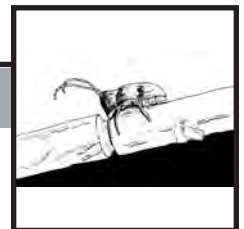
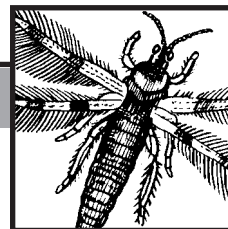
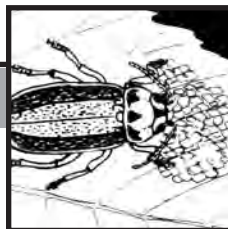
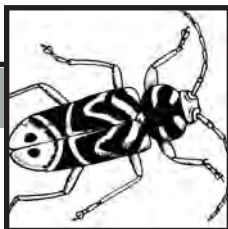
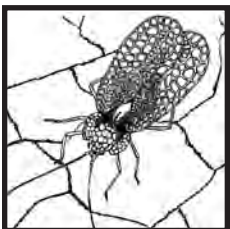


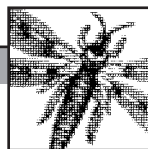
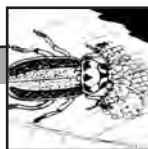


INSECT PESTS

of ornamental plants in the home landscape



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Mississippi gardeners grow hundreds of different species of plants in the home landscape, and most of these plants are subject to attack by one or more insect pests. Being able to identify and control these pests when needed is an important part of managing a home landscape. However, in many cases it is possible to avoid, or at least reduce the potential of, having pest problems in the first place.

Gardeners accomplish this by being aware of the insect pests that are likely to occur on different species and varieties of plants and working proactively to minimize the potential for pest problems. This can be done by avoiding species or varieties of plants that are particularly prone to pest problems, keeping plants healthy and vigorous so they can defend themselves from pest attack, and avoiding actions, such as unnecessary insecticide sprays, that can trigger pest outbreaks. When pest problems do occur, insecticides can be important gardening tools but must be chosen and used with appropriate care and planning. See Extension Publication 2483, *Integrated Pest Management in the Home Landscape*, for more information.

This publication provides you as a home gardener with information on the biology, management, and control of some of the insect pests most commonly encountered on landscape plants. Some pests, such as aphids, are addressed generically, because the biology, management, and treatment of aphids is similar, regardless of the particular species of aphid and the plant on which it occurs. Other pests, such as hibiscus sawfly and lesser canna leafroller, are discussed individually, because they are so commonly encountered.

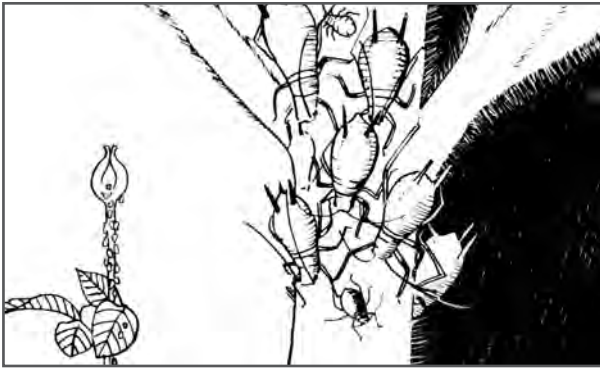
Although this publication does not specifically address all of the different species of insect pests that occur in Mississippi landscapes, smart gardeners often can adapt information to pest situations not specifically covered. For example, if you have problems with large numbers of aphids on day lilies and you determine there is a need for treatment, you can consult the section on “aphids” to see which insecticides are recommended and then check the insecticide label to be sure that particular insecticide is labeled for day lilies. Likewise, if green mapleworms are threatening to defoliate a prized maple tree, you can review the information on other caterpillar pests of deciduous landscape trees to gain some insight into possible management and treatment options.

The insecticides recommended for control of a particular pest are listed according to the active ingredient. This is necessary because a particular active ingredient may be sold under dozens of different brand names. Literally hundreds of different brand name insecticide products are available for use in the home landscape, but these represent only a few dozen different active ingredients. Thus, when shopping for insecticides, it is important to know exactly which active ingredient you wish to buy. The section on “Choosing and Purchasing Insecticides” has more information on this and discusses most of the more common insecticides.

Within the list of insecticides recommended to control a particular pest, active ingredients that may be acceptable for use by “organic gardeners” are listed in *Italics*. Note, however, this does not necessarily mean that all brand name formulations containing that particular active ingredient are acceptable for organic gardening. Organic gardeners should read the product label carefully to be sure it conforms to their requirements.

When choosing insecticides, always read the label carefully to verify the insecticide is labeled for the intended use and for the particular plant being treated. For example, acephate is labeled to control caterpillars on many different landscape plants, but it will injure flowering crabapple, red maple, and several other species of trees. Also, although acephate is labeled for use to control fall webworms on most trees, it may not be used to control fall webworms on pecans, because pecans are food-bearing trees.

APHIDS



aphids: occur on most plants, but plants most commonly attacked include crape myrtles, roses, and silver maple.

description: (around 1/8 inch) Many different species of aphids occur on ornamental plants. All are small, soft-bodied insects with piercing-sucking mouthparts. Depending on species, their color may vary from green, yellow, or black to pink or red. Some species, known as wooly aphids, are covered with white, cottony strands of wax. One of the more distinctive characteristics of aphids is the presence of two elongate “tailpipe-like” structures known as cornicles that protrude from the end of the abdomen of most species.

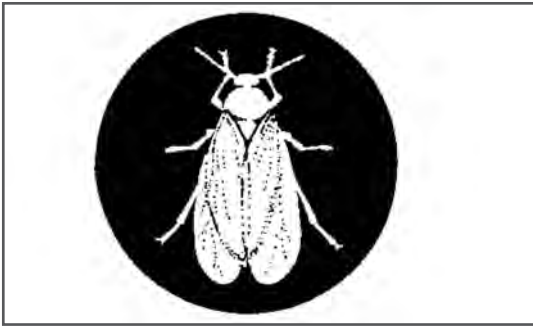
damage: Aphids cause damage by sucking plant sap and by transmitting plant diseases. Although individual aphids consume very little, aphids reproduce rapidly and can occur in extremely high numbers. Many species reproduce by parthenogenesis, which means that female aphids do not need to mate to reproduce. Many species can complete a generation in as few as seven days. Feeding is often concentrated on young expanding leaf and terminal tissue, and the physical damage caused by large numbers of piercing mouth parts can result in distorted plant growth. Aphids excrete large amounts of honeydew or undigested plant sugars. This honeydew accumulates on leaves, causing them to be sticky. Honeydew also results in the growth of black, sooty mold fungi. Although sooty mold does not damage the plant directly, heavy accumulations of sooty mold are unsightly and interfere with photosynthesis. Honeydew and sooty mold will also accumulate on vehicles and lawn furniture located under aphid-infested trees.

common species: The crape myrtle is the only host of the aphid bearing its name. The crape myrtle aphid occurs on the undersides of leaves and can build to extremely high numbers on susceptible varieties. Wooly alder aphid is a common species on silver maple. River birch is commonly infested with an aphid (no common name) that causes leaves to become distorted and reddened. Asian wooly hackberry aphid is a relatively new, non-native species that commonly occurs on sugarberry trees. These insects, which are covered with a white, cottony material, cause accumulations of sooty mold on infested trees. Oleander aphid commonly attacks oleander and butterfly weed (*Asclepias*) planted in butterfly gardens. Yellow pecan aphids and black pecan aphids, two common pests of pecans, are discussed in a following section.

management: Many insects prey on aphids, with lady beetles and lacewings being the most common. Parasitic wasps and fungal diseases also have a big impact on aphid populations. Natural biological control is the most important means of controlling aphids, and outbreaks are more likely when natural control has been disrupted by previous insecticide sprays. Certain varieties of crape myrtles, especially the “indica” varieties, are more likely to develop aphid problems than others. Consider susceptibility to aphids when selecting varieties of crape myrtles for planting. Heavy concentrations of aphids occurring on terminal growth of smaller plants can often be washed off with water sprayed from a garden hose.

control: acephate, *azadirachtin*, imidacloprid, malathion, dinotefuran, *insecticidal soap*, *pyrethrins + canola oil*. Soil drench treatments with imidacloprid can provide effective, long-term control of aphids, but such treatments are slow acting and must be applied before heavy infestations develop.

WHITEFLIES



whiteflies: most commonly seen on gardenia, ligustrum, Chinese privet, and hibiscus.

description: (1/16 to 1/8 inch) Whiteflies are related to aphids. Adult whiteflies are small moth-like insects covered with a white waxy powder. There are several different species, but all carry their white, powdery wings folded tent-like over their bodies. They are most commonly found on the undersides of leaves, but clouds of adults will fly around infested plants when disturbed. Immature whiteflies are immobile, scale-like insects that feed on the undersides of leaves. They are flattened and oval-shaped and, depending on the species, may have waxy filaments protruding from their bodies. However, these traits are difficult to see without a hand lens.

damage: Like aphids, whiteflies suck plant sap through piercing-sucking mouthparts. They are also similar to aphids in their tendency to build to high populations and their ability to produce large amounts of honeydew, which eventually results in sooty mold.

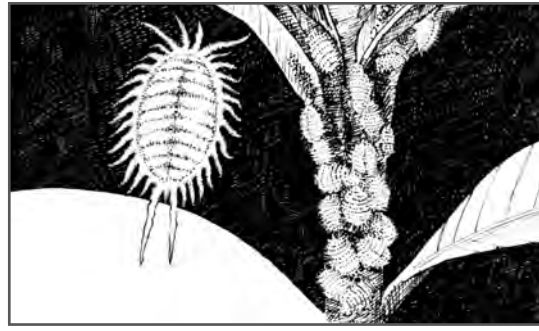
common species: Citrus whitefly is the species commonly seen on gardenia (cape jasmine). Bandedwinged whitefly can be identified by the two gray bands across each wing and occurs primarily on hibiscus and other malvaceous plants. Silverleaf whitefly is an important pest of many vegetable and nursery crops and occasionally occurs on landscape plants. This species can be especially difficult to control.

management: Avoid unnecessary insecticide treatments that can disrupt natural biological control.

control: acetamiprid, azadirachtin, dinotefuran, imidacloprid, *insecticidal soap*, *Neem oil*, *horticultural oil*. Dinotefuran and imidacloprid are useful for control of whiteflies when applied as a soil drench. Acetamiprid is one of the more effective foliar sprays for whiteflies. When attempting to control whiteflies with foliar sprays, apply at least two successive treatments 5 to 7 days apart.

Several other whitefly insecticides are labeled for application only by licensed commercial applicators. Because of the efficacy of these products and the difficulty of effectively controlling whiteflies, homeowners may wish to contract with commercial applicators for whitefly control in difficult situations.

MEALYBUGS



mealybugs: occur on gardenias and a few other landscape plants.

description: (1/8 to 1/3 inch) Mealybugs are soft-bodied wingless insects that are related to aphids and whiteflies. One of the key characteristics of mealy bugs is that their bodies are covered with a whitish or yellowish powdery wax material. The body is somewhat flattened and oval-shaped and, depending on the species, there may be elongate waxy filaments extending from the margins of the body. In most species, eggs are deposited in cottony egg sacs attached to the plant. Mealy bugs are slow-moving insects.

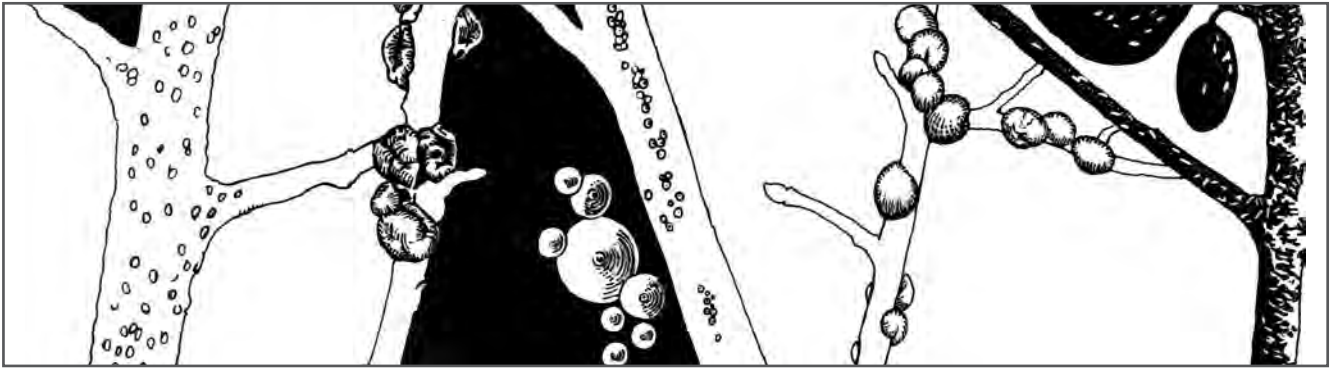
The larvae of some species of lady beetles superficially resemble mealy bugs. These lady beetle larvae are often found in association with infestations of aphids or mealybugs and are often mistaken for mealybugs. Close observation reveals that they move more quickly and feed on the aphids or mealybugs. But these are predators that actively eat aphids and mealy bugs. They move faster than mealy bugs and have a distinct head.

damage: Mealybugs are more commonly seen on plants grown indoors and in greenhouses, but they also occur on certain landscape plants, as well as outdoor potted plants. Like aphids and whiteflies, mealybugs have piercing-sucking mouthparts and produce honeydew that supports the growth of sooty mold. Mealybugs often concentrate their feeding on young tissue in the terminals of plants, and heavy infestations can distort leaves and stems. The accumulations of wax, shed skins, and cottony egg sacs, combined with the resulting honeydew and sooty mold are unsightly.

management: Naturally-occurring predators and parasites play a key role in keeping mealybug populations in check. On heavily infested plants, you can temporarily reduce populations by washing with a forceful water spray.

control: acetamiprid, acephate, imidacloprid, dinotefuran, *insecticidal soap*, *Neem oil*, *horticultural oil*, *pyrethrins + canola oil*: Imidacloprid and dinotefuran control mealybugs when applied as a soil drench. Acetamiprid is one of the more effective foliar treatments. Multiple applications, applied at 7-day intervals, may be necessary when using foliar sprays.

