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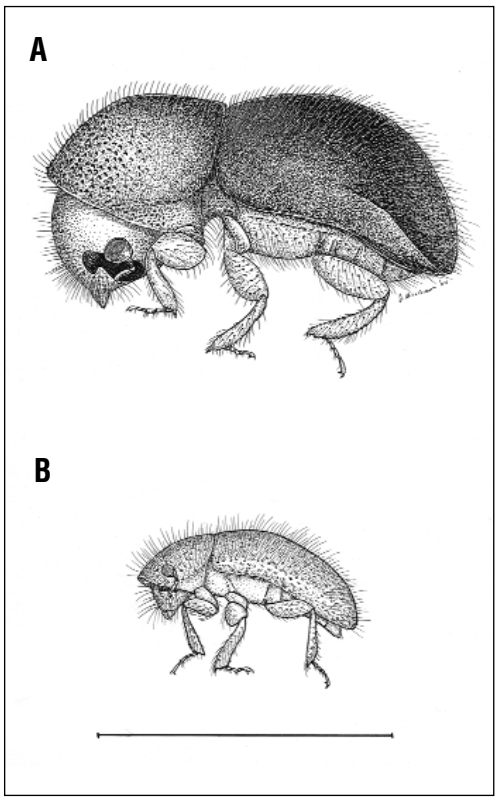
Asian Ambrosia Beetle Biology and Control

The Asian ambrosia beetle (AAB) is an introduced species, and as one might expect, its native range is the tropical Far East. This beetle was first identified in North America on infested peach trees in South Carolina in 1974, and it has since spread to other parts of the United States. Its first known occurrence in Mississippi was from a sycamore sample taken in Columbia (Marion County) in 1984. According to data taken from identified specimens in the Mississippi Entomological Museum, this beetle has been recorded in numerous counties in both the northern and southern sections of the state and is assumed to occur in all counties.

AAB will attack a wide range of woody plant material, and these attacks may occur in the home landscape or in plant nurseries. Some hosts found in Mississippi include pecan, peach, Bradford pear, sycamore, crepe myrtle, fig, and magnolia trees, as well as muscadine vines. Other states have reported the insect on dogwood, shumard oak, persimmon, Japanese maple, golden rain, and Chinese elm trees. Given the right circumstances, this insect will bore into and create tunnels in a wide range of thin-barked, woody plants, with the exception of pine species.

Figure 1. Habitus drawings of *Xylosandrus crassiusculus* (Motschulsky), profile view. **A.** Female. **B.** Male (scale bar = 2 mm).



Description

Females (fig. 1A) are small, stout beetles ranging in size from 2.1 to 2.9 mm long, and they fly readily from host to host. Their overall color is reddish brown with a shiny appearance to the front part of the wing covers (elytra). The rear portions of the wing covers slope downward, and the inner portions of the sloped area are darker than the shiny fronts. If viewed under a microscope, the body is covered with many small hairs, and those on the sloped area are longer than those on the front. Males (fig. 1B) are much smaller than females at about 1.5 mm long, and they do not fly. Also, males are much lighter in color. Due to their flightless condition, males are rarely seen.

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Development and Damage

As a group, AAB colonize woody shrubs or trees that are stressed and/or not in a good state of growth; however, they also attack plants that appear healthy. An infestation begins with the female boring a small hole, approximately 2 mm in diameter (fig. 2), into the sapwood or sometimes into the heartwood of a host plant. As tunnel construction continues, a small circular strand of compacted frass (fig. 3) will project ¼ to 2 inches out from the entrance hole. One or several strands might be visible. The strands are fragile and may be shortened or totally removed by wind and rain. Strands shown in figures 2 and 3 are from infested woody material that was in the laboratory for at least 24 hours.

Figure 2

Figure 3

The presence of beetles within a plant might imply that the beetle utilizes the plant as a food source, but actually this is not the case. As the female bores into a stem or trunk, the surfaces of the tunnels are "seeded" with ambrosia fungal spores from organs (mycangia) located on the insect's back. Conditions are generally ideal for fungal growth within tunnels, and the fungal growth serves as a food source for adult beetles and larvae. The fungal spores produce hypha that penetrate plant cells adjacent to the tunnel system, but it is not known if this penetration produces any lasting detrimental effect to the infested plant. Fungal hypha cause staining of the wood, and the numerous breaks in the bark caused by the females boring entrance holes allow for some drying of the wood.

