

EUCALYPTUS LONGHORNED BORERS

Integrated Pest Management for Professional Landscapers and Home Gardeners

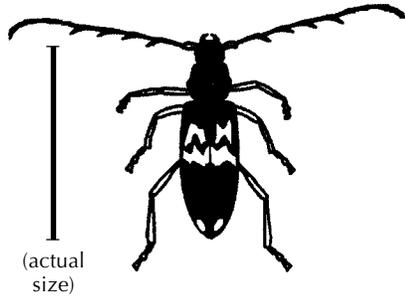


Figure 1. Adult *Phoracantha semipunctata*.

Two closely related species of longhorned borers (family Cerambycidae) attack eucalyptus in California. *Phoracantha semipunctata* (Fig. 1) was introduced into southern California in the 1980s and rapidly became a pest. It currently occurs throughout California wherever eucalyptus trees grow. This beetle readily attacks and kills large numbers of eucalyptus trees. Natural enemies of the eucalyptus borer were introduced from Australia, and biological control in combination with improved cultural care of eucalyptus dramatically reduced the number of trees killed each year by the borer. In 1995, a second species of borer, *Phoracantha recurva* (Fig. 2), was discovered in southern California in Los Angeles, Riverside, Orange, and San Bernardino counties. Like *P. semipunctata*, this beetle is expected to eventually spread throughout California wherever eucalyptus grows. Not all of the previously introduced natural enemies are effective against this new borer, and *P. recurva* together with several other new pests is causing increased stress and mortality of eucalyptus.

Longhorned borers are attracted to freshly cut wood, dying limbs, and

trees suffering from stress, especially drought stress. The problem is exacerbated in California because many eucalyptus trees are growing in unmanaged or minimally managed environments with no supplemental irrigation. Both the beetles and eucalyptus trees are native to Australia. Eucalyptus species that naturally grow in wetter areas of Australia have been planted in California where they experience prolonged dry periods, which makes them susceptible to attack by these beetles.

IDENTIFICATION

Adult eucalyptus longhorned borers have shiny, dark brown and yellow to cream-colored areas on their wing covers. The antennae are as long as or longer than the body, and the antennae of males have prominent spines. The mature larvae may be large (more than 1 inch long) and are cream colored and legless.

Females lay eggs under loose bark or in crevices on bark surfaces. If conditions are ideal, larvae will bore directly into the inner bark after

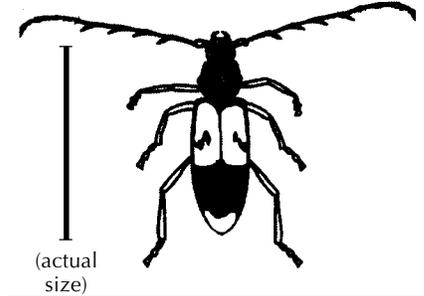


Figure 2. Adult *Phoracantha recurva*.

hatching. If conditions are less than ideal, the small larvae feed outward from the egg mass, leaving a distinct dark trail 1/4 inch to several inches long that scores the bark surface before they bore into the cambial tissue on the inner surface of the bark. Once the larvae have bored into the inner bark, the galleries they form beneath the wood surface can extend several feet.

In trees with heavy infestations, the scraping sounds made by the developing larvae chewing into the cambium are clearly audible from a distance of several feet.

TABLE 1. Differences between Two Eucalyptus Longhorned Borers in California.

<u>Characteristic</u>	<u><i>Phoracantha semipunctata</i></u>	<u><i>Phoracantha recurva</i></u>
color of wing covers (elytra)	mostly dark brown; zigzag line bisecting cream-colored area in middle of elytra	mostly cream to yellowish; dark brown areas primarily limited to rear third of elytra
golden hairs on underside of each antenna segment	none to sparse	long, dense

Sources: Gill, R. J. 1997. An Australian eucalyptus beetle. *California Plant Pest and Disease Report* 16(1-2):12; Hanks, L. M., T. D. Paine, J. G. Millar, and C. Campbell. Another tree-killing pest of eucalyptus invades California. *California Plant Pest and Disease Report* 16(1-2):19-21

These two *Phoracantha* species resemble each other but differ somewhat in biology. Distinguishing between *P. semipunctata* and *P. recurva* can be useful in predicting the importance of biological control based on whether one or both borer species are present in that area. Differences in wing color and hairs and spines on antennae help to distinguish between *P. semipunctata* and *P. recurva* (Table 1). For example, dark brown predominates on the wing covers of *P. semipunctata*, while yellow to cream color predominates on wing covers of *P. recurva*.

