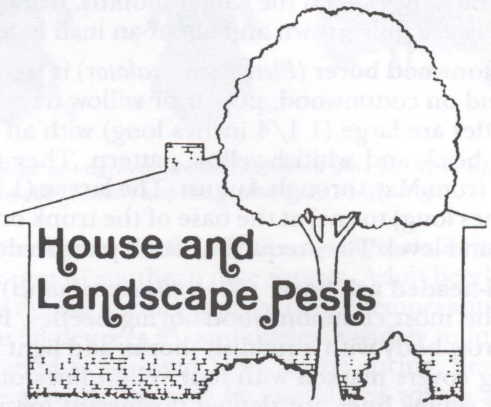
B-5086

Texas Agricultural Extension Service
The Texas A&M University System

Wood-boring Insects of Trees and Shrubs



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Many insects feed and make their homes in the bark, trunks and branches of shade trees and shrubs in Texas. Bark beetles and insect borers belong to several different insect groups including a variety of beetles, moths and horntail wasps.

Most insect borers are attracted to weakened, damaged, dying or dead plants. These are referred to as "secondary invaders" because they attack only after a plant has been weakened by another stress. Secondary invaders are a symptom of other problems with the health of the tree or shrub, but may contribute to its decline. Secondary invaders include species from groups already mentioned, but also may include termites, carpenter bees and carpenter ants.

Many other insects live in dying or dead trees, including natural enemies (predators and parasites) of the insect borers, sap or fungi feeders, or species which merely use the spaces provided by the tunnels and galleries as living quarters.

Wood-boring insects that attack healthy trees and shrubs are called "primary invaders." Primary invaders may eventually kill trees.

Damage

Borer infestations often go unnoticed until plants or parts of plants begin to die or show external signs of damage. Wood-boring insects often produce sawdust-like frass (excrement). Their holes are normally round, oval or semicircular and are found in a random pattern on the plant. Woodpecker damage is sometimes confused with that of wood-boring beetles, however woodpecker damage will not produce frass. One woodpecker, the yellow-bellied sapsucker, produces square holes in rows around a trunk or branch. (See photo on page 5).

Many borers damage plants by tunneling through the inner bark layer (cambium) into the sapwood (xylem) that transports nutrients and water to the leaves. These insects are called phloem feeders. When the cambium layer is completely girdled the plant eventually dies above or beyond the damage site. Partial girdling reduces plant growth and vigor above the site of attack. On occasion, tunneling makes the tree weak, causing limbs and branches to fall. Borer damage can severely affect the quality of lumber and can make trees susceptible to disease.

Wood-boring Insects

Long-horned beetles or round-headed borers (*Coleoptera: Cerambycidae*)

Adults are called long-horned beetles because their antennae are occasionally longer than their bodies. Larvae tunnel underneath bark and into the heartwood. The tunnels are oval to almost round in cross section because of the round shape of the larvae (See Fig. 2). Larvae of some species are legless, but most have three pairs of small legs on the first three segments behind the head capsule. While tunneling, larvae continually pack their tunnels with excrement (frass) which looks like compressed wood fibers, or push frass out of the holes they produce. This excrement, along with the sap exuded by the plant in response to the damage, is often visible on the outside of infested trunks or branches. Many species of beetles belong to this group, but most are secondary invaders. Some examples of long-horned beetles are described below.

Locust borer (*Megacyllene robiniae*) adults are medium-sized (3/4 inch long) long-horned beetles frequently found feeding on goldenrod or other flowers in the

fall. They are dark brown to black with distinctive gold-yellow markings. Larvae hatch from eggs laid in bark crevices. Visible symptoms of infestation are wet spots and frass on the bark of black locusts. Later, larvae tunnel into the inner bark and construct cells in which they spend the winter months. In a year the larvae are fully grown and about an inch in length.

Cottonwood borer *(Plectrodera scalator)* is frequently found on cottonwood, poplar or willow trees. Adult beetles are large (1 1/4 inches long) with an attractive black and whitish-yellow pattern. They are active from May through August. The larvae (1.75 to 2 inches long) tunnel at the base of the trunk or below ground level. They require about 2 years to develop.

