



Ambrosia Beetles: An Often Overlooked Forest Pest

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Introduction

Ambrosia beetles (also called shothole borers) are important forest insects and play a major biological role in forest nutrient cycling. This is accomplished by attacking stressed or weakened trees, and speeding up the decomposition rate of these unhealthy trees (Allen 1995). Typically, trees attacked by ambrosia beetles are either extremely weakened or dead. Ambrosia beetles belong to the same family as bark beetles (Coleoptera: Curculionidae: Scolytinae and Platypodinae), and there are over 3,000 species worldwide. The primary differences between ambrosia beetles and bark beetles is that bark beetles feed only in the phloem or inner bark layer on the nutrient packed cambium, and ambrosia beetles feed deep within the heartwood on symbiotic fungi. Moreover, bark beetles never penetrate into the heartwood, whereas ambrosia beetles do and are considered wood boring insects. Each species of ambrosia beetle carries one or more species of fungi in specialized fungus-tending pouches in their exoskeletons called mycangia (Gorsuch 2003). Ambrosia beetles chew tunnels and galleries into the

wood and tend fungus in them, but do not derive their nutrition from wood. The majority of nutrition for ambrosia beetles is derived from the fungi they maintain. Mississippi is home to several species of both native and non-native ambrosia beetles.

Biology

Adult ambrosia beetles are very small, normally under 3/16 of an inch long and reddish-brown to black in color (Fig. 1) (Allen



Figure 1: Adult Asian ambrosia beetle. Photography by E. Richard Hoebeke, Cornell University, www.forestryimages.org

1995). Both adults and larvae feed on cultivated fungus, rather than wood. The fungus

spores are carried by females in small pouches called mycangia, and each beetle species inoculates a favored fungal species (Gorsuch 2003).

Exotic Species

There are many non-native species of ambrosia beetles, and these are the ones of most concern in the southeastern United States. These introduced beetles are often major pests for plant nursery type operations (Werle et al. 2012), but can also pose threats to trees in forested settings. Three of the most significant non-natives in Mississippi include the [black twig borer](#) (*Xylosandrus compactus*), the Asian ambrosia beetle (*Xylosandrus crassiusculus*), and the [redbay ambrosia beetle](#) (*Xyleborus glabratus*), all of which are able to attack healthy plants (Gorsuch 2003).

Hosts and Impacts

The majority of ambrosia beetles attack weakened or stressed trees and shrubs, as well as recently cut wood, but a few species will attack healthy plants (Gorsuch 2003). The fungus carried by the beetles is what severely weakens and potentially kills the host, not direct beetle attack (Werle et al. 2012). Both conifers and hardwoods are often susceptible to at least one

species of ambrosia beetle (Allen 1995). The black twig borer can attack a variety of trees including dogwood, magnolia, and redbud, while the Asian ambrosia beetle is known to attack over 200 species of plants (Gorsuch 2003).

Signs of Infestation

Plants can exhibit various signs after infestation by ambrosia beetles, with the signs often depending on the beetle species. Wilting foliage on branches is a common sign, and these branches often have small beetle entry holes on the underside. Fungus stains are also commonly present in the vascular tissue, sapwood, heartwood, or pith of infested branches (Fig. 2). Many ambrosia beetles leave small sawdust tubes extending up to an inch from the bark near the infestation site (Fig. 3, page 3) (Gorsuch 2003). These sawdust tubes somewhat resemble toothpicks, except they are made up of sawdust and beetle excrement. These “toothpicks” are rather ephemeral, and often crumble away on windy

or rainy days, making them less obvious to observe in the woods than one might expect. Because of their ephemeral nature, the presence of frass toothpicks indicates an active infestation. Light brown to white frass from excavated tunnels may also be found in bark crevices or at the base of trees attacked by ambrosia beetles (Fig. 4, page 3) (Allen 1995).

Control

Pruning can control small infestations of some ambrosia beetles, but control is difficult with heavy infestations and the best tactic is to remove and destroy the plant. Chemical control is rarely an option in control of ambrosia beetles since the host plant is normally already weakened (Gorsuch 2003). However in situations where ambrosia beetle attack can be closely monitored, such as a nursery setting, chemical control may be an option (Werle et al. 2012). For the average landowner, the best prevention tactic is to sustain healthy plants through common gardening practices such as

fertilization and maintaining proper soil moisture (Gorsuch 2003).

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Figure 2: Gallery and fungal stain in branch from an Asian ambrosia beetle attack. Photograph by: C. S. Gorsuch , Clemson University, www.clemson.edu/cafls/departments/esps/factsheets/turforn/to22_ambrosia_beetles.html.



Figure 4: Sawdust tube on the bark of a redbay ambrosia beetle infested tree.
Photograph by: Albert (Bud) Mayfield, USDA Forest Service,
www.forestryimages.org



Figure 3: Frass and entry holes on a recently cut log attacked by ambrosia beetles.
Photograph by: James Denny Ward, USDA Forest Service, www.forestryimages.org