them to other regions of the country is essential. If the pest is already established in an area, insecticides and biological control can be used to decrease populations and avoid dispersal. Systemic insecticides are used to protect trees and to reduce infestations. If the tree is already badly damaged (with branch die-back and leaf thinning), chemical control measures likely will not be effective. Systemic insecticides must move through tree sap to kill the pest, which is not possible if the plant is severely injured. Chemical control methods that are used to manage EAB infestations in Louisiana can be found in the 2020 LSU AgCenter Louisiana Pest Management Guide (publication No. 1838). When using insecticides, always follow label instructions and recommended application rates.

Biological control of EAB occurs naturally due to bird predation (mostly woodpeckers). Other predators and parasitoids of native buprestid beetles also attack this pest. To improve biological control of the pest, three parasitic wasps were imported from the EAB's native range and released in the U.S. during 2007. These parasitic wasps lay eggs in and on EAB eggs or larvae. Once hatched, the wasp larvae feed on the eggs and larvae of EAB, eventually leading to the death of the pest. The eggs are parasitized by *Oobius agrili* (Hymenoptera: Encyrtidae), while the larvae are parasitized by *Tetrastichus planipennisi* (Hymenoptera: Eulophidae) and *Spathius agrili* (Hymenoptera: Braconidae). Before the imported wasps were released, they were tested for specificity against nontarget beetles to ensure they would not kill native species. Unfortunately, *S. agrili* failed to establish; therefore a related species (*Spathius galinae*) was imported from East Russia to enhance biological control of EAB.

References

Carlton, C. E., T. C. MacRae, A. K. Tishechkin, V. L. Bayless, and W. Johnson. 2018. Annotated Checklist of the Buprestidae (Coleoptera) from Louisiana. The Coleopterists Bulletin 72: 351-367

Herms, D.A., and D.G. McCullough. 2014. Emerald Ash Borer Invasion of North America: History, Biology, Ecology, Impacts, and Management. Annual Review of Entomology, 59:13-30.

Kashian, D., I. Ibáñez, X.-Y., Wang, Z.-Q., Yang, T., Poland, D., Miller, T., Petrice, S., Yang, B., Ravlin, and J., Gould. 2019. Biological Control of Emerald Ash Borer. USDA Forest Service Webpage, https://www.nrs.fs.fed.us/disturbance/invasive_species/eab/control_management/biological_control/ Accessed 6 October 2019.

Louisiana Insect Pest Management Guide – LSU AgCenter. 2019. https://www.lsuagcenter.com/~/media/system/4/9/6/c/496c381f03be739dc3d77b0a1a893309/2019pestmgmtguide_finalpdf.pdf.

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