THE OHIO STATE UNIVERSITY EXTENSION

FACT SHEET

Agriculture and Natural Resources

HYG-2090-08

Powderpost Beetles

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Powderpost beetles are so named because feeding by the larval stages can reduce wood to a powder-like consistency. Wood typically is degraded to a powderpost condition when it is heavily infested or repeatedly attacked over an extended period of time by beetles in the families Lyctidae, Anobiidae, and Bostrichidae.

A common name of lyctids is "true powderpost beetles." Bostrichids are sometimes called "false powderpost beetles" because they differ from lyctids in adult appearance, size of exit holes, and frass characteristics. The common name "anobiids" refers to the beetle family, Anobiidae. However, in this fact sheet, the general term "powderpost beetles" is used for members of these three beetle families (Lyctidae, Anobiidae, and Bostrichidae). These beetles are of particular concern in structures because they can breed in (re-infest) wood in use.

Identification

Lyctid beetles (figure 1) are reddish brown to black and 1/32 to 1/8 inches long. Their body is elongate and flattened. A key characteristic of lyctid beetles is the two-segmented antennal club. Unlike anobiids and bostrichids, the head is readily visible from above.

Anobiid beetles (figure 2) are reddish brown to brownish black and range in length from 1/16 to 1/8 inches. They have a slender, cylindrical body. In most species, the head is bent downward and concealed by a hoodlike pronotum. The antennae have 11 segments.

Bostrichid beetles (figure 3) are reddish brown to dark brown or black and 1/32 to 3/8 inches long. They generally are cylindrical with a roughened thorax. The tips of the elytra (hard forewings) are frequently concave and pitted. The head is bent downward and is not visible when viewed from above. The antennal club has three or four segments.

Because powderpost beetle larvae develop within wood, they typically are unavailable for identification purposes, and they may be difficult to identify to species because many are similar in appearance. Powderpost beetle larvae (figure 4) are grublike with a C-shaped body that is enlarged at the thorax. They are yellowish-white

Figure 1. Lyctid beetle.

Figure 2. Anobiid beetle.

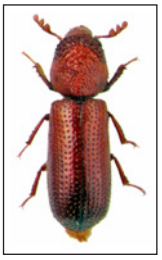

Figure 3. Bostrichid beetle.

Figure 4. Powderpost beetle larva.

with a brown head. A key distinguishing characteristic is that the eighth (rear) abdominal spiracle (small external opening of the respiratory or breathing system) is much larger than all the other spiracles in lyctid larvae, whereas all abdominal spiracles are of similar size in anobiid and bostrichid larvae. A dissecting microscope is needed to see the spiracles.

Life Cycle

The length of the life cycle (egg to adult) of powderpost beetles is influenced by the wood's nutritive content and by environmental conditions, particularly the temperature and relative humidity surrounding the wood. Wood moisture and nitrogen or starch content generally are limiting factors. Larval development usually occurs most rapidly in high nutrient wood with a moisture content >12% and at approximately 68–88°F and 80–90% relative humidity.

The life cycle of lyctids is shorter than the other powderpost beetles. Usually there is only one generation per year, but a generation may be completed in ≤3 months given favorable conditions, or in three or four years under unfavorable conditions. The length of the life cycle typically is one to five years for anobiids, and one year for bostrichids.

Powderpost beetles only lay their eggs on bare, unfinished wood, but the placement site varies depending on the beetle family. Anobiid eggs are usually laid on the wood surface, either in cracks or crevices or in exit holes. The female lyctid inserts her eggs within the wood pores. Female bostrichids lay eggs generally in cracks or crevices on the wood surface or in bark, but several tropical species bore short tunnels in the outer sapwood of bark-free wood and lay eggs.

The larval stage feeds on wood causing the damage. As the larvae feed, they create tunnels (excavations) that become filled with powdery frass (excrement). Their tunneling and development occur entirely below the wood surface.

Pupation occurs once a larva is full grown. The pupal period lasts several weeks or months before the adult beetle emerges through a hole cut to the wood surface. Depending on the species, the exit hole may be made by the emerging adult or by the full-grown larva. In the latter case, the larva retreats into an enlarged pupal chamber just below the exit hole and plugs the hole with wood fibers and frass. The adult removes the frass plug and exits through the hole.

Adult powderpost beetles often are not observed because they are quite small, and they are seasonally produced and live only a few weeks after emerging. The adult beetles are most likely to be observed when they congregate around windows or lights during April-July, the period when adult emergence generally occurs. Adult bostrichid beetles are active at night. Adult anobiid beetles are seldom seen because they tend to hide in exit holes.