Red-headed ash borer *(Neoclytus acuminatus)* is one of the most common wood-boring beetles. It has a narrow body with a reddish thorax and light brown wing covers marked with four yellow lines on each. The yellow lines are slanted downward toward the middle, giving the appearance of a "V" across the back. The antennae are rather short and the long legs are thin and fragile. Red-headed ash borers feed in many species of wood including ash, oak, elm and even grapes. Adults can be found on dead log piles and frequently emerge from firewood.

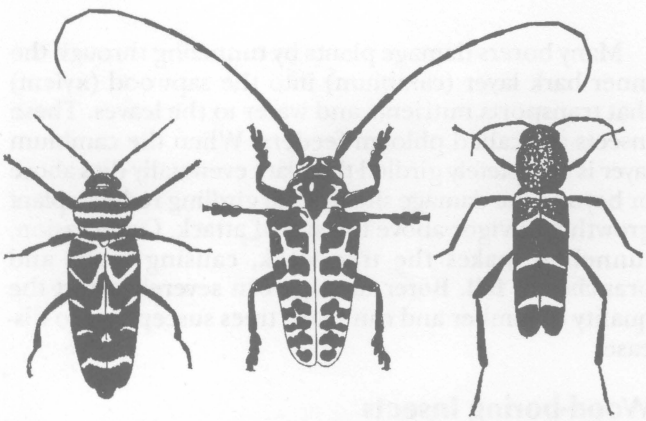


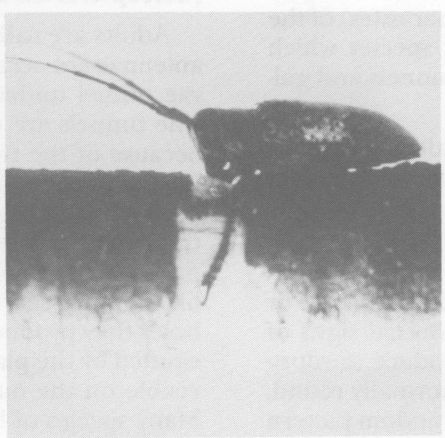
Figure 1. Long-horned beetles or roundheaded borers: locust borer (left); cottonwood borer (center); and red-headed ash borer (right).

Red oak borer *(Enaphalodes rufulus)* attacks oak and maple trees and can be a serious pest in nurseries. The reddish-brown adults (5/8 to 1 1/8 inches long) lay eggs individually in bark crevices during July and August. Larvae tunnel under the bark and into the heartwood. Infested sites can be recognized by the frass around the buckled bark near the gallery entrance. Larvae often tunnel completely around the trunk or branches they infest, producing noticeable scars or girdling. Red oak borers feed for more than a year before pupating in chambers tunnelled into the heartwood. Damage kills limbs or terminals and increases the risk from secondary invaders and diseases.

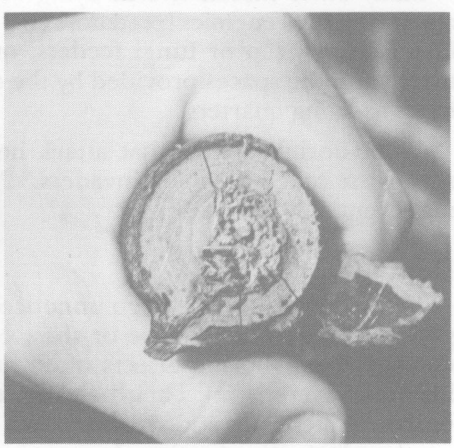
Twig girdler *(Oncideres* species) damage occurs primarily from egg laying. This insect attacks pecan, mimosa, chinaberry and huisache. The grayish-brown adults (1 1/16 inch long) girdle limbs during the fall (late August through mid-November) by chewing a V-shaped groove entirely around twigs, branches or terminals. Eggs are inserted into the bark on the girdled part of the branch away from the tree. Girdled limbs eventually break and fall to the ground, particularly during high winds and storms. Damage can disfigure a young tree and leads to secondary branching, particularly if the terminal is attacked. Larvae reach up to 7/8 inch long and are unable to develop in healthy sapwood. Removing the girdled twigs and branches from the ground during winter and spring and destroying them can reduce the population of these insects.

Twig and branch pruners (*Elaphidionoides* and *Agrilus* species) produce damage superficially similar to that of twig girdlers on elm, hackberry, hickory, maple, oak, pecan, persimmon, redbud, sweetgum and other trees. In these species, however, it is the larvae that girdle twigs and branches underneath the bark. The surface of the severed end of the twig is smooth. The insect usually severs branches where small twigs branch from the main, girdled branch.

