

# AMBROSIA BEETLES - a study in symbiosis <sup>3</sup>

By Douglas C. Allen

These insects have garnered much attention from entomologists world wide because of their economic significance and fascinating life style. They are a small group within the "true" bark beetle family (see April/May, 1994 issue) but are characterized by a feeding behavior that differs markedly from their relatives. Attacks by ambrosia beetles do no structural damage to logs or lumber, but their activity results in significant degrade if the landowner's goal is to produce a wood product.

## Ecological Role

Ordinarily, ambrosia beetle activity goes unnoticed in forests where it plays an important biological role in the early stages of nutrient cycling. Attacks usually are associated with freshly cut or windblown trees and standing trees that are severely stressed or that have been killed recently by other agents. Their galleries provide openings for microorganisms and moisture that, together, accelerate decomposition. Only a few species attack vigorous trees.

## Signs and Symptoms

The reddish brown to black adults are less than 3/16" long. Upon locating a suitable host, they bore directly into the wood and produce very fine, dust-like wood chips that are swept out of the tunnel. These borings match the color of the sapwood, usually very light brown to bright white. The boring dust accumulates in

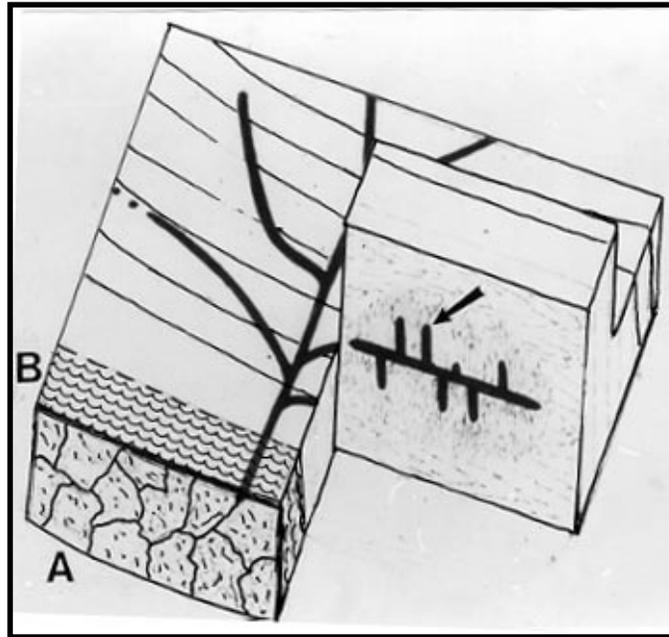


Fig. 2 A block of wood with ambrosia beetle tunnels: A, outer bark; B, inner bark; "cradle" indicated by arrow.

bark crevices (Fig. 1) beneath the entrance hole, at the base of an infested tree or under infested logs. The beetles excavate an intricate network of tunnels (Fig. 2) a few to several inches into the sapwood, in some cases even reaching the heartwood. Tunnel diameter varies from 1/32" to 1/8", depending on the species of ambrosia beetle. The small size of the tunnel is reflected in another common name for this group, "pinworm". A black stain is associated with the tunnel wall and adjacent wood.

Many people encounter evidence of ambrosia beetles while splitting firewood. The small holes, stain and network of galleries are especially common in birch, maple and oak.

## Biology

In contrast to true bark beetles that live and feed only in a narrow zone just under the bark (Fig. 2,B) (hence, the common names "bark beetles" or "inner bark borers"), ambrosia beetles do not eat woody material and spend no time beneath bark. They provide for their own nutrition by feeding on a fungus that flourishes within the galleries. These "fungus gardens" originate from spores that female beetles carry with them in special pocket-like structures associated with their exoskeleton or "skin." The inoculum is passed from one beetle generation to the next. Both larvae and adults feed on this "ambrosia." The fungus is responsible for the black stain that accompanies each tunnel. Some ambrosia beetles deposit eggs directly in the tunnel, others excavate short galleries, called "cradles" (Fig. 2), along the sides of the main gallery. Fungal spores are extruded into each cradle and (or) tunnel. By the time eggs hatch there is plenty of **mycelium** (my-seal-ium), a mat of thread-like tubes that constitute the vegetative structure of the fungus, to nourish both adults and developing larvae.