Damage Characteristics

Wood that has been heavily damaged by powderpost beetles is reduced to a powdery mass surrounded by a thin shell of sound wood perforated with small holes (figure 5). The most common signs of powderpost beetles are small exit holes on the wood surface (figure 5) and powdery frass sifting from the holes (figure 6). Homeowners are much more likely to see evidence of wood damage than the powderpost beetles themselves.

Figure 5. Wood damaged by powderpost beetles.

Figure 6. Powderpost beetle frass may accumulate in piles beneath exit holes.

Powderpost beetles chew small, circular exit holes in the surface of wood. Exit holes made by lyctid beetles are ~0.03 to 0.13 inches in diameter, whereas exit holes made by anobiid beetles are slightly larger (~0.13 to 0.25

inches). Bostrichid exit holes typically are larger than that of lyctids but overlapping in size with anobiids. Bostrichid exit holes range in diameter from 0.09 to 0.28 inches, sometimes smaller.

The powder (frass) in tunnels is useful to differentiate powderpost beetles. Lyctid frass is extremely fine and feels like talc when rubbed between the fingers. It is loosely packed in tunnels. Anobiid frass also is powder-like, but may feel gritty depending on the type of wood. In softwoods, the frass is a loosely packed, fine powder with elongate lemon-shaped pellets that cause it to have a gritty consistency. In hardwoods, the frass of anobiids is a fine powder without pellets, and it is usually tightly packed in tunnels. Bostrichid beetle frass is a fine to coarse powder that tends to stick together; it is tightly packed in tunnels.

Types of Wood Attacked

Powderpost beetles can damage a variety of wood products. In structures, these beetles can damage wooden rafters, joists, flooring, molding, paneling, plywood, and window and door frames. They also can damage wooden furniture, crating, picture frames, ornamental objects, tool handles, gun stocks, fishing poles, and baskets. Early detection is the key to avoiding serious wood damage from powderpost beetles.

Lyctid beetles attack only hardwoods, particularly those with large pores (vessels). The pores must be large enough for the female lyctid to insert eggs. Susceptible wood has >3% starch, which is an essential nutrient for lyctid beetles. In native hardwoods, lyctids feed in the sapwood rather than the heartwood due to the starch content. Lyctids rarely infest wood that is >5 years old. Highly susceptible native hardwoods include oak, ash, hickory, pecan, and mahogany. Other susceptible native hardwoods include cherry, elm, persimmon, sycamore, walnut, etc. Many of the lighter-colored, low-density tropical hardwoods (banak, luaun/meranti, obeche, etc.) are highly susceptible to lyctid attack.

Anobiid beetles typically are more commonly encountered than lyctids or bostrichids. Anobiids can attack both hardwoods and softwoods. However, they cause more extensive damage to hardwoods than softwoods because hardwoods contain more nitrogen. Maple, beech, poplar, and pine are particularly susceptible to attack by anobiids. Anobiid beetles cause the greatest damage to wood with a moisture content >12%, which they preferentially infest. Infestations often occur in unfinished, untreated wood in moist, poorly ventilated areas such as crawl spaces or basements of buildings, in outbuildings (garages, utility sheds, barns), or outdoors (improperly stored lumber). Because softwoods are most commonly used for building construction, structural infestations often originate in exposed softwoods in crawl spaces. The lack of a central heating or air-conditioning system to reduce moisture levels to <12% can create favorable conditions that allow anobiid infestations to spread upward into the walls and building interior, including furniture.

Bostrichids are more abundant in the tropics. They attack unseasoned and seasoned hardwoods. Whereas bostrichids attack only the sapwood portion of U.S. hardwoods, they attack both the sapwood and heartwood of tropical hardwoods. Starch is an essential nutrient for bostrichid beetles. Bostrichids readily infest recently sawn, air-dried hardwood lumber with bark, firewood, and grapevine wreaths. The larger tropical bostrichid species infest packaging, veneers, furniture parts, and specialty ornamental products. The bamboo powderpost beetle is a tropical species that damages bamboo products such as baskets, picture frames, and furniture. Bostrichids do not re-infest wood after it is dry.

Determining Whether an Infestation is Active or Inactive

Powderpost beetle infestations usually are not detected until exit holes are created by emerging adults, yet the wood was initially attacked months or years earlier. Exit holes in the wood's surface indicate that there was an infestation in the wood and that larvae still may be present. However, powderpost beetle infestations sometimes die out on their own accord. Hence, it is important to determine if an infestation is active or inactive, but this can be a lengthy, difficult process.

It is very difficult to determine whether an exit hole is new or old. Old, abandoned exit holes may take on the weathered appearance of the surrounding wood, whereas new holes do not appear weathered. Active infestations may have light-colored powder (the color of fresh-cut wood) sifting from the exit holes and accumulating in small piles beneath them. Nonetheless, be aware that vibrations can dislodge powdery frass from old larval galleries. If the piles of powder are covered

with a film of dust or debris, the associated exit holes likely are old.