SCALE INSECTS



scale insects: occur on camellia, holly, magnolia, euonymus, and many other plants.

description: (1/16 to 1/2 inch) Scale insects are unusual in that they are immobile for most of their life and do not resemble other insects. Scale insects spend most of their lives underneath a hardened or soft waxy covering, with their mouthparts imbedded in the host plants. Newly hatched scale insects are insect-like and are known as crawlers. Scale crawlers quickly imbed their mouthparts into the plant and form the scale-like covering for which this group of insects is named. Scale insects are related to aphids, whiteflies, and mealybugs. There are two major groups of scale insects—armored scales and soft scales—and there are many different species within each of these groups.

soft scales: Soft scales secrete a waxy covering that is firmly attached to their bodies. **Soft scales produce large amounts of honeydew, which in turn can support the growth of sooty mold.** In most cases mature soft scales are usually much larger than armored scales, ranging in size from 1/8 to 1/2 inch across.

armored scales: Armored scales secrete a waxy covering that is not attached to their bodies (although this is difficult to see without a microscope). **Armored scales do not produce honeydew** and are generally smaller, 1/8 inch or less, and more flattened than soft scales.

damage: Depending on the species, scale insects may feed through the bark on twigs and limbs or on leaves. Heavy infestations of scale insects can be very damaging to plants, causing unthrifty growth, honeydew (in the case of soft scales), distorted growth, and even death of branches, limbs, or entire plants. Infestations of armored scale are easy to overlook because their coverings blend in with the bark.

common species: Common species of soft scales include magnolia scale, which is commonly seen on many of the small deciduous magnolias, as well as on Southern magnolia; tulip tree scale, which occurs on yellow poplar; pine tortoise scale, which occurs on pines; and Indian wax scale, which occurs on Indian hawthorn and many other shrubs. Common armored scales include tea scale, an important pest of camellia and holly; euonymus scale, which occurs on many species of euonymus; white peach scale/false oleander scale, which occurs on the leaves of magnolia and many other plants; and San Jose scale.

management: Predators, such as lady beetles, and small parasitic wasps often keep scale populations in check. Outbreaks are more likely to occur when this naturally-occurring biological control is disrupted by insecticide sprays; but outbreaks can also occur for other reasons, such as plant stress, absence of natural control agents, or individual plants that are inherently susceptible. Applications of pyrethroid insecticides are especially likely to flare scale outbreaks. Some homeowner mosquito treatments containing pyrethroids are labeled for application to shrubs to control resting adult mosquitoes, but gardeners should be aware that their use increases the potential for scale problems. Also, scale outbreaks tend to be more common in areas where there is an active mosquito fogging program, particularly on plants that nearest the application route.

In some cases, you can use pressurized water sprays, with a fine spray at approximately 30 PSI of pressure, to dislodge eggs and female scales from plants. Such treatments also help remove accumulations of sooty mold. This method is most effective against large soft scales, such as wax scales, infesting thick-leaved species such as hollies and Indian hawthorn. Apply these treatments before bud break, when only mature leaves are present. Tender leaves and buds can be injured with excessive water pressure. Hand removal can also be a helpful tool in reducing soft scale numbers on small or lightly infested plants.

SCALE INSECTS (cont.)

Some plant species or varieties are more prone to having scale problems than others, and one way to avoid problems with scale insects is not using plants especially prone to scale infestations. Heavy outbreaks of scale are often naturally controlled, but this takes time. Such a cycle of scale outbreak followed by naturally subsiding populations is often seen with tulip tree scale on yellow poplar. However, heavy infestations of scale can kill or severely injure ornamental plants before natural control occurs.

control: *azadirachtin*, dinotefuran, imidacloprid, acephate, malathion, carbaryl, *neem oil*, *horticultural oil*: Scale insects can be very difficult to control. In cases where control of scale insects becomes necessary there are three basic control options: horticultural oils, systemic insecticides, and “crawler sprays.”

horticultural oils: Horticultural oils control scale insects and their eggs by suffocating them. Hence oil sprays control only scale insects/eggs they contact directly, and getting adequate spray coverage is important when using oil sprays. Horticultural oils can be applied during the late winter, as dormant or delayed-dormant type sprays, as well as during the growing season. If used improperly, horticultural oils can injure plants, so be sure to read carefully and follow label directions. Because horticultural oils can be effective against all life stages of scale insects, they can be very useful tools for scale control. Examples of currently available horticultural oils include Hi-Yield Dormant Spray, Bonide All Seasons Horticultural & Dormant Spray Oil, Monterey Saf-T-Side, Fertilome Scalecide, Fertilome Dormant Spray & Summer Oil Spray, and Ortho's Volck Oil.

systemic insecticides: Because they constantly feed on plant sap, scale insects are susceptible to certain systemic insecticides. These are insecticides applied to the soil or injected into the trunk and taken up in the sap of the plant where they are consumed by the scale insects.

A relatively new insecticide known as imidacloprid (Bayer Advanced Tree and Shrub Insect Control is one brand name) is now available for homeowner use as a soil drench to control infestations of soft scale. Note that this product is specifically labeled for use against soft scales (the group that produces honeydew) but is not labeled for control of armored scales. This product can be a useful tool in the control of soft scales, especially when used in combination with other methods.

Use rate depends on either height of shrub or cumulative trunk circumference. Keep in mind, however, that this product is slow acting, and it may take a month or more to begin seeing results. Apply this treatment according to label directions when plants are actively growing.

Dinotefuran (Greenlight Tree & Shrub Insect Control) is an even newer systemic insecticide for use as a soil-applied treatment to control scale insects. It is especially useful against armored scales (the group that does not produce honeydew). This is a granular product you apply to the soil around the plant and water in. The use rate is based on inches of circumference around the main stem for trees, or on height in feet for shrubs. It is slow-acting but can provide up to 3 months of residual control.

crawler sprays: Contact insecticide sprays provide effective control of scale crawlers. Crawlers are soft-bodied and generally easy to kill with good coverage of a labeled insecticide. But such treatments are effective only if they you apply them when scales are in the crawler stage. This can be difficult to do, because eggs of different species of scales hatch at different times of the year. Frequently examining infested twigs with a magnifying lens, and/or using double-stick tape, wrapped around infested twigs, are two methods you can use to determine when crawlers first appear. When properly timed, two or three successive sprays at 7- to 10-day intervals will kill most of the crawlers, thus breaking the life cycle of the scale insects on the infested plant. Timing crawler sprays is generally more difficult for soft scales, which have fewer generations per year than armored scales. Insecticides recommended to control scale crawlers include malathion or acephate.

use a combination of methods: Because scale insects can be difficult to control, it is often necessary to use a combination of methods. On severely infested plants, one of the first steps is to prune out any severely damaged and/or infested limbs. This helps reduce the number of scales present and increases the ability to get adequate spray coverage. **Getting thorough coverage is very important when attempting to control scale with insecticidal oils or crawler sprays.** One problem with assessing progress with scale control is that dead scales look much like live scales, and dead scales may remain attached to the plant for quite a long time. With soft scales you can often gauge progress by the presence of honeydew. As long as soft scales continue to

SCALE INSECTS (cont.)

produce honeydew, they are still alive. Because ants, such as fire ants and carpenter ants, actively tend and protect soft scales in exchange for the honeydew they produce, controlling ants can help control scales. Likewise, controlling scales can help control certain ant species.

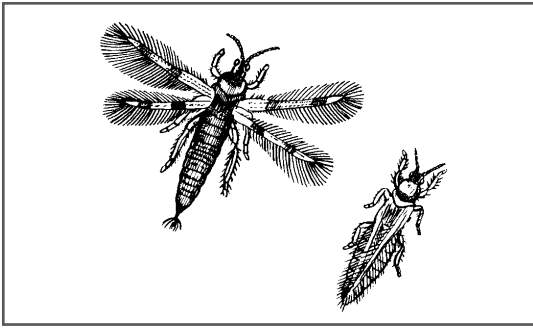
use a professional: Several scale insecticides are labeled for application only by licensed commercial applicators, and commercial applicators have the equipment necessary to effectively apply these products. Homeowners may wish to contract with commercial applicators for scale control in difficult situations.

other scale control options: Two other options for scale control must be mentioned. One is the “do nothing approach.” In some cases a plant may experience a heavy outbreak of scale insects that is eventually brought under control by naturally occurring parasites and predators. This often occurs with tulip tree scale on yellow poplar. But it takes time for the predators and

parasites to find the scale infestation and control it. This is more likely to occur if the homeowner does nothing than if harsh chemical sprays are used. With this approach there is the risk that the situation could get much worse, resulting in serious plant injury, before this natural control occurs.

Another option for dealing with scale insects is to replace the plant. This is a drastic step you should take only after careful assessment and consideration. Occasionally a plant becomes so severely infested and damaged by scale that this may be the best option. Obviously when replacing such plants, you may want to choose a different species or variety of plant less prone to scale problems.

THRIPS



thrips: occur on many plants but are most important on roses, tropical hibiscus, and laurels.

description: (about 1/16 inch) Thrips are very small, elongate insects that are no more than 1/16th of an inch long when fully mature. Most adults have fringed wings they carry folded lengthwise over their bodies, but these are evident only when viewed through magnification. Immature thrips are usually light yellow to lemon-colored and are spindle-shaped.

damage: Thrips can cause damage by feeding on leaves as well as by feeding on flowers. Their injury reduces the aesthetic value of the blooms of roses and other similar plants. Thrips also injure the foliage of certain plants, causing the leaves to have an unsightly, bleached appearance. A thrips feeds by punching plant cells with its needle-like mandible and sucking up the resulting plant juices. This results in silvery or bleached damaged areas. Because feeding is often concentrated on young, actively growing tissue, flowers and leaves are often crinkled or distorted as they continue to expand after being damaged. Thrips also transmit certain plant viruses.

common species: Western flower thrips and flower thrips commonly damage the blooms of roses, especially light colored varieties, and blooms of other plants. Greenhouse thrips often cause serious damage to the foliage of Grecian laurel.

control: acephate, *azadirachtin*, malathion, imidacloprid, bifenthrin, cyfluthrin, cyhalothrin, permethrin, *spinosad*, *insecticidal soap*: Soil drench treatments of imidacloprid will help control foliage feeding thrips, but thrips feeding in flowers are more difficult to control. During certain times of the year, large numbers of thrips migrate from maturing weeds and other hosts. Weekly sprays may be necessary to minimize damage to intensively managed roses during such periods of heavy migration.

LEAFMINERS

leafminers: most common on holly, boxwood, and azalea, occasionally on other plants.

description: (1/4 inch or less) The term “leafminer” describes any insect that completes at least a portion of its life by living and feeding inside plant leaves. In most cases the larvae feed on the leaf tissue between the upper and lower epidermis of the leaf. Depending on the feeding habits of the particular species, the mines may appear as irregularly shaped blotches or blisters or as winding tunnels. There are many different species of leafminers, representing several different groups of insects. Some of the most common leafminer species are flies, but some caterpillars live as leafminers for at least the early portion of their lives, and some species of sawflies and beetles are also leafminers.

damage: Damage is caused by the larval stage, which destroys leaf tissue by mining in the leaf, thus reducing leaf area and interfering with nutrient translocation. Extremely heavy infestations can result in enough loss of leaf area to adversely affect plant vigor and health. Fortunately, this is not common and most leaf miner infestations do not seriously affect plant health. However, even light leafminer infestations can cause plants to be unsightly and damage to broadleaved evergreens may persist. This aesthetic injury is the primary damage leafminers cause.

common species:

Holly Leafminers: Holly leafminers are the larval stage of a small fly. Actually several different species of leafminers attack holly. Most have only one generation per year and overwinter as larvae or pupae within mines in the leaves. Adults emerge and lay eggs when new leaf growth is forming in the spring. Heavy infestations can result in severe aesthetic injury and leaf drop.

Boxwood leafminers: Boxwood leafminers are larvae of a small, gnat-like fly. The yellow to orange-colored larvae overwinter inside the leaf mine, pupate in the spring, and emerge as adults in mid-spring.

Azalea leafminer: Azalea leafminers are the larvae of a small moth. Newly hatched caterpillars feed as leafminers inside the leaves, causing blister-like mines, but older caterpillars exit the mines and feed as “leafrollers” or “leaf-tiers.” Injury is concentrated on young leaves at the ends of stems. There are several generations per year, and heavy infestations can cause plants to be unsightly.