LIFE CYCLE

Several nights after emerging and mating, the female beetles of *P. semipunctata* begin laying eggs in groups of 3 to 30 under loose bark of eucalyptus trees. Females may live one or more months and lay up to 300 eggs, which hatch in about 1 to 2 weeks depending on temperature. First-instar larvae may bore directly into the inner bark or they may mine short distances in the outer bark layers before turning inward to mine at the bark-cambium-xylem interface, leaving a dark stain on the wood surface. At the end of the feeding period, larvae excavate pupal chambers in the wood. They enter the chambers, packing the holes behind them with wood shavings and frass (Fig. 3). Larvae require about 70 days to develop in fresh wood or logs during hot summer months, and up to 180 days in drier logs. Only relatively fresh logs

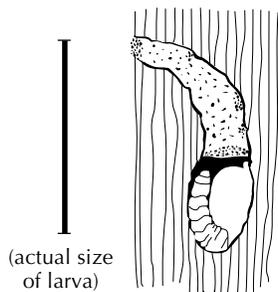


Figure 3. Mature larva exposed in wood.

sustain beetle larvae; old dry logs are too hard for larvae to feed on and then successfully develop.

Following pupation, adult beetles emerge from the same holes by chewing through the plugs of frass. During spring and summer, the beetle requires 3 to 4 months to complete its life cycle, but starting in fall and winter it may require up to 9 months. There are two and possibly three poorly synchronized generations a year; adults can emerge anytime from April through October.

The life cycle of *P. recurva* differs somewhat from that of *P. semipunctata*, and it is currently in the process of being documented. *Phoracantha recurva* may have a longer period of activity each year, with adults emerging as early as February.

In their native Australia, eucalyptus longhorned borers develop in broken limbs, pruned limbs, fallen trees, and highly stressed trees. They rarely kill healthy trees. Eucalyptus naturally growing in areas to which they are adapted appear more resistant to beetle attack, and beetles in Australia are preyed upon by many natural enemies.

DAMAGE

Holes in the bark and stains or oozing liquid on limbs or trunks are common longhorned borer damage symptoms. Foliage may discolor and wilt, and limbs may die back. Longhorned borers mostly attack stressed or damaged plants; vigorous, well-watered trees are rarely attacked. However, in California many eucalyptus trees are seasonally water-stressed during hot summer months, rendering a significant proportion of them susceptible to the beetle.

Extensive larval feeding at the inner bark-cambium-xylem interface can effectively girdle the tree. Trees at this stage of infestation are characterized by a thin canopy with wilted or dry leaves; the bark is cracked and

packed with larval excrement. Infested trees are often killed in a matter of a few weeks. Resprouting may occur from the tree base.

MANAGEMENT

The same methods are used to manage both *Phoracantha* species. Control eucalyptus longhorned borers by reducing tree stress, properly handling eucalyptus wood, planting resistant species, and avoiding activities that disrupt biological control. Pesticide applications generally are not effective in managing these pests.

Eucalyptus are also attacked by several other introduced insects. Pest managers should learn how their efforts, such as choosing a tree species to plant, may affect the control of these other pests. Eucalyptus pests include leaf-feeding beetles, eucalyptus gall wasp, and at least six species of psyllids (see *UC IPM Pest Notes Publication 7423, Psyllids* and *UC IPM Pest Notes Publication 7460, Eucalyptus Redgum Lerp Psyllid*). Certain of these insects are now under effective biological control, including the blue gum psyllid (*Ctenarytaina eucalypti*) and eucalyptus snout beetle or the gumtree weevil (*Gonipterus scutellatus*). Several parasites are being introduced to control other pests, such as the leaf-feeding Australian tortoise beetle (*Trachymela sloanei*). Inappropriate actions such as spraying persistent broad-spectrum insecticides can harm natural enemies and might cause outbreaks of these other pests. Conversely, uncontrolled populations of pests such as eucalyptus redgum lerp psyllid (*Glycaspis brimblecombei*) can seriously stress trees, increasing eucalyptus susceptibility to longhorned borers.

Cultural Management

Choose eucalyptus species that are well adapted to each location and provide them with proper cultural care. Certain species of eucalyptus are more resistant to longhorned borers (Table 2). Most eucalyptus species that are adapted to wetter growing conditions are more suscep-

TABLE 2. Relative Susceptibility of *Eucalyptus* spp. to *Phoracantha semipunctata*.**More susceptible**

blue gum, *E. globulus*
 flooded gum, *E. grandis*
 Karri gum, *E. diversicolor*
 manna gum, *E. viminalis*
 shining gum, *E. nitens*
 Sydney blue gum, *E. saligna*

More resistant

hybrid, *E. trauitii*
 lemon gum, *E. citriodora*
 mountain gum, *E. dalrympleana*
 red ironbark, *E. sideroxylon*
 river red gum, *E. camaldulensis*
 sugargum, *E. cladocalyx*
 swamp mahogany, *E. robusta*

Adapted from Hanks, L. M., T. D. Paine, J. G. Millar, and J. L. Hom. 1995. Variation among *Eucalyptus* species in resistance to eucalyptus longhorned borer in southern California. *Entomologia Experimentalis et Applicata* 74:185-194.

tible to longhorned borers, while the more resistant eucalyptus often are species adapted to drier conditions. However, most eucalyptus can be attacked if they are heavily stressed, for example by being planted in poor soils or deprived of sufficient water. A well-maintained tree of a susceptible species may be at less risk of infestation than a neglected tree of a resistant species. Trees with some resistance to these wood borers may produce copious amounts of resin in response to an attack.