Red oak borer larvae girdle main trunks and branches during the second year of larval development.



Female twig girdler beetles chew a V-shaped groove entirely around twigs, branches or terminals. (Photo by M. E. Rice)



Twig and branch pruner larvae girdle from underneath the bark.

Metallic wood-boring beetles (or flat-headed borers) (*Coleoptera: Buprestidae*)

Adult beetles are flattened, hard-bodied and boat-shaped with short antennae. These are beautiful beetles with distinctive metallic colors (green, blue, bronze, copper). Larvae are cream-colored and legless with widened, flattened body segments just behind the heads. Consequently, when these larvae tunnel beneath bark or into the sapwood they produce oval or flattened tunnels in cross section (Fig. 2). Galleries are often winding and packed with frass. Tunneling activities can girdle trunks and branches. Many species of flat-headed borers occur in the state. Most are secondary invaders.

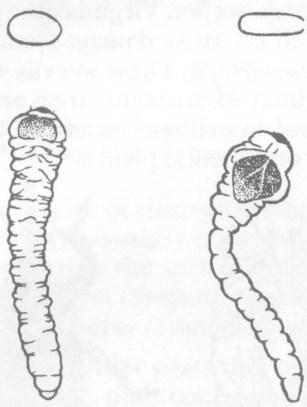


Figure 2. Larvae of round-headed borer (left) and flat-headed borer (right) with cross sections of tunnels (above).

Examples of flat-headed borers include the **bronze birch borer** *(Agrilus anxius)*, uncommon in Texas because of the lack of host trees; ***Agrilus* species** found on oak and raspberry (*A. bilineatus* and *A. ruficollis*, respectively); **flat-headed appletree borer** *(Chrysobothris femorata)* and a closely related species that attacks recently transplanted or stressed shade, pecan and fruit trees.

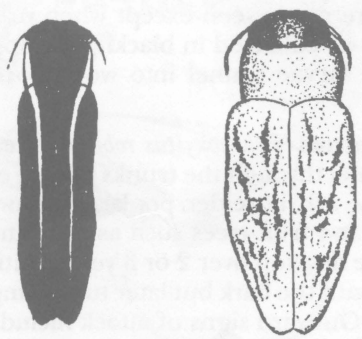


Figure 3. Metallic wood-boring beetles or flat-headed borer adults: *Agrillus bilineatus* (left); flat-headed appletree borer (right).

Bark Beetles (*Coleoptera: Scolytidae*)

Beetles in this group tunnel below the bark of trees and/or into the wood. Adult beetles are small and reddish-brown to black. Larvae are cream-colored grubs without legs. One member of this group, the European elm bark beetle (*Scolytus multistriatus*), is the carrier of Dutch elm disease. It occurs in the Texas panhandle, but is infrequently encountered in other parts of Texas. Other members of this group are described below.

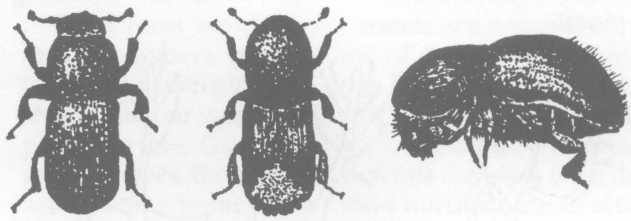


Figure 4. Bark or engraver beetles: Southern pine beetle (left); *Ips* engraver beetle (center) and Asian ambrosia beetle (right).

Southern pine beetle *(Dendroctonus frontalis)* is a primary pest of southern pine forests. Adult beetles are active during warmer months (when temperatures are above 58 degrees F), and disperse widely to injured, weakened or stressed trees in the spring. Seven or more generations may be completed within a year. When abundant, they can attack healthy trees. Larvae tunnel beneath the bark producing tunnels or galleries in patterns resembling the letter "S" (Fig. 5). This tunnelling quickly disrupts the cambium layer, girdling the tree. Infested trees can have numerous masses of resin called "pitch tubes" on the tree trunk. Needles of newly attacked trees turn reddish-brown 1 to 2 months after infestation during the summer, and up to 3 months in the winter. Removal and destruction of infested trees may prevent healthy trees in the vicinity from being attacked (see Extension publication L-921, "Pine Bark Beetles").