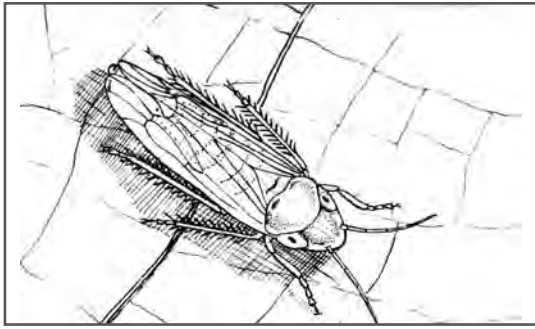
Citrus leafminer: This is a relatively new pest of citrus trees, which are often grown as landscape trees in the southern portion of the state. Citrus leafminers are the larvae of a small moth. They cause long, winding mines in the leaves of many types of citrus, causing plants to be unsightly. Because this insect is newly introduced, it has few natural enemies, and infestations are often heavy. Because citrus is grown both as a landscape plant and as a food crop, it is important to be sure any insecticides applied to citrus are specifically labeled for that use.

Locust leafminer: Locust leafminers are the larvae of a small beetle that causes irregular blotch-shaped mines on black locust. In some portions of the country, this insect occurs in such high numbers that black locust trees may be severely defoliated by mid-summer to early fall.

management: Predators and parasites often keep leafminer populations in check, and outbreaks are more likely when biological control is disrupted by previous insecticide treatments. Handpicking of mined leaves can be an effective method of managing light infestations of leafminers. This is especially true for holly leaf miners, which overwinter inside the leaves. Picking and destroying infested leaves destroys the insects while also improving plant appearance. Light pruning can help control azalea leafminer, especially when combined with a foliar insecticide treatment. English boxwoods are less susceptible to boxwood leafminer than are other types of boxwood.

control: acephate, imidacloprid, *spinosad*: Because the larvae live in a protected location inside the leaves, leafminers can be difficult to control. Systemic insecticides such as acephate or imidacloprid are normally most effective. Soil drench applications of imidacloprid control some species of leaf mining flies. Contact insecticide sprays must be applied during the time when adults are active and laying eggs. The objective is to control adults and establish an insecticide residue that controls newly hatched larvae as they are boring into the leaf. Several applications may be required to adequately cover the period of adult activity. Treatments containing the active ingredient spinosad are especially useful against leaf mining caterpillars, such as azalea leafminer and citrus leafminer, and some formulations of spinosad are specifically labeled for use on home grown citrus.

LEAFHOPPERS



leafhoppers: minor pests of most plants.

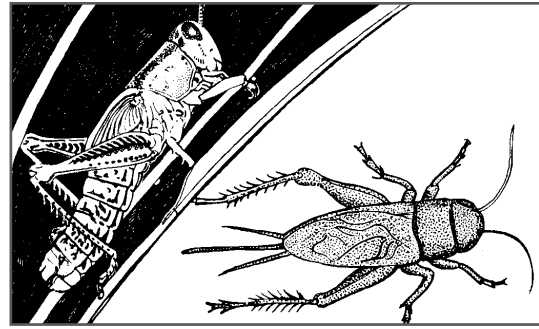
description: (1/8 to 1/2 inch) Leafhoppers are active, long-bodied, somewhat wedge-shaped insects. They have piercing-sucking type mouthparts and readily run, hop, or fly when disturbed. There are many different species; most are green to yellow, but some species are brightly marked with yellow, red, or blue.

common species: Glassywinged sharpshooter is common on crape myrtle. This is an unusually large leafhopper (approximately 1/2 inch long) that forcibly excretes large amounts of liquid. Potato leafhoppers can cause leaf injury on red maple, while the redbud leafhopper is a common inhabitant of redbud trees.

damage: Both adults and nymphs feed on the undersides of leaves and on tender stems, sucking the sap and causing leaves to become spotted or to turn yellow or reddish and dry up. In other cases, leafhopper injury causes distortion of leaves and/or terminals. Leafhoppers can also transmit important plant diseases, such as aster yellows and Pierce's disease of grapes. The feeding of some species causes a toxic response in the plant, resulting in a burning effect that can cause leaf tips to wither and die. In most cases, leafhoppers are minor pests that seldom cause serious plant injury.

control: bifenthrin, cyfluthrin, cyhalothrin, malathion, carbaryl, imidacloprid, permethrin, *insecticidal soap*, *pyrethrins + canola oil*: It is rather uncommon for leafhopper populations to become heavy enough to require treatment. Apply foliar sprays as needed. Soil drenches of imidacloprid provide some control but are rarely applied specifically to control leafhoppers.

GRASSHOPPERS & CRICKETS



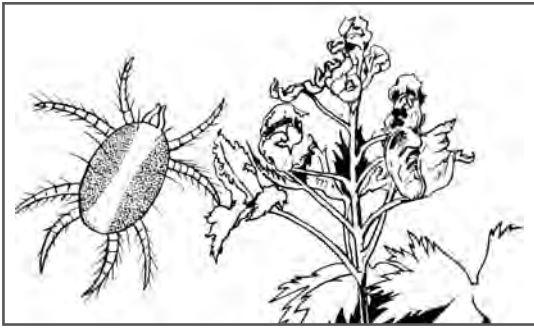
grasshoppers & crickets: general feeders on the leaves of many plants.

description: (1/2 to 3 inches) There are many different species of grasshoppers and crickets. They vary in size and color, but most are easily recognized by their hind legs, which are well-developed for jumping.

damage: Adults, as well as the immature nymphs, cause damage by eating leaves. Normally the amount of defoliation these insects cause is negligible, but outbreaks occasionally occur and cause excessive defoliation. Potential for significant damage is greatest on small plants. In cases where grasshoppers are migrating from nearby fields, roadsides, or natural areas and feeding on ornamental plants, repeated insecticide treatments may be required.

control: carbaryl, bifenthrin, cyfluthrin, acephate, malathion: Apply foliar sprays as needed to prevent excessive injury.

SPIDER MITES



spider mites: occur on roses, boxwoods, ornamental conifers, azaleas, camellias, and other plants.

description: (1/32 inch or less) Although they are not insects, spider mites belong to a closely-related group. Adult spider mites are so small they are barely visible to the naked eye, but they can be readily observed through a 10X hand lens. Adults of most species are somewhat globular in shape and have eight legs. There are many different species and color may vary from red to green or yellow. One of the more common species, the two-spotted spider mite, appears to have a dark spot on either side of the body.

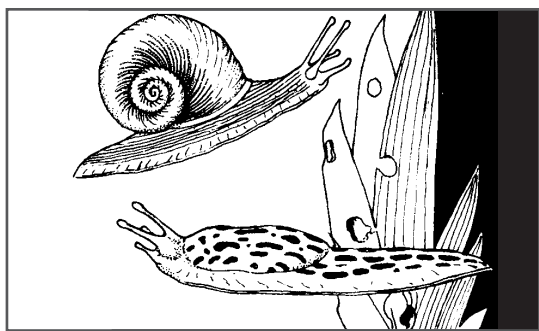
damage: Spider mites feed by sucking the fluid from plant cells. Adults and nymphs cause similar injury. Feeding by low numbers of mites is minor, but these pests have a very high reproductive potential and can complete a generation in as few as 7 days. Heavy infestations can cause severe injury and can even kill plants. Feeding by individual mites causes localized cell death, resulting in light colored “stippling.” When mite populations are heavy these individual feeding sites fuse, giving leaves a “bleached” or bronzed appearance. Severely injured leaves may curl and drop from the plant. At first, mite infestations are just on the undersides of leaves, but under heavy infestations the mites produce webbing, hence the name “spider mite,” and occur on the tops of leaves and on other plant parts.

common species: Two-spotted spider mite is a common species on many ornamental plants, including roses. Southern red mite commonly occurs on holly, camellia, and azalea. Boxwood mites are common on boxwood. Spruce spider mites are pests of many ornamental conifers.

management: Naturally occurring predatory mites and other predators often keep populations of plant-feeding mites in check. Outbreaks of spider mites often occur following insecticide treatments targeted against other pests because these treatments destroy the predatory mites. Avoid unnecessary insecticide treatments. Foliar applications of carbaryl or pyrethroid insecticides tend to trigger mite outbreaks, and outbreaks are also more likely to occur on plants treated with imidacloprid. Outbreaks of some species of mites are favored by hot dry weather, especially if accompanied by dusty conditions. Thus keeping plants well watered during periods of drought helps reduce the potential for mite outbreaks. Washing foliage with a water spray can also be beneficial in controlling or preventing mites, but this should be done early in the day to reduce the potential for encouraging disease.

control: malathion, *insecticidal soap*, *Neem oil*, *horticultural oil*, *pyrethrins + canola oil*. Horticultural oils can provide very effective mite control when thorough spray coverage is achieved. Few specific miticides are available for use by homeowners. When treating for mites it is important to apply two or more successive treatments four to five days apart, to effectively break the life cycle. Choose the product carefully. Using products that don't work or inadequate treatment intervals can intensify mite problems. For serious mite problems on high-value plants, consider contacting a licensed commercial applicator. These professionals have access to more effective miticides.

SLUGS & SNAILS



slugs & snails: attack hostas and other tender perennials, as well as many annual plants.

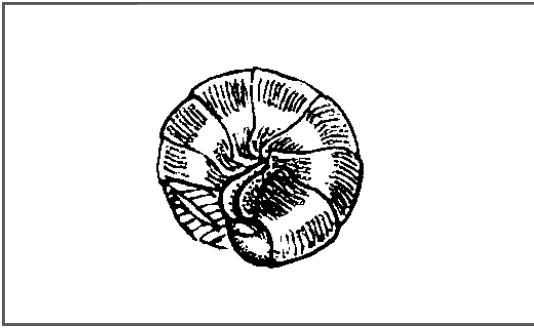
description: (1/2 to more than 3 inches) Slugs are more closely related to oysters and other mollusks than to insects. Their long, fleshy, slime-covered bodies are not jointed, and there are two movable “eye stalks,” as well as another pair of sensory tentacles, on the head. Although similar, snails have a shell, whereas slugs do not. Both slugs and snails move about on a layer of slime that dries to leave shiny trails. There are several species of slugs, some of which may be longer than three inches when mature. There are many different species of snails as well. Through most of Mississippi, slugs are generally more common and more damaging than snails. These animals are active mostly at night and spend the day hiding under flowerpots, mulch, leaf litter, or in other protected sites.

damage: Although snails and slugs often feed on decaying plant material, they also damage the leaves of tender perennials and annual bedding plants by feeding on them with their rasping-type mouthparts. Damage appears as long, narrow holes in the leaves and is often associated with the shiny trails. These pests also damage blooms, especially blooms growing near the ground. Keep in mind these pests are rarely active during the day, but their shiny foraging trails can indicate their presence. Feeding is often concentrated on the emerging leaves of plants such as hosta, which magnifies the overall impact of the injury. High populations often occur in situations where there is heavy mulch, leaf litter, or other organic matter and in densely-planted beds. They thrive in conditions of constant moisture.

management: Slugs thrive in moist, protected areas with heavy accumulations of decaying organic matter. Limit conditions favorable to slugs, such as excessive moisture, excessive organic matter/mulch, excessive leaf litter, and other detritus, and items such as flower pots, rocks, fallen limbs, and such, that provide daytime hiding places. Raking mulch away from the base of susceptible plants can also help reduce attack. You can use copper barriers or other types of barriers to protect especially sensitive or valuable plants. You can control slugs through diligent use of traps baited with beer or other attractive baits, such as moist dog food. Another nonchemical control option is to place inverted flower saucers, boards, or other attractive harborages in the flower bed, check them regularly, and physically remove and destroy any snails or slugs you find. These controls are more practical for small plantings.

control: metaldehyde, iron phosphate: Slugs and snails can be controlled with baits specially formulated for this purpose, and many commercial brands are available for home use. For best results, combine baits with management efforts to make the area less conducive to slugs and snails. To prevent injury to developing leaves of hosta and other susceptible plants, it is important to begin control efforts early in the spring before plants begin to break dormancy. Many species of slugs overwinter as adults and become active as temperatures warm in the spring. Baits are generally less effective when slugs are less active because of cool temperatures. Repeated bait applications are usually required to obtain and maintain control. Place baits near areas where the pests hide. Keep in mind that baits tend to lose their effectiveness when they become wet, or if they are exposed to sunlight for prolonged periods. Because baits containing metaldehyde are toxic to pets and wildlife, be careful to use them properly. Baits containing iron phosphate are labeled for use around domestic animals.

PILLBUGS



pillbugs: attack hostas and other tender perennials, as well as many annual plants.

description: (about 1/4 inch) Pillbugs are not insects but are land-dwelling crustaceans related to shrimp and crayfish. These animals have jointed bodies and seven pairs of legs and can roll into a ball when disturbed, hence the name pillbug. Pillbugs prefer moist, protected environments with lots of decaying organic matter. Heavy populations often occur in heavily mulched flowerbeds or areas with heavy accumulations of leaf litter.

damage: Although pillbugs feed mostly on decaying organic matter, they sometimes feed on the leaves of tender ornamental plants, such as hosta, and bedding plants. Damage often occurs as the leaves of dormant perennials are emerging through mulch and/or leaf litter.

management: As with slugs, limiting mulch, leaf litter, and other detritus in flowerbeds can help limit pillbug numbers. Damage to emerging hosta and other tender perennials can also be limited by carefully raking mulch and leaf litter away from plants during emergence. This prevents the pillbugs from having a protected place to feed on the emerging foliage.

control: carbaryl: Baits containing carbaryl help control pillbugs. Many commercially available slug baits contain metaldehyde + carbaryl, with the carbaryl being included mainly to control pillbugs. These are often sold as “slug and bug” baits.