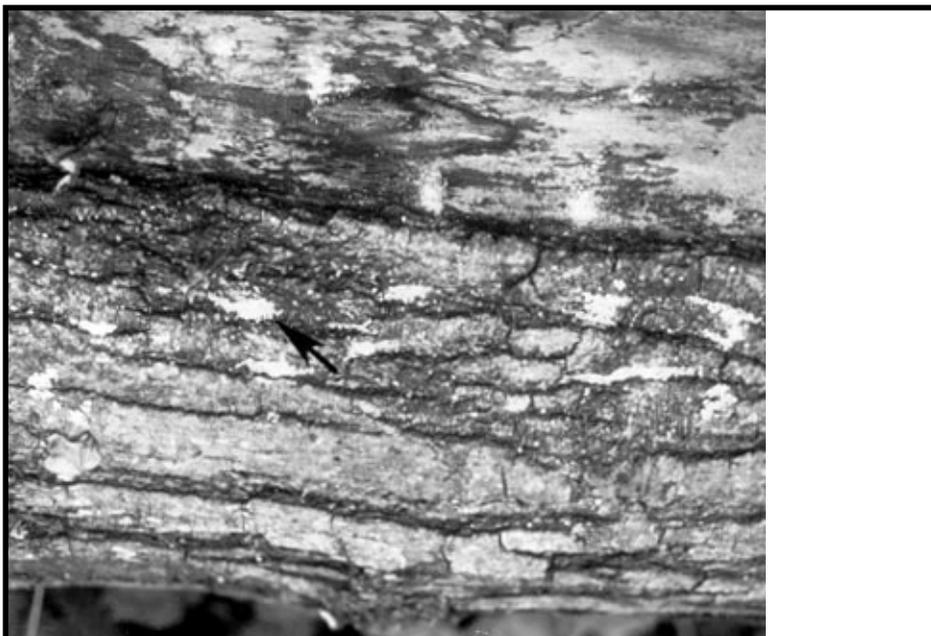


Fig.1. Accumulations of white boring dust on a maple log infested by ambrosia beetle.

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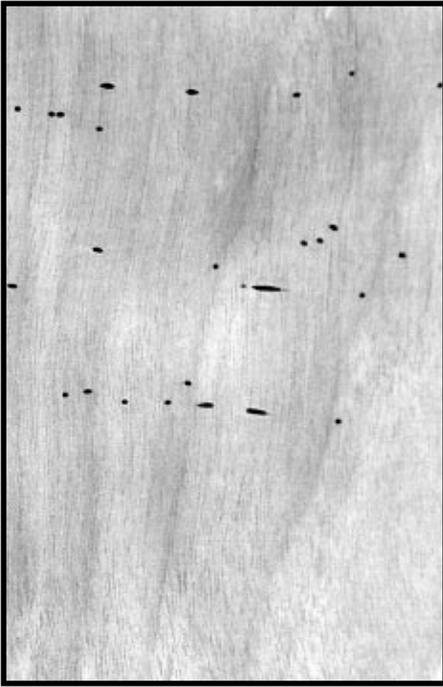


Fig. 3. Ambrosia beetle damage to yellow birch veneer. Actual dia. of each hole is 1 mm (.04 inches).

### Hosts and Susceptibility

Many species of conifers and broadleaved trees are subject to infestations by at least one species of ambrosia beetle. Host material is only susceptible as long as the amount of moisture in the wood exceeds the fiber saturation point; that is, a moisture content of approximately 30% or more. Below this point there is no free water in the wood cells and any water that exists in the wood is chemically bound to cell walls.

Ambrosia beetle attacks are especially common in freshly cut logs that are left in the woods and (or) retained on a shaded log deck for several weeks. Under these conditions, damage is most severe to logs cut in spring and early summer, a time when adults are most active.

### Economic Significance

Commercial loss to ambrosia beetle activity occurs in the form of degrade associated with the presence of dark-stained pin holes in lumber or veneer processed from infested logs (Fig. 3). This loss is especially important, because the damage occurs in the sapwood where the most valuable clear lumber or veneer should be found.

### Prevention

The best way to prevent damage is to process logs quickly. Minimize the availability of susceptible logs (i.e., freshly cut, above fiber saturation) during periods of beetle flight, usually in the spring and early summer. Even logs decked adjacent to a woodland may be invaded. So, most especially in the spring, process logs quickly. As long as the moisture content of the wood remains high enough, the sap within will ferment and emit chemical odors that greatly facilitates the insect's ability to locate a suitable log. Any log that is producing light colored "dust" should be suspect and quickly processed. ▲

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