Consider providing supplemental water on a regular schedule during prolonged dry periods, particularly if seasonal rainfall has been below normal. It is particularly important not to suddenly cut off irrigation to trees that have been receiving water regularly. These trees will become water stressed and susceptible to heavy attack. Irrigate around the outer canopy, not near the trunk. Trees should receive proper amounts of water to maintain tree vigor; however, frequency and duration of irrigation depends on the site, use, and species of eucalyptus. The watering schedule used for lawns is too frequent, and its duration is inadequate to maintain good tree health. Such a watering schedule is likely to promote tree root disease.

Protect trees from injuries. Remove infested trees and branches immediately, but do all other pruning during

December and January when adult beetles are inactive. When extensive limb removal is planned for reasons other than dead wood removal or to eliminate hazardous trees, space the trimming over several years. Otherwise, the tree may not have adequate foliage to produce the food it needs to maintain good health. Also, extensive pruning suddenly exposes previously shaded bark to direct sunlight, which can result in sun scald cankers that are susceptible to borer attack.

Eucalyptus logs used for firewood and dead or dying branches and trees are the primary beetle-breeding sites. Sanitation is critical for reducing beetle numbers. Until the wood dries below a critical level, it remains suitable and highly attractive to ovipositing beetles. Anything that can be done to speed the drying process, such as cutting and splitting wood, helps to reduce the length of time the wood can support beetle development. If the wood is already infested, it should be treated or destroyed. Bury, burn (where permitted), or chip infested eucalyptus wood. Chipped eucalyptus makes an excellent mulch. Alternatively, remove the bark from felled logs or solarize the wood by placing it in a sunny location for 10 to 12 weeks and covering it with ultraviolet-resistant plastic. This prevents new beetles from attacking and resident beetles from emerging and flying to nearby living eucalyptus. Solarized wood can be stored for firewood.

Biological Control

Biological control with natural enemies may provide the best long-term solution to longhorned borer problems. If beetle populations are reduced to low levels, natural enemies are better able to keep populations in check, and vigorous trees can survive a few attacks. At least one native California wasp that parasitizes beetles, *Helcostizus rufiscutum* (Ichneumonidae) attacks *P. semipunctata*, but the most effective parasites are those that have been imported from Australia.

The most important parasitic wasp from Australia is *Avetianella longoi*, a 1/16-inch-long, host-specific encyrtid that lays its eggs within the eggs of the beetles. *Avetianella longoi* disperses rapidly and efficiently finds borer eggs. This wasp has widely established in northern and southern California, typically attacking and killing over 90% of *P. semipunctata* eggs in the field. Preliminary research, however, suggests that it may be less effective against *P. recurva*.

Four species of braconid wasp parasites have also been introduced (*Syngaster lepidus*, *Callibracon limbatus*, *Jarra maculipennis*, and *J. phoracantha*). At least one, *S. lepidus*, may be established at several sites. These wasps are attracted to infested eucalyptus trees and use long egg-laying structures to drill through the bark and locate feeding beetle larvae. The female wasps paralyze the developing larvae and lay one or more eggs on each one. These eggs hatch and the developing parasite larvae feed on the borer larvae, eventually killing them. These species of wasps are highly specialized parasites attacking only certain beetles; they represent no threat to humans, pets, or livestock. All were originally introduced to control *P. semipunctata*; additional parasite species may be introduced to better control *P. recurva*.

Chemical Control

Early work from both California and other regions where beetles have become established demonstrates

that insecticides are not suitable for management of eucalyptus longhorned borer populations. Contact and systemic insecticides are ineffective, costly, or environmentally inappropriate because of the potential for drift, effects on beneficial or nontarget insects, and risk of exposure to human populations in urban environments.

Borer management must focus on providing cultural practices and envi-

ronmental conditions that favor the tree to the disadvantage of the beetle. Because natural enemy introductions by government agencies and university scientists are funded through taxes, public and professional support is critical to the ongoing success of biological control.

COMPILED FROM:

Dreistadt, S. H., J. K. Clark, and M. L. Flint. 1994. *Pests of Landscape Trees and Shrubs: An Integrated Pest Man-*

agement Guide. Oakland: Univ. Calif. Div. Agric. Nat. Res., Publication 3359.

Paine, T. D., J. G. Millar, and L. M. Hanks. 1995. Integrated program protects trees from eucalyptus longhorned borer. *Calif. Agric.* 49(1): 34-37.

For more information contact the University of California Cooperative Extension or agricultural commissioner's office in your county. See your phone book for addresses and phone numbers.

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PRODUCED BY IPM Education and Publications, UC Statewide IPM Project, University of California, Davis, CA 95616-8620



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This material is partially based upon work supported by the Extension Service, U.S. Department of Agriculture, under special project Section 3(d), Integrated Pest Management.

WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits and/or vegetables ready to be picked.

Dispose of empty containers carefully. Follow label instructions for disposal. Never reuse the containers. Make sure empty containers are not accessible to children or animals. Never dispose of containers where they may contaminate water supplies or natural waterways. Do not pour down sink or toilet. Consult your county agricultural commissioner for correct ways of disposing of excess pesticides. Never burn pesticide containers.

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