PECAN PHYLLOXERAE

pecan phylloxerae: attack only pecans and hickories.

Although pecans produce edible nuts, they are also one of the more common trees in Mississippi landscapes. Pecan phylloxera is one of the most common insect pests of pecans. Because pecan is also a food-bearing tree, it is important that you use only insecticides specifically labeled for application to pecans when it is necessary to treat pecans.

description: Pecan phylloxera are small yellow insects that look very much like aphids. But we seldom see them because they are encased inside the galls that they cause to form on stems and nuts. The pea- to marble-sized, knot-like galls these insects cause make them easy to identify.

damage: Pecan phylloxera overwinter as eggs in cracks and crevices on limbs and branches. Egg hatching coincides with leaf bud break in the spring, and the young nymphs immediately crawl to the developing leaf buds and begin feeding. Their feeding affects the growth of the leaf tissue, causing the formation of the hollow, knotty galls that encase the feeding nymph. These galls cause severe deformation of developing twigs and nuts. On heavily infested trees, more than 70 percent of the new terminal tissue can be affected, resulting in trees that are unsightly and unproductive. Fortunately, outbreaks of pecan phylloxera are somewhat cyclic and trees may experience heavy infestations for a year or so, followed by several years of low populations.

management: Avoid planting pecans in the home landscape. If you do plant pecans, avoid the high maintenance varieties normally grown in commercial pecan orchards. Instead plant varieties such as Candy, Elliott, Farley, Jenkins, or Syrup Mill that tend to perform better in unmanaged, landscape situations. Although they generally produce smaller nuts, these varieties exhibit phylloxera and/or disease resistance or exhibit other traits desirable for unmanaged trees. Be aware that these varieties may be difficult to locate, but if you wish to plant pecan trees in the home landscape, it is worth the effort to locate these or similar varieties.

control: carbaryl: You can control pecan phylloxera with well-timed foliar sprays of carbaryl, but few homeowners have the power spray equipment needed to treat large pecan trees. In most cases, licensed commercial applicators must treat large trees, but not many are willing or able to do it. Always be aware of the potential

PECAN PHYLLOXERAE (cont.)

for drift onto neighboring properties and other nontarget sites, and take appropriate precautions to avoid drift related problems. In many urban settings the potential for problems from spray drift may be so great as to negate making insecticide treatments. If you attempt treatment, proper timing is critical. Treatments will not be effective after the protective gall forms around the insect. To be effective, treatments must be applied as soon as leaf buds begin to break in the spring and before there is more than 1 inch of new leaf growth. If the tree were severely infested the previous year, apply a second application about 10 days after the first. Getting good spray coverage is also an important consideration when treating for pecan phylloxera. Depending on tree size, 10 to 20 gallons of finished spray are normally required to adequately treat one tree. When treating pecans be sure the insecticide you use is specifically labeled for use on pecans.

PECAN APHIDS

pecan aphids: attack only pecans.

Pecans are included in this publication because they are often grown in the home landscape. Because they produce an edible crop, be sure to use only insecticides specifically labeled for pecans, when it is necessary to treat pecans.

description: Two species of aphids commonly occur on pecans. Their common names provide good general descriptions. Yellow aphids are small yellow aphids that occur on the undersides of pecan leaflets. Yellow aphids can build to high populations, with numbers exceeding 50 to 100 aphids per compound leaf. Black aphids are small black aphids that also occur on the undersides of leaflets, but are much less numerous than yellow aphids. Black aphids are easily identified by the angular shaped yellow lesions that their feeding causes on pecan leaflets. Often you can see an aphid feeding in such an area.

damage: Yellow aphids cause damage by sucking plant sap and producing honeydew. The loss of sap and other associated damage can adversely affect vigor and nut production, and this is an important consideration for commercial producers. But for homeowners, honeydew and the resulting accumulations of sooty mold are often considered to be the more important injury. This is especially true for pecan trees growing over patios or parking areas. Although outbreaks can occur in late spring to early summer, heavy infestations of yellow aphids occur most commonly in late August through October.

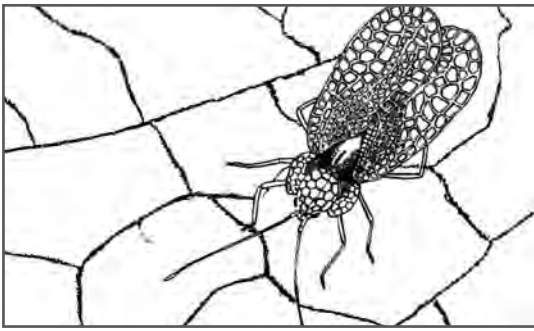
Although they are much less abundant than yellow aphids, black aphids can cause more damage to the vigor and yield potential of pecans. This is because they inject toxic saliva that results in angular shaped yellow lesions. These lesions eventually turn brown and leaflets and entire compound leaves will be shed from the tree prematurely. Because they are much less numerous than yellow aphids, black aphids do not usually cause large amounts of honeydew.

management: Avoid planting pecans in the home landscape, or at least avoid planting pecans near patio and parking areas where you don't want accumulations of honeydew and sooty mold on automobiles or lawn furniture. If you plant pecans, avoid planting high maintenance varieties. Instead, plant varieties such as Candy, Elliott, Farley, Jenkins, or Syrup Mill that tend to perform better in unmanaged landscapes. Although they generally produce smaller nuts, these varieties resist or tolerate insects and/or disease or have other traits desirable for unmanaged trees. Be aware that these varieties may be difficult to find, but if you want to plant pecan trees in the home landscape, it is worth the effort to find them or similar varieties. Avoid spraying pecan trees with insecticides. Because many foliar insecticide sprays destroy predators and parasites that help keep aphid numbers in check, using them can cause aphid outbreaks.

control: Imidacloprid: There are no insecticide sprays recommended to control aphids on pecan trees in the home landscape. Applying foliar insecticide sprays to pecan trees often increases aphid populations. The soil applied systemic insecticide imidacloprid is labeled for use on homegrown pecans to control aphids. Because this product is applied as a drench to the soil around the tree and because it works systemically, it is less likely to disrupt natural control. Although control is often erratic, because of varying soil and weather conditions, it is the only useful treatment available to the homeowner, and it is relatively easy to apply.

Homeowners who choose to use the imidacloprid drench treatment should read the label carefully to be sure they are applying the proper rate. The product is sold in 1-quart bottles, and the use rate is based on the number of inches around the tree at breast height. It may take more than 1 quart of product to treat one tree. For example, a tree that has a diameter of 12 inches has a circumference of nearly 38 inches. It would take 38 fluid ounces of product to treat a tree of this size. Because it takes a long time for this systemic insecticide to be taken up and moved through the plant, you must apply it well before you expect a pest problem.

LACE BUGS



lace bugs: attack azaleas, lantana, pyracantha, rhododendron, sycamore, oak, and a few other plants.

description: (about 1/8 inch) Adult lace bugs vary in color from brown to light gray, depending on species. They are about 1/8 inch long, with lace-like wings. In most species the wings are enlarged and have net-like veins. Nymphs may be black to gray and are usually covered with spines.

damage: Adults and nymphs cause damage by sucking sap from the undersides of the leaves. Damaged leaves have a stippled appearance, which is often mistaken for spider mite injury. Heavily-damaged leaves may look bleached out before eventually turning brown. Dark spots of shiny, shellac-like fecal material on the undersides of leaves are a sure sign of lace bug infestation and may be present even when insects are not obvious. Azalea, lantana, and pyracantha are the species most likely to require treatment. Although lace bugs are common on sycamore and some oaks, infestations are seldom severe enough to cause serious injury.

common species: Azalea lace bug is the most common insect pest of azaleas. Heavy infestations can cause foliage to appear bleached out and unsightly. Because of the evergreen nature of azaleas, damage will remain for quite a while after insects are controlled. Lantana lace bug is a common pest of lantanas. Heavy infestations cause bleaching and browning of leaf margins and eventually cause death of entire leaves. Lace bug injury on lantanas is often mistaken for drought stress, disease, spider mite feeding or chemical injury. You must look closely to see the small insects on the undersides of the leaves.

management: Lace bugs have several natural enemies. Check susceptible plants regularly to detect infestations before serious injury occurs. Azaleas planted in full sun are more susceptible to attack than those planted in filtered shade. Some varieties of azaleas exhibit resistance.

control: acephate, malathion, imidacloprid, bifenthrin, cyfluthrin, cyhalothrin, permethrin, *Neem oil*, *horticultural oil*, *pyrethrins + canola oil*: Soil drench treat-

ments of imidacloprid applied in fall or spring help control lace bugs. Foliar insecticide sprays are the quickest way to eliminate heavy infestations. Foliar insecticides that provide systemic activity, such as acephate or imidacloprid, are most effective. Direct insecticide sprays to the undersides of leaves for best control, especially with nonsystemics.

AZALEA CATERPILLARS

azalea caterpillars: primarily attack azaleas, especially the “indica” varieties. Sometimes attack blueberries.

description: (2 inches). This large, strikingly marked caterpillar is an occasional pest of azaleas throughout the South. Newly-hatched azalea caterpillars are yellow with longitudinal reddish stripes, but their appearance changes markedly as they grow. Older caterpillars are black, checkered with yellow or white, and have a reddish-orange head and legs. These caterpillars often rest with their heads and tails raised into the air, creating a broad u-shape. Mature caterpillars are approximately 2 inches long.

damage: The moths deposit their eggs in masses of up to 100 eggs. Newly-hatched larvae feed together on the undersides of leaves, causing leaf skeletonization. As larvae grow they spread out and feed individually, causing progressively greater amounts of defoliation. Heavy infestations can cause total defoliation of entire plantings of azaleas. As with most caterpillars, 80 to 90 percent of the total leaf area that a single caterpillar will eat during its life is eaten during the last 3 to 4 days before pupation. This is why severe defoliation can seem so sudden. Plants that appear perfectly fine on Sunday afternoon can be totally defoliated by Wednesday afternoon. Infestations are most common on the large-leafed “indica” varieties.

management: Be alert for early signs of defoliation injury to azaleas – leaf skeletonization caused by young caterpillars. Infestations are most common in late summer and early fall. Early detection and control of young larvae can prevent serious defoliation injury.

control: permethrin, bifenthrin, carbaryl, acephate, cyfluthrin, cyhalothrin, *Bts*, *spinosad*: Azalea caterpillars can be controlled with foliar sprays containing these active ingredients. When treating for azalea caterpillars you should also consider the potential for lace bug problems and, if necessary, choose a treatment such as acephate or cyfluthrin + imidacloprid that controls both pests. Use Bt products only against small larvae not threatening to cause immediate defoliation.

EASTERN TENT CATERPILLARS

eastern tent caterpillars: occur primarily on black cherry but also attack apple, crabapple, and occasionally other trees.

description: (Mature caterpillars are about 2 inches.) Eastern tent caterpillars are easy to identify by the silken tents they build in the crotches and limb forks of black cherry trees in early spring. The tents normally have an overall angular shape because of their location. Because few, if any, leaves are enclosed within the tent, the caterpillars must leave the tent, usually at night, to feed on nearby leaves. The background color of the body is black, etched with fine gold or yellow markings, but a distinct white line runs down the center of the back and a row of irregular blue spots and markings down either side. The head is black and the body is sparsely covered with long, fine, tan-colored hairs. Mature larvae wander about on the ground in search of a place to pupate. Eggs are laid in dark-colored, somewhat slick, spindle-shaped masses around the smaller twigs. This is the overwintering stage.

damage: Heavy infestations can cause significant, or even complete, defoliation, but there is only one generation per year, and trees can recover with little long-term injury. Protect young, newly established trees from too much defoliation.

Pregnant mares abort as a result of accidentally consuming eastern tent caterpillars wandering about on the grass in search of pupation sites. This phenomena cost Kentucky thoroughbred breeders more than \$300 million in lost foals in 2001, when eastern tent caterpillars were unusually abundant. Although this situation has not been documented in Mississippi, cautious horse breeders may wish to avoid pasturing pregnant mares near infested wild cherry trees in the spring.

management: Most years the damage eastern tent caterpillars cause is not significant, and no control is necessary. Removing and destroying tents and the caterpillars in them can control on smaller trees. You can use a hook fashioned from a clothes hanger and taped to a long pole to remove tents from larger trees (be careful around power lines).

control: permethrin, carbaryl, cyfluthrin, cyhalothrin, *Bts*, *spinosad*: In cases where treatment is necessary to control heavy infestations, or to protect small, susceptible trees, apply foliar insecticide sprays. Often you can treat small, recently-planted trees with a hand sprayer. You can use hose-end sprayers designed for treating trees and shrubs for trees up to 20 to 25 feet tall, but few homeowners have the power spray equipment needed to treat large trees. Treatment of large trees usually must be performed by licensed commercial applicators. Always be aware of the potential for drift onto neighboring properties and other nontarget sites, and take appropriate precautions to avoid drift related problems. In many urban set-

tings the potential for problems from spray drift may be so great that you wouldn't want to make such treatments.