"Pitch tubes" are commonly seen on the trunks of pines attacked by pine bark beetles.

Ips engravers (*Ips*. spp.) are often mistaken for the southern pine bark beetle because their appearance and damage are similar. Their gallery patterns tend to be more parallel to each other, however (Fig. 5). *Ips* usually attack weakened trees only. Recently felled

wood should be covered with plastic to prevent *Ips* beetle infestation. The **black turpentine beetle**, *Dendroctonus tenebrans*, is another species attacking pines.

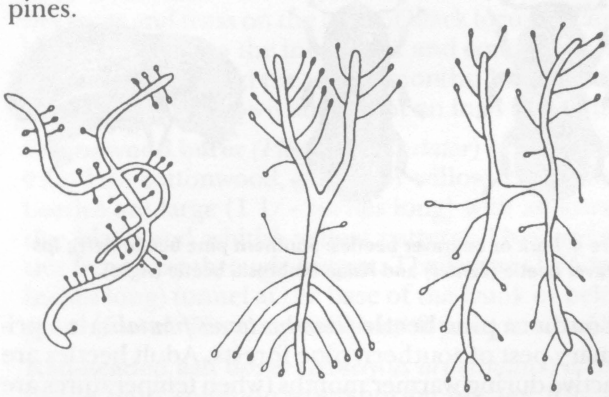
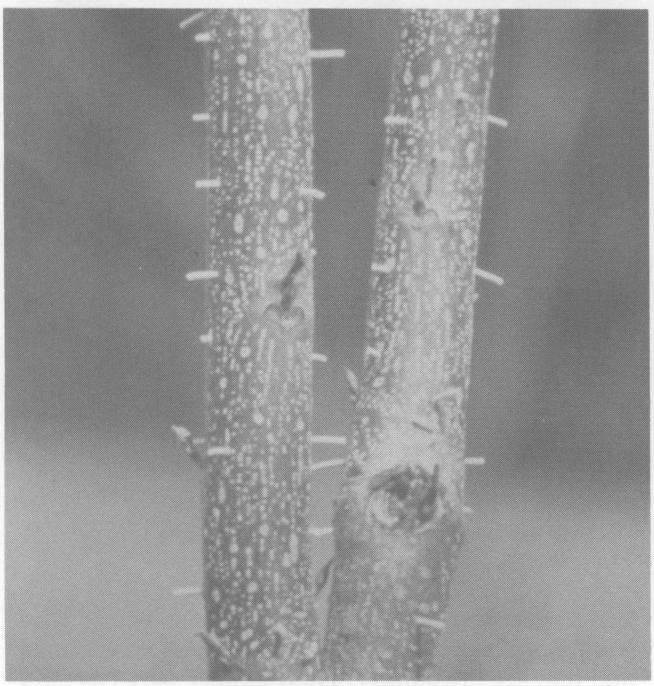


Figure 5. Left to right: "S"-shaped egg galleries of the Southern pine beetle; "Y"- or "H"-shaped egg galleries of the Ips engraver beetles.

Shothole borers *(Scolytus rugulosus)* are secondary pests of common fruit trees (peach and plum), wild plums and occasionally ash, elms and hawthorne. Beetles tunnel through the bark and make small holes in the bark crevices.

Asian ambrosia beetle *(Xylosandrus crassiusculus)* is a newly introduced species that attacks healthy, stressed or freshly cut elm, pecan, peach, *Prunus* species, oak, sweetgum and other trees in east Texas. Tiny (2 to 3 millimeters long), dark reddish-brown adult female beetles tunnel into twigs, branches or small tree trunks, excavating a system of tunnels in the wood or pith in which they lay eggs. They also introduce a fungus on which the larvae feed. Visible damage includes wilted leaves on infested branches and protrusions of compressed wood dust from numerous small holes, resembling toothpicks pointing outward. Dead and dying areas of bark (cankers) can form at the damage site, eventually girdling the tree and killing it. There are several generations per year. Chemical control of this species has been generally unsuccessful. Native ambrosia beetles are also called **shot-hole** or **pine-hole borers**. These species have similar biologies but rarely attack healthy, vigorous trees.



Protrusions of compressed wood dust signal attack by the Asian ambrosia beetle.