Biology studies specific to Mississippi conditions have not been conducted. Available data is from specimens housed in the Mississippi Entomological Museum at Mississippi State University. This data indicates that the AAB is present as early as March 13 in Forrest County, and as early as March 16 or 17 in Oktibbeha County. Although total specimen numbers are not high, it appears that AAB activity could begin from late February to the middle of March. The earlier date is for the coastal areas of the state, and the later date is for the central areas. The beetles may appear a little later in the northern areas of Mississippi.

After tunnel construction, females lay eggs randomly within the tunnel. Following egg hatch, larvae begin feeding on the fungus lining the tunnel walls. Following pupation, females mate with males within the tunnels, emerge, and seek out other hosts for egg laying. Data from Tennessee indicates that a cycle (egg to adult beetle) takes about 55 days. Three generations probably occur per year, and a fourth generation could occur in some parts of the state.

Plants may totally recover from an AAB infestation if beetle numbers are relatively low and the infestation occurs only on one side of a stem, limb, or trunk. However, if the infestation is extensive, transporting tissues may be totally cut around the infested part. If this occurs, the plant material beyond the infested area will wilt and die. Even if the damage is not enough to cause wilting or death, the presence of boring holes may hurt nursery sales.

Controls

The attack on healthy plants seems to occur more often in the spring prior to the occurrence of visible plant growth. This timeframe may seem unlikely for an insect infestation, and nursery operators, homeowners, or lawn care personnel (licensed for pesticide applications) may not catch the problem. Once "frass strands" are noticed, chemical control is not an option. Plant tissue surrounds the insects, and a chemical application will not penetrate established tunnels. If the infestation is extensive, removal may be the only option for that particular plant, but insecticide applications can be used on surrounding plant material as "protective" sprays. The objective of such treatments is to provide an insecticide barrier on the bark that kills the beetles before they are able to bore into the trunk and deposit eggs.

Treatment options for AAB are limited, and, in most cases, AAB is not specifically listed on product labels that are available. Instead, these labels include a generic term such as "wood-boring insects." There are several brand name treatements containing permethrin that are available "over the counter"; however, residual control may be short-lived, necessitating the use of repeated treatments throughout the growing season. Mixing instructions will vary between products based on the concentration, so it is essential to follow instructions on the product of choice .

One product—Astro—is available to licensed commercial applicators for use in a variety of landscape settings. This product contains a section on its label describing southern pine beetles, black turpentine bee-

tles, and engraver or ips beetles. These beetles are in the same family of beetles as AAB. To use this product, mix 2 to 5 quarts per 100 gallons and spray to thoroughly wet the bark. Bifenthrin (Onyx), which gives longer residual action, is also available for use in landscape settings (currently not cleared for use in nurseries), but it must be applied by a properly licensed commercial applicator. Homeowners wanting to use this product must hire a professional applicator to make the treatments. The Onyx label does not list AAB, but it does list some of the other species that are in the same group of beetles as AAB. Mix Onyx at 1 to 2 pints per 100 gallons and apply to the tree trunk until it is thoroughly wet. Remember, this is applied as a protective and not a curative spray. Chlorpyrifos (Dursban) is still available for use by commercial nurseries.

Monitoring

A trapping system that will capture AAB beetles is available, and this system is very beneficial in determining the movement of this beetle, especially their first flight in the spring. This system involves the use of a Lindgren funnel trap (fig. 4) and WHR ethanol lure strips. The trap can be placed between a wooded area and nursery stock or in other areas of suspected AAB activity. In most areas of the state, place traps before the first of March, but on the coast, place them by around the middle of February. Check traps weekly for the presence of AAB and, if appropriate, for treatments applied.

Figure 4

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By **James H. Jarratt**, Extension Entomologist, Retired; Evan Nebeker, Entomologist (Forest)/Professor, Department of Entomology; and **Blake Layton**, Extension Entomologist. Figure 1A drawn by Joseph A. MacGown, Scientific Illustrator, Entomology Museum, Department of Entomology and Plant Pathology. The male beetle in figure 1B was provided by Doug Stone, graduate student in Forest Entomology.

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