FOREST TENT CATERPILLARS

forest tent caterpillars: occur on various oaks, sweetgum, black tupelo, maple, elm, and other hardwood species.

description: (Mature caterpillars are about 2 inches.) Forest tent caterpillars are closely related to eastern tent caterpillars, which they resemble. Like eastern tent caterpillars, the background color of the body is black, etched with gold or yellow markings, and the caterpillars are sparsely covered with long, tan hairs. Forest tent caterpillars have a row of white, "keyhole-shaped" spots down the center of the back, rather than the solid white line seen in eastern tent caterpillars and a nearly continuous slate blue line down either side of the body. Despite their name, forest tent caterpillars do not build a tent. Instead, they form silken mats on the trunk and larger limbs. There is only one generation per year, and this insect overwinters in the egg stage. Eggs are deposited in dark-colored, somewhat slick, masses that encircle smaller twigs. Eggs hatch in early spring as leaves begin to develop.

damage: Occasionally, forest tent caterpillars occur in outbreak numbers and cause widespread defoliation of forest and landscape hardwoods. During non-outbreak years, individual trees can suffer heavy defoliation. Although this injury is unsightly, trees normally produce a second flush of leaf growth, and hardwood trees usually recover from one defoliation with little long-term adverse effect. But repeated defoliation can reduce tree growth rate.

management: Protect trees that suffer severe defoliation from further stress, such as a second defoliation, or drought stress, for the rest of the season.

control: permethrin, carbaryl, cyfluthrin, cyhalothrin, *Bts*, *spinosad*: In cases where insecticides are needed to control heavy infestations or to protect small, susceptible trees, apply foliar insecticide. Often, you can treat small, recently planted trees with a hand sprayer. You can use hose-end sprayers designed for treating trees and shrubs on trees up to 20 to 25 feet tall, but few homeowners have the power spray equipment needed to treat large trees. Treatment of large trees usually must be performed by licensed commercial applicators. Always be aware of the potential for drift onto neighboring properties and other non-target sites, and take appropriate precautions to avoid drift-related problems. In many urban settings the potential for problems from spray drift may be so great that you won't want to make such treatments.

FALL WEBWORMS

fall webworms: primarily attack pecan and persimmon, occasionally other trees, such as Bradford pear.

Fall webworms are important pests of pecans in the home landscape, and heavy infestations can cause severe, and even total, defoliation. Although pecans are commonly grown in the landscape, they are considered a food crop, and you must be careful when selecting insecticides to use on pecans.

description: (Mature larvae are about 1 1/4 inches.) This caterpillar makes conspicuous webs that enclose the ends of branches. Many dozens of caterpillars occur and feed within one web. The webbing protects the caterpillars from birds, insects, and parasites. The caterpillars themselves may be redheaded with light-colored spots or black-headed with dark spots. Regardless of head color the caterpillars will be sparsely covered with long light-colored hairs. Although there are two generations per year, these caterpillars are much more common in late summer and fall.

damage: The webs this insect makes are unsightly, especially when heavy outbreaks result in dozens, or even hundreds, of webs per tree. This caterpillar causes defoliation by feeding on the leaves enclosed within the web, and heavy infestations can result in total defoliation of susceptible trees. In the absence of other stress, trees normally survive and recover from one-time complete defoliation. But pecans that are severely defoliated may suffer from poorly filled nuts in the year of the defoliation and reduced nut load the following year. Heavy infestations of fall webworms occur more routinely in the southern portion of the state.

management: The “do nothing approach” is the most commonly used option for managing fall webworms. Avoid planting susceptible species—pecan and persimmon. When only a few webs are present on small- to medium-sized trees, you can remove them by using a hook made from a coat hanger and taped to the end of a long pole (be careful around power lines). Destroying the web this way also exposes the caterpillars to predation and parasitism.

control: permethrin, carbaryl, cyfluthrin, cyhalothrin, *Bts*, *spinosad*: Control webworms with contact insecticide sprays that penetrate the webbing. Often you can treat small, recently planted trees with a hand sprayer. You can use hose-end sprayers designed for treating trees and shrubs to treat trees up to 20 to 25 feet tall, but few homeowners have the power spray equipment needed to treat large trees. Treatment of large trees usually must be performed by licensed commercial applicators. Always be aware of the potential for drift onto neighboring properties and other non-target sites, and take appropriate precautions to avoid drift related problems. In many urban settings the potential for problems

from spray drift may be so great that you won't want to make such treatments. When treating pecans, be sure the insecticide is specifically labeled for pecans (some formulations of carbaryl and malathion are labeled for use on pecans).

WALNUT CATERPILLARS

walnut caterpillars: occur on walnut, hickory, and pecan.

description: Although they are gregarious and feed together as a group, walnut caterpillars do not build a web. They have the unusual habit of clustering in mass on the trunk of the infested tree when it is time for them to molt or shed their skin. After molting, the caterpillars move back into the crown of the tree to resume feeding, leaving a mass of shed skins stuck to the trunk of the tree. These masses of shed skins may remain on the tree for some time after the caterpillars have completed their development and crawled to the ground to pupate. The caterpillars are red with white stripes down their sides when young, and black or dark colored when fully mature. Caterpillars of both colors are sparsely covered with long white hairs. When they are disturbed, the caterpillars tend to arch their heads and tail ends, creating a wide U-shape. There are two generations per year.

damage: These caterpillars feed together in large groups causing localized defoliation within the crown of the tree. Often all of the leaves on one branch will be eaten, leaving only the larger mid-veins, while leaves of adjacent branches are undamaged. Such localized defoliation seldom causes serious long-term injury.

management: When masses of caterpillars move to the trunk of the tree to molt they are often near the ground where you can reach them and physically destroy them, or you can spray them directly with labeled contact insecticides.

control: permethrin, carbaryl, cyfluthrin, cyhalothrin, *Bts*, *spinosad*: If infestations are heavy enough to threaten severe defoliation, you can control caterpillars with foliar insecticide sprays. Small, recently planted trees can often be treated with a hand sprayer. Hose-end sprayers designed for treating trees and shrubs can be used to treat trees up to 20 to 25 feet tall, but few homeowners have the power spray equipment needed to treat large trees. Treatment of large trees usually must be performed by licensed commercial applicators. Always be aware of the potential for drift onto neighboring properties and other non-target sites, and take appropriate precautions to avoid drift related problems. In many urban settings, the potential for problems from spray drift may be so great that you wouldn't want to make such treatments. When treating pecans, be sure the insecticide you are using is specifically labeled for pecans (Some formulations of carbaryl and malathion are labeled for use on pecans).

BAGWORMS



bagworms: most commonly attack arborvitae, juniper, cedar, and other needle-bearing evergreens but also occasionally occur on broadleaf trees and shrubs.

description: (Bags are about 1 1/4 inches.) You can easily recognize this insect by the tapering grey to tan silk bags it produces and attaches to its host plant. Some of the needles or leaves of the plant are usually woven into the bag. If the bags contain caterpillars, they are not firmly attached to the plant, but when the insects pupate, they use strong silk to attach the bag to the plant. Adult females are wingless and never leave the bag. Eggs are deposited inside the bag, and this is how this pest overwinters. In the spring, newly hatched larvae either remain on the original plant or spread to other plants by ballooning on a silken parachute.

damage: Damage is the result of defoliation caused by the feeding caterpillars. When only a few caterpillars are present, defoliation is negligible, but heavy infestations can result in complete, or severe defoliation of individual plants. Defoliated plants covered with bags are unsightly.

management: Because of this insect's limited mobility, infestations are often localized, and handpicking before eggs hatch in the spring can effectively control low infestations or small plants. It is easier to remove bags of larvae than pupal cases or egg cases, which are attached to the plant with strong silk. These often have to be cut away with scissors or pruning shears.

control: *Bts*, *spinosad*: You can control this pest with foliar insecticide sprays, but choose your treatment carefully. Spider mite populations sometimes increase after applications of carbaryl or pyrethroid insecticides (permethrin, cyfluthrin, and cyhalothrin). Spinosad and Bt products are less likely to flare mites. Treat small, recently planted trees with a hand sprayer or use a hose-end sprayer designed to treat trees and shrubs to treat trees up to 20 to 25 feet tall. Treat in mid-April through early June to control newly hatched caterpillars before they cause much damage. Treatments applied in late summer or fall, after caterpillars have pupated, will not be effective.

LESSER CANNA LEAFROLLERS

lesser canna leafrollers: attack cannas.

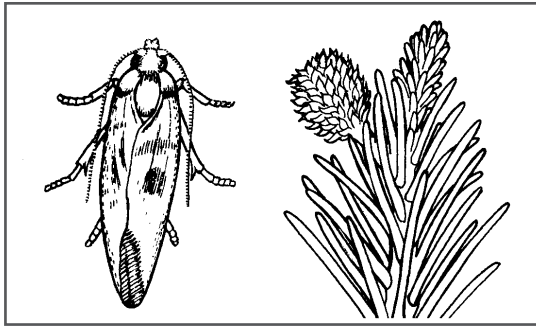
description: (mature larvae about 3/4 inch) This caterpillar is the most important insect pest of cannas. You can easily identify by the damage it causes—leaves fail to unroll properly and exhibit a “rat-tailed” appearance. The caterpillars, which are found inside these rolled leaves, have skin that is somewhat translucent and covered with light-colored spots. The larvae look green because you can see the gut contents through the skin. The naked brown pupae are also found inside the rolled leaves. You may see the moths, which are light tan with faint wavy lines of darker brown, resting on the foliage with their wings spread and their antennae folded back along the side of the body.

damage: Young larvae begin by feeding as leaf miners, creating small, frass-filled tunnels within the leaf. As the caterpillars grow larger, they leave the leaf mines and bind the young, unrolled leaves with silk, preventing them from unrolling properly. They then complete their development within the protected area of this leaf roll where they feed on the upper surface of the leaf but leave the lower, translucent epidermis intact, creating a windowpane effect. As many as 10 or more caterpillars may feed inside a single leaf roll. Leaves that do manage to unroll often have mines where young larvae fed, windowpaned defoliated areas, and rows of holes across the leaf blade. Heavily infested plantings produce few blooms and are unsightly.

management: Some gardeners avoid planting cannas because of this pest. Some varieties of cannas are less susceptible than others. These insects overwinter as partly grown larvae and pupae in the whorls and debris of the previous year's foliage. Removing and destroying old stalks and debris in or before late winter can aid greatly in controlling this pest, especially if there are no nearby plantings where old stalks and debris are allowed to remain through the winter. Check cannas regularly for early signs of infestation. If you detect infestations, prune and destroy infested stalks and apply a foliar insecticide.

control: acephate, carbaryl, bifenthrin, cyfluthrin, cyhalothrin, permethrin, *spinosad*: Control this insect with foliar insecticide sprays. Many effective treatments are available in pre-mixed, ready-to-use formulations, and this can be a quick and convenient way to treat small plantings. Because there are several generations per year, it may take several treatments, applied at intervals throughout the summer, to maintain control. Be sure to direct sprays into the unrolled leaf whorls. Because canna leaves are slick and waxy, it is helpful to add a “sticker” to the insecticide spray. Insecticides that have systemic activity, such as acephate are often most effective.

NANTUCKET PINE TIP MOTHS



nantucket pine tip moths: attack most pines, including Virginia Pine and Scots Pine, but not longleaf or eastern white pine; seldom attack slash pine.

description: (1/3 inch) Adult moths are small and seldom seen; they are about 1/3 inch long and are brick red mottled with gray. Larvae, which are about 1/3 inches long when mature, are small yellow caterpillars with dark heads and cervical shields. The small shiny brown pupae are often found inside infested terminals.

damage: Damage is caused by the larvae, which bore into tips of new growth, causing deformity or death of infested tips. This results in excessive branching and uneven growth on older trees. Attacks to newly planted trees can result in crooked or malformed trunks. Trees less than 10 feet tall are most susceptible. This insect has several generations per year. Emergence of the first generation can occur as early as late February, especially in the southern portion of the state.

management: Monitor susceptible species of pine and protect them from excessive damage by tip moth during the first three to five years after planting. You can use pheromone traps to monitor for presence of adult moths, but insecticide treatments are required to provide control when damaging insect numbers are present.

control: Imidacloprid (drench), acephate, bifenthrin, permethrin, cyfluthrin: Soil drench applications of imidacloprid will aid in control of pine tip moth. This is one of the few caterpillar pests that imidacloprid controls. Treatments should be applied in early winter. When properly timed, foliar insecticide treatments control newly hatched larvae and prevent infestation. Several applications per year may be required to properly protect newly planted, susceptible trees.

SAWFLIES

sawflies: attack pine, ash, river birch, and various other plants.

description: Adult sawflies are wasp-like insects, but their biology is very different from the paper wasps with which most people are familiar. During the larval stage most sawflies feed on the leaves of plants and resemble caterpillars. In fact, sawfly larvae look so much like caterpillars that many people are surprised to learn they are not caterpillars. Sawfly larvae can be distinguished from caterpillars by the fact that they have more than five pairs of prolegs on their abdomen and by the presence of a distinct eyespot on the head.

damage: The larvae cause damage by eating the leaves or needles of infested plants, occasionally resulting in severe defoliation. Sawfly populations are very cyclic and sporadic, but heavy infestations occasionally occur on pine, ash, river birch, and other plants.

common species: There are many different species of sawflies. Following are some of the most common.

Redheaded Pine Sawfly: The larvae of this insect are covered with rows of distinct shiny black spots on a background of light yellow to green. As the name suggests, the head capsule is reddish, and there is a black eyespot on each side of the head. Outbreaks of redheaded pine sawfly occasionally occur on young pines. Infestations are most common on pines less than 15 feet tall. There are two to three generations per year.