Weevils (*Coleoptera: Curculionidae*)

Adult weevils have a characteristic snout which bears the chewing mouthparts (Fig. 6). Larvae are legless and cream-colored, and generally feed in cells or hollowed out cavities underneath the bark rather than in galleries or tunnels as do bark beetles. Virginia pine plantings in Texas have suffered extensive damage from the **deodar weevil**, *Pissodes nemorensis*. These weevils attack the trunks during the winter where young trees are in poor planting sites. Several weevil species attack the bases and roots of woody ornamental plants.

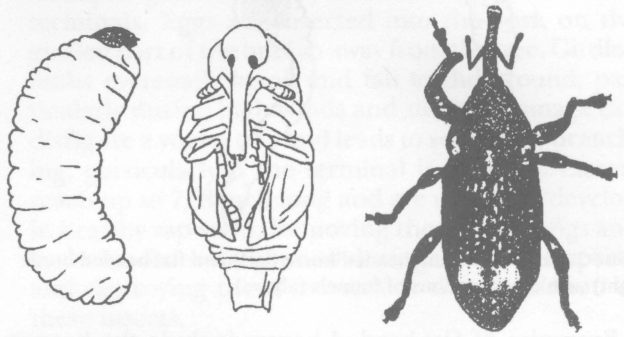


Figure 6. Deodar weevil larva, pupa and adult.

Wood-boring caterpillars (*Lepidoptera*)

These insects are the immature stages of several kinds of moths. Caterpillars can be easily identified by their "false legs" (prolegs) with tiny rows of hooks on the undersides of some of the abdominal segments (Fig. 7). Adult moths are rarely seen except when reared from the host plants or collected in blacklight traps. Several kinds of moth larvae tunnel into woody ornamental plants:

Carpenterworms *(Prionoxystus robinae)* are large larvae that tunnel through the trunks of oak, elm, black locust, willow, ash, boxelder, poplar, cottonwood, Chinese tallow and fruit trees such as pear and cherry. These larvae develop over 2 or 3 years, initially feeding underneath the bark but later tunnelling into the heartwood. Outward signs of attack include piles of sawdust and excrement, particularly in cracks and crevices. Carpenterworms may enter and exit the trunk of the tree several times during their development. Several closely related species with similar life cycles also occur in Texas, but may develop in other host trees. Adult moths, which emerge in the spring, are rather large with spotted wings.

Peach tree borer *(Synanthedon exitiosa)* is one of the most important insect pests of peach and plum. Adult peach tree borer moths mate and lay their eggs on the trunks of peach and plum (*Prunus* species) trees

during August and September. These daytime fliers are one of several species often called clear-wing moths, and they look superficially like wasps (Fig. 7). Larvae hatch from eggs in about 10 days and tunnel beneath the bark for 10 to 11 months before emerging from the trunk. After emerging, they drop to the soil to pupate at the base of the tree. Affected trees can be identified by masses of sap around damage sites at the base of the trunk. Infestations can kill scaffolding limbs or entire trees.

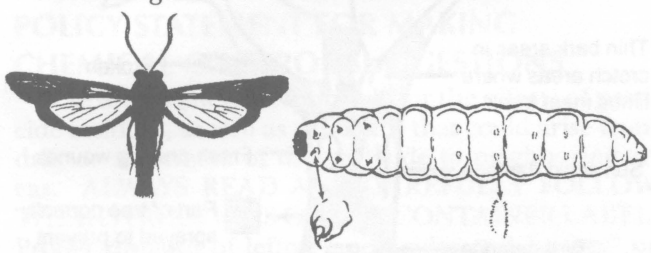


Figure 7. Clear-wing moth and underside of larva showing true legs (right) and false legs (prolegs) bearing tiny rows of hooks (crochets).

Other species of clear-wing moths are: 1) the **lilac** or **ash borer** *(Podosesia syringae)*, which has its adult flight period during the spring and early summer; 2) the **dogwood borer** *(Synanthedon scitula)*; and 3) the **lesser peach tree borer** *(Synanthedon pictipes)*.

Other caterpillar pests that occur in Texas include: the southern pine coneworm *(Dioryctria amatella)*, which tunnels around the bases of Virginia pine trunks; *Euzophera ostricolorella*, a root collar borer that infests potted magnolia; and the American plum borer *(Euzophera semifuneralis)*, which invades damaged or improperly pruned branches on a wide variety of woody ornamentals.