Although time-consuming, a means of confirming that an infestation is active is to mark any existing exit holes or seal them with tape, then determine if additional holes appear thereafter. Be sure to sweep up all the powdery frass, then wait several weeks or months before re-examining the wood for new exit holes and fresh powder. Spring and summer are the best time for a re-inspection since most adult emergence occurs from April-July. It is possible that new exit holes may not appear during the autumn or winter months even though the infestation remains active.

Integrated Pest Management Strategies

Powderpost beetles damage wood slowly. Thus, a homeowner should not think that immediate chemical treatment is needed to preserve the home's structural integrity. A "wait and see" approach often is desirable, especially when there is doubt as to whether the infestation is still active.

Prevention and Exclusion

Powderpost beetle infestations in lumber typically are removed by kiln-drying and wood-processing operations. Kiln-dried lumber is dried a minimum of eight hours at 130 to 140°F and 80% relative humidity. Be sure to use kiln-dried lumber for new construction.

Powderpost beetle infestations often result from improperly dried or stored wood (lumber, paneling, flooring, furniture, etc.) that contained eggs or larvae when placed in the home. Wood that has been improperly stored or dried should not be used, particularly if beetle exit holes are present. Many of the most serious infestations arise when old lumber from a barn or outdoor wood pile is used for home remodeling, such as paneling a room or building an addition.

Powderpost beetles only lay their eggs on bare, unfinished wood. Bare wood can be protected from powderpost beetle attack by painting, varnishing, waxing, or otherwise finishing exposed surfaces. Infestations by some bostrichid species can be avoided by removing all bark edges from wood.

Beetles that emerge from finished articles such as furniture typically were present in the wood before the finish was applied. Because many powderpost beetles species that emerge from finished wood can re-infest it by laying eggs in their own exit holes, it is important to seal the holes to prevent this possibility.

Anobiid infestations sometimes occur as a result of beetles flying in from outdoors or being carried in on firewood. Use tight-fitting screens on windows and doors to prevent entry of flying beetles.

Moisture Reduction

Powderpost beetles, especially anobiids, have specific moisture requirements for survival and development. Most beetles do not develop in wood with a moisture content below 15%. A central heating or air-conditioning system is useful to reduce moisture levels to <12%, which creates unfavorable conditions for anobiids.

It is advisable to install a moisture or vapor barrier in the crawl space of a structure. Covering the soil with four to six mil polyethylene sheeting reduces wood moisture content. For existing anobiid beetles infestations, installing a moisture barrier greatly reduces the threat of the infestation spreading upwards into walls and upper portions of the building. A moisture barrier may slowly eliminate anobiid beetle infestations by preventing re-infestation.

Increased ventilation also can lower moisture in damp crawl spaces. This can be accomplished by installing foundation vents (one square foot of vent opening per 150 square feet of crawl space area if a vapor barrier is not present; one square foot of vent opening per 300 to 500 square feet of crawl space area if a vapor barrier is present). Make sure that vents are kept open. Remove any vegetation covering foundation vents.

Wood Replacement

If the powderpost beetle infestation appears to be localized (e.g., a few pieces of flooring, molding, or paneling), simply remove and replace the infested pieces of wood. If new beetle holes begin to appear in adjacent areas, additional action can then be taken.

Subzero Temperatures

Powderpost beetle infestations in small, movable items can be eliminated by storage at subzero temperatures for approximately 48 hours.

Insecticide Treatments

Control of powderpost beetle infestations in structural wood can be achieved by applying a liquid insecticide to the wood's surface or by injecting it into

the wood. Boron-based insecticides (i.e., Bora-Care®, Tim-Bor®) are very effective in controlling powderpost beetles. These products are applied to unfinished wood surfaces where they tend to penetrate deeply into the wood to kill some of the larvae, and they are highly effective in preventing re-infestation. Effective control can be obtained by thoroughly spraying all exposed wood surfaces in crawl spaces or outbuildings with a boron-based insecticide. The liquid insecticide also can be pressure injected into the larval galleries through small holes drilled in the damaged wood. When wood is protected from the weather, such as in crawl spaces, boron-based products have a long residual lifetime.

Copper compounds are available for application to wood, but they typically only penetrate about 1/8 inch into the wood. A pyrethroid also is available that can be pressure injected into wood to provide quick contact toxicity.

Fumigation with an insecticide usually provides immediate control of all beetle life stages within the wood. However, this method is expensive and it provides no residual protection against beetle re-infestation. Beetle infestations in small, movable items can be eliminated by fumigation. Tent fumigation of a structure generally is not warranted, although it may be the best choice for infestations of tropical species of bostrichids.