Dusky Birch Sawfly: This insect is an occasional defoliator of river birch. It looks somewhat like the redheaded pine sawfly, having rows of shiny black spots on a green to yellow background, but has a dark-colored head capsule. These larvae often rest with the end of their abdomens raised away from the leaf surface in a characteristic S-shaped pose.

Hibiscus Sawfly: Hibiscus sawfly is an important pest of certain types of ornamental hibiscus. It is discussed in more detail in the following section.

control: permethrin, bifenthrin, cyfluthrin, cyhalothrin, carbaryl, malathion, *spinosad*: When you detect them in time, you can control sawfly infestations with sprays of foliar insecticides. Small, recently planted trees can often be treated with a hand sprayer. Hose-end sprayers designed for treating trees and shrubs can be used to treat trees up to 20 to 25 feet tall, but few homeowners have the power spray equipment needed to treat large trees. Treatment of large trees usually must be performed by licensed commercial applicators. Always be aware of the potential for drift onto neighboring properties and other non-target sites, and take appropriate precautions to avoid drift related problems. In many urban settings the potential for problems from spray drift may be so great that you don't want to make such treatments.

HIBISCUS SAWFLIES

hibiscus sawflies: attack hibiscus, particularly the large flowered *moscheutos* varieties.

description: (Larvae are about 1/4 inch.) Hibiscus sawfly is the most important insect pest of the large flowered *moscheutos* type hibiscus. The larvae are small, green, caterpillar-like insects that are only about 1/4 inch long when fully mature. They have a black head and rows of short, raised, spike-like projections along the back, and normally feed on the underside of the leaf. Larvae are so small and inconspicuous that they are often overlooked by the casual observer. Adults are small wasp-like insects, about 1/4 inch long. The body and head are black, but the thorax is reddish orange. Eggs are inserted into the leaf tissue near the tip or edge.

damage: These insects cause heavy defoliation injury to susceptible varieties of hibiscus. Untreated infestations can result in complete defoliation, leaving only the lacy leaf veins. There are several generations per year, and defoliation can occur throughout the growing season.

management: Native varieties such as *grandiflorus* and *aculeatus* are less susceptible to this pest, and many new hybrids exhibit resistance. Check susceptible varieties often throughout the growing season, and treat as soon you detect sawflies. Check for small larvae on the undersides of leaves, for the black and red adults, or for egg-laying wounds on leaves.

control: acephate, permethrin, bifenthrin, cyfluthrin, cyhalothrin, carbaryl, malathion, Imidacloprid (drench), spinosad: Hibiscus sawflies are easily controlled with foliar insecticide treatments. Because there are several generations per year, several treatments are usually required to provide season long protection. Many effective treatments are available in pre-mixed, ready-to-use formulations, which makes applying treatments quick and convenient. Systemic insecticides, such as acephate, usually provide longer lasting control. Soil drench applications of imidacloprid help control of hibiscus sawfly.

LEAF-FEEDING BEETLES



leaf-feeding beetles: most common on elm, crape myrtle, willow, cottonwood.

Several different species of leaf-feeding beetles occur on landscape plants. These belong to the family of beetles known as Chrysomelidae. This is an unusual group of beetles in that, in many species, both the larvae and adults feed on leaves.

description: The adults are small beetles approximately 1/4 inch long. Coloration depends on species. Some are colorfully marked; others are metallic blue. Larvae range from black to tan or yellow with black spots or stripes.

damage: For most species, damage is caused by both adults and larvae, which feed on the leaves and cause defoliation. Damaged leaves often have an unsightly skeletonized appearance because of browned, uneaten leaf veins and cross veins.

common species: A few of the most commonly encountered species of leaf-feeding beetles are briefly discussed below.

Elm Leaf Beetle: Adults are yellow with longitudinal black stripes. Larvae are also yellow with a dark stripe down each side. Both adults and larvae feed on leaves, and the yellow eggs are deposited in clusters on the undersides of leaves. It attacks all species of elms but is more common on some species than on others.

Cottonwood Leaf Beetle: Adults are yellow and strikingly marked with long black marks. Smaller larvae are dark colored, but larger larvae are gray with black spots. Both adults and larvae feed on leaves, causing skeletonizing defoliation. This insect is found on eastern cottonwood as well as willow and other species of poplar. There are also several closely related species.

Altica foliacea: This flea beetle has no common name but is sometimes referred to as the “crape myrtle flea beetle.” The adults are small shiny blue-green metallic-colored insects that jump when disturbed. Adults and larvae feed on weed hosts, occasionally building to high numbers. High numbers of adults can occur on crape myrtle in mid-summer, causing damage by injuring the leaves. It is most commonly found in nurseries or recently-planted trees.

control: carbaryl, bifenthrin, cyfluthrin, imidacloprid, cyhalothrin, permethrin, malathion, *spinosad*: Leaf beetle populations are often kept in check by predators and parasites. When outbreak populations occur, foliar insecticide sprays are required to minimize damage. Repeated applications may be required to control heavy or persistent infestations. Although not generally effective against beetles, *spinosad* is active against the larval stage of some leaf-feeding beetles.

YELLOW POPLAR WEEVILS

yellow poplar weevils: attack magnolia, yellow poplar, and sassafras.

description: (adults about 1/8 inch) Adults are small, stout bodied, gray weevils. The larvae are white, legless grubs that feed inside leaf mines.

damage: Infestations of concern most commonly occur on Southern magnolia. Adults cause damage by feeding on buds and tender new leaves. Damage is often magnified as leaves expand, resulting in small holes in the leaves. Damage to fully expanded leaves results in numerous brown feeding spots, usually concentrated near the tip of the leaf. Larvae feed as leafminers, in large puffy, blotch-shaped mines at the tips of the leaf. Several larvae may occur within one leaf mine. Although infestations are rarely so severe as to adversely affect tree health, heavily infested trees are unsightly. Because of the longevity of magnolia leaves, damage may be evident even when insects are no longer present.

management: Because this insect overwinters in leaf litter of host trees, raking leaf litter in fall or early winter can reduce overwintering populations.

control: Little information is available on control of this pest, and no insecticides are labeled specifically for yellow poplar weevil. Soil drenches of imidacloprid have shown some promise in controlling this pest. Foliar insecticide sprays can be used to control overwintering adults in the spring of the year as soon as they begin feeding on buds and young leaves, with the objective of controlling the adults before they have a chance to begin laying eggs. Products such as carbaryl, permethrin, or cyfluthrin + imidacloprid should control adult weevils, but timing of sprays is critical, and multiple treatments will be required.

MAY BEETLES

may beetles: attack various hardwood trees.

These insects occasionally cause mysterious defoliation of young hardwood trees planted in landscapes.

description: (adults about 1/2 inch) May beetles are the adult stage of white grubs, which can be important pests of turf grass. They are robust, heavy-bodied brown to tan. As their coloration suggests, these beetles are active primarily at night.

damage: Young oaks and other hardwoods occasionally sustain mysterious defoliation injury that appears to have occurred overnight, yet no insect pests can be found on the tree. Damaged leaves may be totally consumed, leaving only the petiole and midvein. This type of injury is caused by adult May beetles, which occasionally congregate on individual trees in large numbers during late spring. The beetles feed heavily during the night but leave the tree to seek shelter during the day. This injury is rather uncommon, and most often occurs on newly planted trees less than 15 feet tall.

management: Attacks by May beetles are sporadic and difficult to predict. Young trees near outdoor lights that are left on overnight seem to be most susceptible to attack. Where feasible, turning off overnight lights located near young, susceptible trees during May and early June may reduce the probability of attack.

control: permethrin, bifenthrin, cyfluthrin, cyfluthrin + imidacloprid, carbaryl: Although May beetles are susceptible to foliar insecticide treatments, timing of control is difficult because of the unpredictable nature of attack. Foliar sprays may provide some short-term residual control and may help in certain high-risk situations.

JAPANESE BEETLES

japanese beetles: attack the foliage and/or blooms of many ornamental plants.

Although Japanese beetle is currently not well established in Mississippi, it does occur in the state, and damaging infestations are common in parts of Tennessee and northern Alabama. This pest has progressively expanded its range over the eastern US since it was introduced in the early 1900s. Thus, Mississippi gardeners need to be familiar with this important pest.

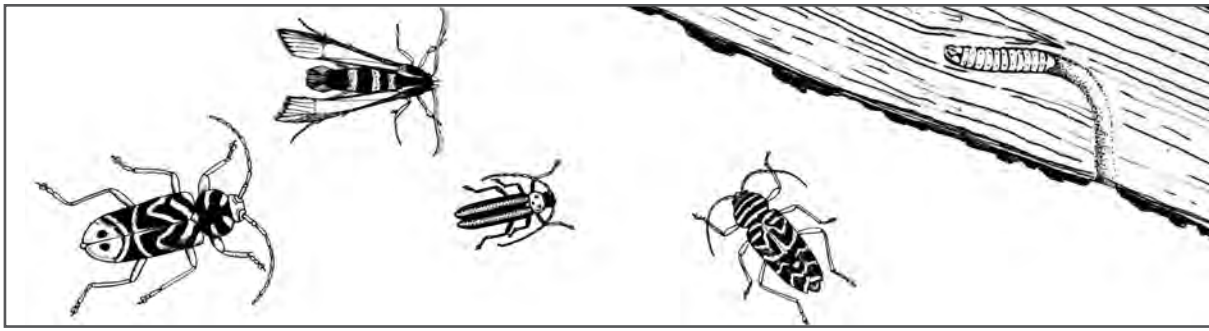
description: (adults about 1/2 inch) Adult Japanese beetles are shiny, metallic green with metallic bronze colored wings and rows of white fuzzy spots toward the end of the abdomen. This makes them fairly easy to recognize, although some other native scarab beetles are also metallic green. Larvae are “white grubs,” which are about 1 inch long when fully mature, and they feed on the roots of grasses in commercial turf, as well as in pastures, roadsides, and unmanaged areas.

damage: Damage is caused by the adults, which feed on the foliage and/or blooms of many different species of ornamental plants. This includes many trees, woody shrubs, herbaceous perennials, and annual plants. Leaf-feeding results in skeletonizing defoliation, with the severity of damage being related to the number of beetles present. Japanese beetles are also highly attracted to the blooms of many plants, especially large light-colored blooms. They feed on the anthers and petals, causing unsightly damage. White or yellow roses are favorite targets and often sustain heavy damage in areas where Japanese beetles are common.

management: In areas where Japanese beetles are abundant, gardeners may choose to avoid growing species or varieties of plants that are especially susceptible. Be careful in making this determination, because susceptibility can vary greatly within a group of plants. For example, Japanese maples are quite susceptible, while red maples are seldom attacked. Likewise, some varieties of crape myrtles are relatively resistant to attack, while others are highly susceptible. Light-flowered varieties of roses are more likely to be attacked than are varieties with darker colored blooms. Extension Publication 2333 provides information on the relative susceptibility of many common landscape plants. Biological treatments, such as the milky spore disease bacteria and Japanese beetle traps are sold commercially, but their effectiveness is not supported by results from controlled experiments. Because larvae can also develop in pastures and wastelands, controlling larvae in commercial turf may not help prevent attack of landscape plants by large numbers of adults.

control: Carbaryl, cyfluthrin + imidacloprid, bifenthrin, permethrin, cyhalothrin, cyfluthrin, *azadirachtin*: Adult Japanese beetles can be controlled with foliar sprays, and foliar sprays may also provide short-term residual protection. Repeated treatments will be necessary to protect susceptible plants adequately where this pest is abundant. Repeated applications of products containing azadirachtin—a natural product derived from neem seed—also repels Japanese beetles.

WOOD BORING INSECTS



Close examination of a dead or dying tree almost always reveals wood boring insects. But this does not necessarily mean insects are the primary cause of the tree's distress. Hundreds of different species of insects are attracted to dead or dying trees, and many families of beetles and moths specialize as wood borers. In most cases, infestations of wood boring insects are the result, not the cause, of a tree's being in distress. Many species of wood borers attack only dead wood, and many others can successfully initiate an attack on trees that are stressed and in decline. Relatively few species can successfully attack healthy trees. Some of these are discussed specifically in the following sections. Even these species are most likely to attack trees that are stressed or injured.

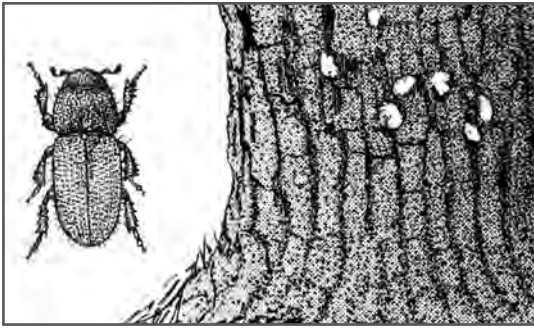
Healthy, vigorously growing trees defend themselves from attack by wood boring insects in many ways. Tight, healthy outer bark provides a physical barrier to insect entry. Pines and other species produce large amounts of resin that can "pitch-out" or entomb attacking insects. Invading larvae can be crushed or walled off by rapid vigorous growth. Healthy trees also produce many chemical defenses. However, stressed or injured trees produce characteristic odors that are highly attractive to wood boring insects, signaling that the tree is susceptible to attack.

The most important thing you can do to protect landscape trees from wood boring insects is to **maintain tree health by avoiding injury or stress**. Following are some of the key points to keep in mind.