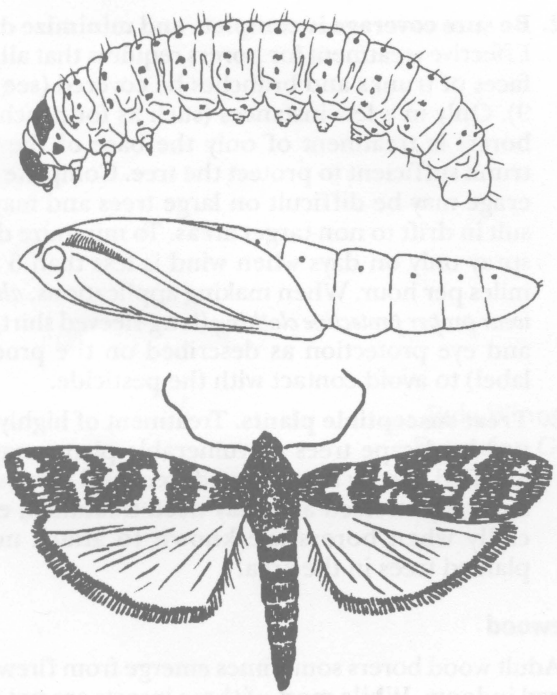


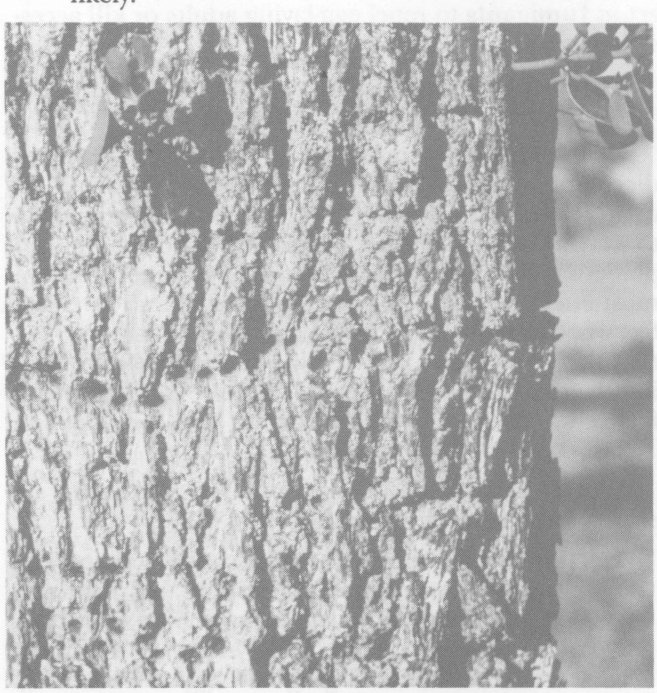
Figure 8. Southern pine coneworm larva (top), pupa (middle) and adult (bottom).

Managing Wood-boring Insects

Prevention

Since most wood-boring insects are considered secondary invaders, the first line of defense against infestation is to keep plants healthy. Proper care of trees and shrubs discourages many borer pests and helps infested plants survive. Good sap flow from healthy, vigorously growing trees, for example, defends the plant from damage by many borer pests. Good horticultural practices include:

- Selecting well adapted species of trees and shrubs that are not commonly attacked by wood borers in your area. Arizona ash, birch, cottonwood, locust, soft maple, flowering stone fruits (such as peaches and plums), slash pines (in west Texas), willow and poplar are especially prone to borer attack.
- Choosing and preparing a good planting site to avoid plant stress, freeze damage, sun scald and wind burn.
- Minimizing plant stress and stimulating growth by using proper watering and fertilization practices.
- Avoiding injury to tree trunks from lawn mowers, weed trimmers or construction.
- Promptly caring for wounded or broken plant parts using pruning or wound paint during all but the coldest months of the year.
- Properly thinning and pruning during colder months.
- Removing and destroying infested, dying or dead plants or plant parts, including fallen limbs.
- Wrapping tree trunks and limbs with quarter-inch hardware cloth spaced about 1 1/2 inches from the tree's surface where woodpecker damage is likely.



Sapsucker damage appears as square holes in a tree trunk.