- Choose planting sites carefully, and match the site to the species you are planting.
- Use trunk wraps to protect newly planted trees.
- Avoid tight guy wires or trunk wraps that can injure bark (be sure to remove trunk wraps).
- Use mulch or trunk guards to prevent injury from string trimmers or mowers.
- Avoid using too much mulch, and do not pile mulch against base of trunk.
- Avoid physical injury to trunk or bark.
- Prune properly and at the right time of year.
- Avoid injury to roots and trunk during construction operations.
- Avoid compacting soil over roots.
- **Keep trees adequately watered during periods of drought.**
- Provide adequate nutrition, but avoid over fertilization.
- Avoid chemical or herbicide injury.

The following sections provide additional information about some of the more important species of wood borers that will attack healthy, or relatively healthy, landscape trees in Mississippi.

BLACK TURPENTINE BEETLES



black turpentine beetles: damage is restricted to pines.

description: (Adults are 1/4 to 1/3 inch). These are barrel- or cylindrical-shaped beetles that are reddish brown to black. The larvae are small, legless, white grubs.

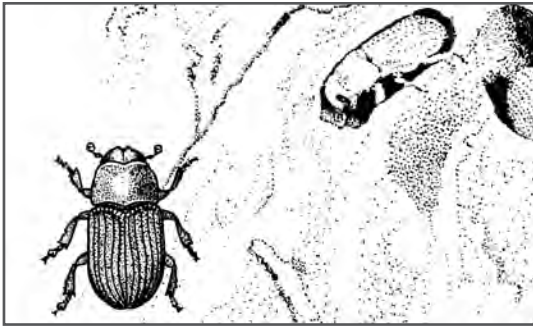
damage: This insect bores through the outer bark of pine trees and lays its eggs in the inner bark, or cambium layer. The developing larvae feed as a group, creating pocket-like galleries in the inner bark. Multiple attacks can effectively girdle the tree, resulting in death. Popcorn-sized masses of dried resin, known as “pitch tubes,” on the outer bark often mark the site of an attack. These pitch tubes often contain reddish/brown boring dust. Attacks by black turpentine beetles are normally restricted to the lower 6 to 10 feet of the trunk. Trees suffering injury or stress are most susceptible to attack. Large, over-mature, and thus high-value trees, are generally more susceptible than young trees. Attacks are most common from May through September.

management: Avoid injury or stress to trees. Trees that have been physically injured are more likely to be attacked. Stressed trees are less able to defend themselves by production of resin. Avoid situations that cause soil compaction, root injury, or drought. **Keep trees well watered during periods of drought.** Remove dead and dying trees, as well as stumps, as quickly as possible to prevent beetles from breeding in these and then moving to nearby healthy trees.

control: permethrin: When infestations of black turpentine beetles are evident on nearby trees or stumps, it may help to apply preventative insecticide treatments to the trunks of high value trees. Trunk sprays containing permethrin can help protect trees, and several brands are labeled for homeowners. Be sure to choose a permethrin product that specifically lists use on pine trees to control borers and allows adequate rates of permethrin (0.5% concentration in finished spray). You may need to repeat sprays several times during the summer for adequate protection.

Onyx (bifenthrin) is not labeled for use by homeowners but may be applied in the home landscape by licensed commercial applicators. Because this treatment provides longer residual activity, it may be worth hiring a commercial applicator to treat high-value trees during periods of high beetle populations.

SOUTHERN PINE BEETLES



southern pine beetles: damage is restricted to pines.

description: (Adults are about 1/8 inch) Southern pine beetles are smaller than black turpentine beetles but are similarly shaped. They are cylindrical-shaped and reddish brown to dark colored. The larvae are small, legless grubs.

damage: Like black turpentine beetle, this insect bores through the outer bark of pine trees and lays its eggs in the inner bark, or cambium layer. The beetles eat winding s-shaped galleries in the cambium. Adult beetles inoculate infested trees with a fungal disease, which hastens tree death, and larvae also feed in the cambium, girdling this life-supporting tissue.

Trees defend themselves by producing extra resin where the adult beetle tries to bore into the tree. Healthy, unstressed trees can often successfully “pitch out” attacking beetles. Because of fungal disease and the girdling of the cambium caused by the winding feeding tunnels, successful invasion by only a few beetles usually kills the tree. Southern pine beetles normally focus their attacks on the main tree trunk, from chest height to where the lower limbs are attached. Trees suffering injury or stress are most susceptible to attack.

management: Keeping landscape trees well watered during drought is the most important practice you can do to help reduce the probability of bark beetle attack. Avoid injury or stress to trees. Trees that have been physically injured are more likely to be attacked. Avoid situations that cause soil compaction, root injury, or drought. Remove dead and dying trees, as well as stumps, as quickly as possible to prevent beetles from breeding in these and then moving to nearby healthy trees.

control: permethrin: When infestations of Southern pine beetles are active in nearby trees, it may help to apply preventative insecticide treatments to high value trees. To be effective, though, such treatments must thoroughly cover the trunk from its base to where the first lower limbs are attached. Few homeowners have the necessary equipment to treat larger trees properly. Trunk sprays containing permethrin can help protect trees, and several brands are labeled for use by homeowners. Be sure to choose a permethrin product that specifically lists use on pine trees to control borers and allows adequate rates of permethrin (0.5% concentration in finished spray). You may need to repeat sprays several times in the summer to get adequate protection.

Onyx (bifenthrin) is not labeled for use by homeowners but may be applied in the home landscape by licensed commercial applicators. Because this treatment provides longer residual activity, it may be worth hiring a commercial applicator to treat high value trees during periods of high beetle populations.

IPS BEETLES



ips beetles: pines are the most common trees attacked by Ips beetles, but some species also attack certain hardwoods.

description: (Adults are about 1/6 inch.) Adult beetles are so small that they are rarely seen. There are several species, all of which have a distinctive indentation at the end of the abdomen that is bordered by two rows of small spines. The larvae are small, legless grubs.

damage: Ips beetles are one of the more common pests of landscape pines. Attacks by Ips beetles are normally focused on the trunk and large limbs located in the upper, or crown, area of the tree. If the tree is already stressed before attack, reddish boring dust can be found in bark crevices. Attacks to trees that are relatively healthy may result in resin flowing from bore holes and even the formation of small pitch tubes, similar to those caused by Southern pine beetle. Adult beetles bore through the outer bark and excavate galleries in the inner bark or cambium layer. The larvae construct their own feeding galleries that branch out from the initial “egg gallery.” When the larvae mature and emerge from the tree as adult beetles, they leave numerous small round emergence holes that cause the bark to look as if it has been riddled with birdshot.

management: Keep trees well watered during drought. Avoid injury or stress to trees. Trees that have been physically injured are more likely to be attacked. Stressed trees are less able to defend themselves. Avoid situations that cause soil compaction, root injury, or drought. Remove dead and dying trees, as well as stumps, as quickly as possible to prevent beetles from breeding in these and then moving to nearby healthy trees. Ips beetles also breed in freshly cut pine logs and pulpwood, as well as freshly trimmed limbs. Promptly removing or burning such material reduces the potential for attack.

control: Keeping trees well watered during drought is the most important practice homeowners can do to help reduce the probability of bark beetle attack. Because Ips beetle attacks are concentrated in the upper, or crown, area, preventive insecticide treatments are difficult to use effectively.

GRANULATE AMBROSIA BEETLES

granulate ambrosia beetles (*Xylosandrus crassiusculus*): attack and kill many species of ornamental hardwoods, including Bradford pear, crape myrtle, ornamental cherries, maple, magnolia, sweet gum, and pecan.

description: (adults about 1/10 inch) This small beetle is reddish brown, stout, and cylinder-shaped. It has a somewhat humpbacked appearance and the head points downward. When trees are first being attacked, curved toothpick-size columns of tightly packed frass, extending up to 3 inches long, often extrude from the bore holes, and these are somewhat characteristic of this species. These columns of frass are eventually broken off by wind and rain, leaving only birdshot-sized, frass-packed entrance holes. This is a relatively recent invading pest that seems to be gaining in importance.

damage: Although Asian ambrosia beetle readily attacks dead or dying trees, it is a particular threat to young recently established trees. Such trees are still under stress as a result of planting. Attacks are more common on trees less than 3 inches in diameter, and attacks to young saplings are most likely to occur in the very early spring, at or slightly before bud break. Attacks may occur later in the year as well. Invading beetles inoculate trees with a fungal disease, which serves as food for the larvae. While some trees may survive localized attacks, trees with numerous frass columns or bore holes around the main trunk do not survive.

management: Promptly cut and destroy heavily infested trees to reduce potential for spread to uninfested trees. Avoid injury or stress, since these factors increase the potential for attack.

control: permethrin: Trunk sprays containing permethrin can help protect trees, and several brands are labeled for homeowner use. Be sure to choose a permethrin product that specifically lists control of borers and allows use of adequate rates of permethrin (0.5% concentration in finished spray). Trunk sprays applied in late winter may help prevent attacks to susceptible, high-value trees.

Onyx (bifenthrin) is not labeled for use by homeowners but may be applied in the home landscape by licensed commercial applicators. Because this treatment provides longer residual activity, it may be worth hiring a commercial applicator to treat susceptible, high-value trees during periods of high beetle populations.

FLATHEADED APPLETREE BORERS

flatheaded appletree borers: attack many different species of hardwood trees.

description: (adults about 1/2 inch; larvae about 1 inch) Adults are somewhat oval-shaped short-horned beetles and are metallic gray. The larvae are legless, white, segmented, and worm-like. They have small, dark-colored heads, and the three white segments immediately behind the head are enlarged and flattened.

damage: Although this insect is most attracted to trees that are stressed or injured, it will also attack relatively healthy trees, especially young trees just being established. The larvae damage the tree by boring in bark, cambium and wood. It takes only one or two larvae to kill or seriously injure a young sapling. There is only one generation per year, but egg-laying may occur throughout much of the growing season.

management: Healthy, vigorously growing trees often can defend themselves against attack. Avoid injury or stress, which can predispose trees to attack. Trunk wraps can be used to protect newly planted trees during the first couple of years after planting. Be sure support wires do not injure the tree, and avoid excessive mulch around the base of the tree or planting too deep.

control: *permethrin:* If you detect larvae actively boring in the trunk, you may be able to lessen damage by digging them out with a knife or using a small, flexible wire to probe into the galleries and puncture the larvae. Trunk sprays of permethrin (0.5% concentration in finished spray) or bifenthrin (bifenthrin is available to licensed commercial applicators only) may help protect high-value trees.

DOGWOOD BORERS

dogwood borers: attack many species of hardwoods, but dogwood is the most commonly damaged landscape species.

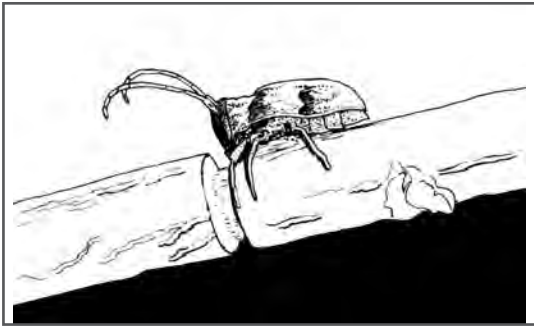
description: (Adults are less than 1/2 inch.) Adults are small, day-flying, wasp-like moths that are blue/black with yellow bands around the abdomen. The wings are mostly clear with black tips and markings. Fully mature larvae are slightly over 1/2 inch long and are cream-colored with a reddish brown head.

damage: Eggs are deposited on the outer bark and newly hatched larvae enter the tree through wounds and small cracks in the bark. The larvae cause damage by boring in the inner bark layer of the tree. Loose, scaling bark or swollen, knotty areas on the trunk indicate infestation. Heavily infested trees may suffer from limb or crown dieback and poor growth.

management: Keeping trees healthy and vigorous and avoiding injury and stress are the most important means of preventing infestation. Choose planting sites carefully. Trees planted in full sun are more susceptible to attack than trees planted in partial shade. On trees that are exposed to full sun, avoid pruning lower limbs to allow more shading of the trunk. Although no cultivars of dogwood are resistant to this pest, some types of dogwood (such as Korean dogwood) are less susceptible.

control: *permethrin:* You can use trunk sprays of permethrin to partially protect heavily infested or high value trees. Sprays will not control larvae that have already bored into the tree. The objective is to have a residue of insecticide on the bark to control newly hatched larvae before they bore under the bark. Sprays must be applied several times during the growing season to obtain season-long control. Egg-laying moths may occur from spring through September, but heaviest populations occur later in the season.

TWIG GIRDLERS



twig girdlers: usually attack pecan or hickory but sometimes occur on other hardwoods.

description: (about 1 inch) This is a large, gray-brown long-horned beetle.

damage: This insect does not attack the trunk of the tree. The female girdles pencil-sized twigs by chewing away a ring of wood and deposits her eggs in the girdled twig. These girdled twigs eventually fall to the ground, and the larvae complete their development inside the fallen twigs. Excessive damage can disfigure young trees and slow growth.

control: Gather and burn fallen twigs, or place in plastic garbage bags and dispose in garbage. This prevents larvae from developing and re-infesting trees. No chemical control is recommended.

GALL-FORMING INSECTS

gall-forming insects: attack oaks, dogwood, maples, sugarberry, and many other species.