(See Extension publications L-1309, "Protecting Existing Landscape Trees from Construction Damage Due to Grade Changes," and L-1097, "Fertilizing Woody Ornamentals," for additional information.)

Wrapping trunks to prevent borer attack is ineffective and may, under certain conditions, increase the rate of infestation. Using plastic trunk protectors to help prevent injury from lawn mowers and weed trimmers is a good idea.

Non-chemical control for infested plants

Once trees and shrubs are infested, non chemical options for borer control are limited. One option is to remove and destroy heavily infested or injured plants. Damage sites also can be inspected closely to determine if the larvae stages can be extracted from the plant with a pocket knife, wire or other suitable tool.

Chemical control

It is important to remember that stressed, unhealthy trees can be attacked repeatedly and will need repeated applications of insecticide indefinitely. In most cases this is neither economical nor environmentally justified. When chemical treatments are used, efforts always should be made to improve overall tree health.

Insecticide products registered for borer control are listed in Table 1. Most of these products are applied as sprays to the trunks and branches, and are non-systemic, **residual insecticides** (e.g., bendiocarb, carbaryl, chlorpyrifos, endosulfan, es-fenvalerate, fluvalinate, lindane, methoxychlor, sumithion). While these products do not kill larvae that have already penetrated the sapwood or heartwood, they will kill adult and larval stages tunneling through the treated bark layer. These are primarily a preventive treatment. Some products (those containing paradichlorobenzene and ethylene dichloride) act as **fumigants** to repel egg-laying adults or kill accessible larvae.

Systemic insecticides are ineffective for borer control and few are registered for this purpose.

Trunk injection products (containing acephate, dicrotophos and oxydemeton-methyl) are registered for treatment of some borers. These products are supposed to work by delivering insecticides into the cambium and phloem tissues where borers feed. These injections are most effective against sap feeding insects and rarely affect wood borer larvae. Furthermore, research has shown that damage caused by inserting the injection devices into trunks can be significant. Data supporting the effective use of these products has not been produced in Texas.

Several factors should be considered when using insecticides to control insect borers:

1. **Time your treatments to match adult activity.** The life cycles of some insect borers are well known in Texas. Knowing when adults lay their eggs is critical, as insecticides are most effective if applied when adults are emerging and eggs are hatching.

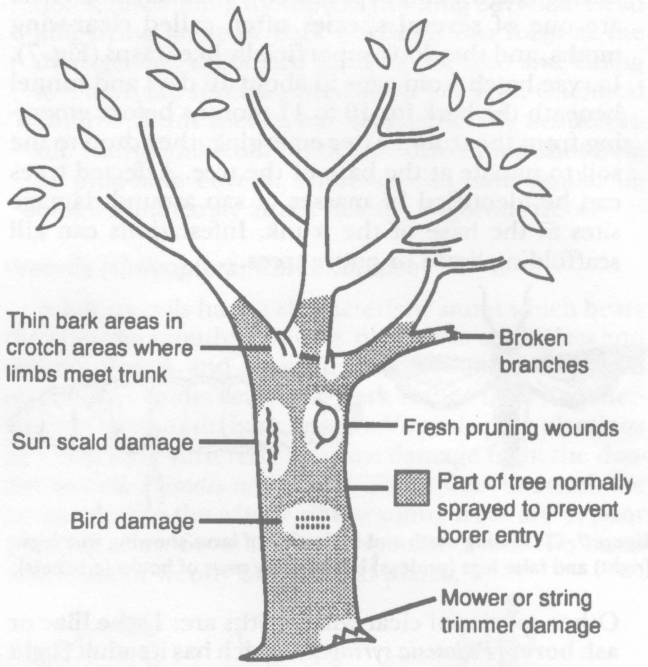


Figure 9. Sites where borers are most likely to enter a tree. The highlighted areas are the most critical sites for treatment to prevent borer entry.

For the peachtree borer, a single surface application of a contact insecticide in late August or early September can prevent infestations on *Prunus* species. For most beetles, the adult egg-laying period is either very long or unknown. Surface treatments are effective for only a 3- to 10-week period. Therefore, regular re-treatment of susceptible plant parts is needed for effective control.

2. **Be sure coverage is complete and minimize drift.** Effective treatment for borers requires that all surfaces of trunks and branches be covered (see Fig. 9). Only in a few instances (such as for peachtree borer) is treatment of only the base of the tree trunk sufficient to protect the tree. Complete coverage may be difficult on large trees and may result in drift to non-target areas. To minimize drift, spray only on days when wind is less than 6 to 7 miles per hour. When making applications, *always wear proper protective clothing* (long-sleeved shirt, hat and eye protection as described on the product label) to avoid contact with the pesticide.
3. **Treat susceptible plants.** Treatment of highly-valued landscape trees or vulnerable plants may be justified. Newly transplanted trees and shrubs are naturally stressed and may need treatment, especially when borers are known to attack newly planted trees in the area.

Firewood

Adult wood borers sometimes emerge from firewood stored indoors. While most of these insects are not considered harmful, old house borer and powderpost beetles will attack seasoned, dry wood inside the home

(see Extension publication L-1784, "Wood Destroying Beetles"). Treating firewood with insecticide is both ineffective and potentially dangerous to the homeowner. Wood should be stored outdoors away from the house until just before use. If firewood is infested with borers it can be treated by wrapping it in a tarp and allowing sunlight to heat it. Stacking wood layers in alternate directions will help it dry and reduce areas that can harbor insects.

POLICY STATEMENT FOR MAKING CHEMICAL CONTROL SUGGESTIONS

The user is always responsible for the effects of pesticide residues, as well as problems that could arise from drift or movement of the pesticide to neighboring areas. ALWAYS READ AND CAREFULLY FOLLOW THE INSTRUCTIONS ON THE CONTAINER LABEL. Proper disposal of leftover pesticides and "empty" or used containers is an essential step in safe pesticide use.

Suggested pesticides must be registered and labeled for use by the Environmental Protection Agency and the Texas Department of Agriculture. The status of pesticide label clearances is subject to change and may have changed since this publication was printed. County Extension agents and appropriate specialists are advised of changes as they occur.

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas Agricultural Extension Service is implied.

Acknowledgment

The authors are grateful to R. N. Coulson, L. Dreesen, P. J. Hamman and S. Richter for reviewing this publication.

Editor

Judy Winn, Associate Professor and
Extension Communications Specialist

Table 1. Insecticides registered for treatment of insect borers.

PEST	INSECTICIDE
Bark beetles	
(unspecified)	carbaryl, chlorpyrifos, lindane
ambrosia beetle	chlorpyrifos
anobiid beetle	chlorpyrifos
black turpentine beetle	chlorpyrifos
(native) elm bark beetle	chlorpyrifos, methoxychlor
ips engraver	carbaryl
fruit tree bark beetle	lindane
southern pine bark beetle	chlorpyrifos, lindane
Wood-boring beetles	
long-horned borer beetles or round-headed borers (unspecified)	chlorpyrifos, lindane
cottonwood borer	chlorpyrifos
locust borer	carbaryl, chlorpyrifos
red oak borer	chlorpyrifos
twig girdlers	lindane
metallic wood borer or flat-headed borers (unspecified)	chlorpyrifos
apple tree borer	chlorpyrifos, paradichlorobenzene
bronze birch borer	acephate, bendiocarb, chlorpyrifos
olive borer	carbaryl
two-lined chestnut borer	chlorpyrifos
Weevils	
(unspecified)	chlorpyrifos
obscure weevil (adults)	acephate, bendiocarb, diazinon, fluvalinate
pales weevil	bendiocarb, carbofuran, chlorpyrifos, es-fenvalerate, sumithion
pitch-eating weevils	carbofuran, chlorpyrifos
Caterpillars, clear-wing moths	
(unspecified)	chlorpyrifos
ash borer	carbaryl, chlorpyrifos
dogwood borer	chlorpyrifos, endosulfan, lindane
lesser peachtree borer	chlorpyrifos, endosulfan, ethylene dichloride
lilac borer	chlorpyrifos, endosulfan, lindane
oak borer	chlorpyrifos
peachtree borer	chlorpyrifos, endosulfan, ethylene dichloride, lindane, paradichlorobenzine
peach twig borer	chlorpyrifos, endosulfan

NOTE: Refer to product labels for use rates, application frequency and list of ornamental plants that can be sprayed using products containing the insecticides listed above. Some insecticides listed are for use by commercial pest control operators only.

Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Zerle L. Carpenter, Director, Texas Agricultural Extension Service, The Texas A&M University System.

10M-3-94, New