Many insects can cause galls or unusual growths on ornamental plants. Many of these are small wasps or tiny flies, but several other types of gall-forming insects and some species of mites also cause galls. Gall-forming insects are usually host specific. The plant makes galls in response to chemicals released by the insect, resulting in the growth of plant tissue around the insect. Many disease organisms also cause galls, and careful identification is necessary to distinguish between galls caused by insects and galls caused by pathogens. Examples of a few of the more common insect-induced galls are discussed here.

Pecan Phylloxera: See page 15 for information on this gall-forming insect.

Gouty Oak Galls: These are the large golf ball-sized knot-like growths on the twigs of oaks. A small cynipid wasp causes this gall. There are two generations per year; the first causes small, blister-like galls on the leaves, and the second generation causes the knotty stem galls. Horned oak gall is a similar gall caused by a related species.

Oak Apple Gall: Oak apples are round marble to golf ball-sized, spongy galls on the undersides of the leaves of various red oak species. They are caused by a small cynipid wasp. Each gall contains only one larva that develops within a smaller, seed-like capsule in the center of the gall.

Dogwood Club Gall Midge: These are the larvae of a small fly that deposits its eggs in very small developing dogwood leaves at the tips of the terminal. The resulting larvae, or maggots, burrow into the tip of the developing shoot, causing the end of the twig to become enlarged and club-like. Several dozen of the small orange-colored maggots may be inside one club gall. Heavy infestations can result in stunting and malformation of trees.

Yaupon Psyllid Gall: This small aphid-like insect causes the leaves of Yaupon to become distorted, creating a folded, pouch-like leaf gall. Several developing nymphs may be inside one gall.

Erineum Galls: Red or green felt-like patches on the undersides of maple leaves are caused by very small mites belonging to the group known as eriophyid mites. Other species of eriophyid mites cause various types of leaf distortion galls, and there are many species of eriophyids that cause bud proliferation galls and “witches broom” galls.

management: Pruning and destroying galls before the developing insects have time to emerge is an effective method of control on small plants, but this is obviously not feasible for large trees. Although galls may be unsightly, they rarely cause severe economic damage, and chemical control is generally not recommended.

control: Soil drenches containing imidacloprid may be effective against certain species of gall-forming sucking pests, such as yaupon psyllid gall. Foliar sprays can reduce gall incidence, but timing is very critical, since there is only a very narrow window of time when susceptible adults are present.

CHOOSING & PURCHASING INSECTICIDES

When buying an insecticide to use in controlling an insect problem in your home landscape, you must consider several important factors. The time spent considering these factors and reading insecticide labels **before** making the purchase is time well invested! Purchasing the wrong product can lead to many undesirable consequences, including poor control, plant injury, application difficulties, or time spent returning the product. **Always read the label at least two times, once before purchasing the product and again before applying the product.** Following are some of the key points to consider when purchasing insecticides.

- 1) What is the active ingredient in the product?** When purchasing insecticides, think in terms of active ingredient rather than brand name. Granted, the names of these active ingredients sound somewhat technical in nature (ex: permethrin, carbaryl, imidacloprid), but in the long run they are much shorter, less confusing, and easier to remember than brand names (for example: Hi-Yield Kill-A-Bug II, Garden Tech Sevin Concentrate Bug Killer, Bayer Advanced Season-Long Grub Control). Quite often, the same active ingredient may be sold under dozens of different brand names. Knowing the active ingredient makes it easier to find an alternative product if the brand name you are seeking is not available. Also be aware that the active ingredient in a product with a given brand name may change over time. Do not assume that Mo-Betta Bug-Bopper 33 contains the same active ingredient now as it did when you used it five years ago.
- 2) Is the product labeled for the intended site and use?** If you need a product to control tea scale on camellia, be sure to read the label and verify the insecticide you are purchasing is labeled for home landscapes, that it is safe to use on camellias, and that it is effective against tea scale. All of this information should be on the product label, and it should also tell how much product to use and how to mix and apply. If you do not find this information on the label, don't buy that product! Look for products with labels that are easy to read and understand.
- 3) How is the product formulated?** In many cases, the same active ingredient is available in products formulated as granules, as wettable powders, as liquid concentrates, and as dilute ready-to-spray products. Be sure you are buying the formulation best suited for your intended use. If you purchase a wettable powder formulation that is designed to be mixed with water and applied as a liquid spray, but you do not have the necessary spray equipment, you won't be able to apply the product. Also, be sure to consider what type of formulation is best for the intended use, and be sure you have the necessary equipment to apply that formulation before purchasing the product. Granular products are useful and effective for control of many pests of the home lawn, but, except for a few systemic insecticides, granular formulations are not appropriate for treating landscape plants.
- 4) What is the percent active ingredient in the product, how much is in the container, what is the use rate, and how much product do you need to do the job?** If you buy a quart of ready-to-spray formulation containing 0.002% active ingredient when you really need a 25% liquid concentrate, you may not be able to apply the rate of insecticide needed to control the target pest.
- 5) Be sure to communicate clearly to the salesperson the active ingredient you are seeking and its intended use.** "I am looking for an insecticide containing acephate that can be used to control caterpillars on my cannas" or "I want to buy an insecticide containing permethrin that is labeled for use on ornamental plants." Having the name of the active ingredient(s) written down and spelled correctly makes this communication much easier. Be wary of substitutions. Always read the label closely and be sure you understand what you are purchasing and how it must be used before you leave the store.

APPLYING INSECTICIDES TO PLANTS IN THE HOME LANDSCAPE

There are several different methods by which insecticides may be applied to landscape plants, and in many cases you may have a choice of methods of applying the same active ingredient to control a particular pest. Regardless of the method of application you choose, it is important to read the label carefully and calibrate equipment properly to be sure that you are applying the correct amount of insecticide. Avoid applying excessively high rates. Not only is this wasteful, but it increases the risks of plant injury, poisoning or injury to non-target organisms, and other undesirable consequences. Conversely, using too little insecticide is likely to result in poor control.

be safe: Before using any insecticide, always be sure to read the label carefully and follow all label directions for personal protection equipment and instructions for mixing and applying the product. The label is the law. The use directions it specifies are for the safety of the applicator, the environment, and those using the area. Handle insecticides with the respect they deserve. They are poisons, and over exposure can result in acute and/or chronic health problems.

methods of application: The following sections discuss some of the more common methods of applying insecticides to landscape plants.

ready-to-use sprays: Many insecticides are formulated as ready-to-use sprays and sold in small volume containers equipped with trigger pump sprayers. The insecticide has already been diluted to the right end-use concentration and is ready to use. These are an easy and convenient method for treating small plants or isolated insect problems.

systemic soil drenches: Some insecticides are formulated for use as soil drenches. These are not applied to the foliage, but are mixed and applied to the soil around the roots of the plant. The use rate normally depends on the size and type of plant being treated, and the appropriate amount of insecticide is normally diluted in water and poured uniformly over the soil around the plant. Because they must be taken up by the roots and translocated to the sites where the pests are feeding, systemic insecticides often require time to work, but they also distribute the insecticide thoroughly through the plant. This method of application can be very useful in control of sucking insect pests, such as aphids, whiteflies, and scales.

granular systemic insecticides: Many insecticides are formulated as dry granules. This is a popular means of formulating insecticides to use in the home lawn, because they are convenient to apply, using granular spreaders. However, granular insecticides have little use for treating landscape plants. An exception to this is systemic insecticides formulated as granules. Systemic granules are usually applied to the soil around the plant and watered in. Application rate normally varies with the size and type of plant. As with systemic soil drenches, granular systemics are relatively slow acting.

single nozzle hand sprayers: Single nozzle hand sprayers are one of the more common methods of treating landscape plants. They are very useful for treating individual plants or small plantings. These sprayers are designed for applying liquid concentrate, wettable powder, and wettable granule insecticides, as well as horticultural oils. These sprayers are powered by air pressure generated by a hand-operated pump. The tank capacities of these types of sprayers typically range from one quart to several gallons. Typical directions on the label of a product intended for this method of application will indicate "mix ____ fl. oz. (or tablespoons) per gallon of water and spray to run off."

power sprays: Power sprayers operate on the same principle as hand pump sprayers. The insecticide is diluted in a carrier, usually water, and applied according to label directions. They can be used to apply insecticides formulated as liquid concentrates, wettable powders, or wettable granules, as well as for applying horticultural oils. The capacity of power sprayers can range from only a few gallons to large commercial sprayers with capacities or more than 100 gallons. The smaller power sprayers used by homeowners are most commonly powered by an electric pump and can reach only relatively low pressures. CO₂ pressurized sprayers would also fit in this category. Large commercial-sized sprayers are normally operated by mechanically powered pumps that can reach relatively high pressure.

hose-end sprayers: Hose-end sprayers are a common and effective method of applying insecticides to the home lawn, but the large droplets produced by these types of sprayers are less than optimal for treating the foliage of ornamental plants. Despite this limitation, the hose-end sprayers designed for treating trees and large shrubs are often the only practical method available to the homeowner for treating large shrubs and small- to medium-sized trees. Depending on available water pressure, “tree and shrub” hose-end sprayers can treat plants 15 to 25 feet tall. You must recognize the coverage limitations of hose-end sprayers and the adverse effect this may have on control.

It is important to install a backflow prevention device between the hose and faucet when using hose-end sprayers. This prevents insecticide from being sucked into the water system in case of a sudden loss of pressure in the water system. When using hose-end sprayers, begin spraying the area farthest away from the faucet and apply the spray in a pattern that keeps you from having to walk over recently treated areas.

hire a commercial applicator: One final treatment option available to homeowners is to hire a commercial applicator. Commercial applicators have special licenses that allow them to apply pesticides for a fee. Most have large volume, commercial quality equipment that lets them treat large plantings or large plants. This can be important when it is necessary to treat large trees. Few homeowners have the equipment needed to treat large trees effectively. The high pressure sprayers available to commercial applicators can make such applications. Before applying such treatments in an urban setting, both the homeowner and the commercial applicator should carefully consider the potential for drift onto neighboring properties and other non-target sites. Take all necessary precautions to avoid drift-related problems. In many urban settings the potential for problems from spray drift may be so great that you won't want to make such treatments.

Commercial applicators are also licensed to apply certain insecticides homeowners can't buy and use. This can be an important consideration when dealing with hard-to-control pests, such as wood borers, scales, or whiteflies, especially when infestations are widespread or involve large plantings or high-value plants.

INSECTICIDES FOR USE IN THE HOME LANDSCAPE

Although hundreds of different insecticide products are labeled for the home landscape, there are only a few dozen different active ingredients. When purchasing insecticides for use in the home landscape, it is important to think in terms of active ingredient rather than brand name. Brand names can be confusing and even misleading. This section provides some general information about some of the more commonly used insecticides.

use insecticides safely! Before using any insecticide, always be sure to read the label carefully and follow all label directions regarding personal protection equipment and instructions for mixing and applying the product. The label is the law, and the use directions are for the safety of the applicator, the environment, and those using the area. Handle insecticides with the respect they deserve. They are poisons and over exposure can result in acute and/or chronic health problems.

be sure the insecticide is labeled for use on the plant(s) being treated: Some insecticides may actually cause injury, or phytotoxicity, to certain landscape plants. Before applying an insecticide to a particular species of plant, be sure to read the label and verify that the product is labeled for use on that particular species/variety.

insecticides by active ingredient (Insecticides suitable for use by organic gardeners are listed in italics.):

acephate: Acephate is sold as Bonide Systemic Insect Control. Acephate is a systemic insecticide that is effective against sucking insects such as aphids, whiteflies, scales, and lacebugs, as well as thrips and many caterpillars and beetles. Because acephate is absorbed by plant leaves and translocated within the plant, it often provides better control of insects that feed on the undersides of leaves than insecticides that kill only by direct contact.

acetamiprid: Acetamiprid is sold as Ortho Max Flower, Fruit, and Vegetable Insect Killer. This is a pre-diluted or "ready-to-use" spray that is especially effective against whiteflies and mealybugs.

azadirachtin: Azadirachtin is a botanical insecticide that acts as a contact insecticide and insect growth disruptor. It is most often used to control soft-bodied insects such as aphids, whiteflies, and thrips. Azadirachtin is also somewhat repellent to Japanese beetles and other insects. Azadirachtin is sold to homeowners under the brand name Azatrol, which is an approved organic insecticide.

carbaryl: Carbaryl is most commonly sold under the brand name Sevin. It has been a standard for home insect control for many years. It is effective against a wide range of pests and is labeled on many different plants. Carbaryl is especially useful against many beetles. However, this product can trigger population increases in spider mites.

malathion: Malathion is another longtime standard insecticide. Like carbaryl, it controls a wide range of pests and is labeled on many different species of plants. It is especially useful to control aphids, bugs, and certain beetles. Malathion can also be used to control spider mites, but it is important to apply two or more successive applications at four- to five-day intervals.

Bt kurstaki: *Bacillus thuringiensis* is a bacterium that produces compounds toxic to certain insect species. There are different species and strains of this bacteria that produce different toxins. *Bt kurstaki* produces a compound that is toxic to certain caterpillars but does not affect other insects. Thuricide is one of the more common brand names under which this product is sold. It is most effective against leaf-feeding caterpillars but is not effective against boring caterpillars, such as dogwood borer and pine tip moth. *Bt* is most effective against small larvae and attempts to control large caterpillars with *Bt* products may give disappointing results.

imidacloprid: Imidacloprid is a systemic insecticide labeled for homeowner use. It is sold under the brand name Bayer Advanced Garden Tree and Shrub Insect Control and, in this formulation, is applied as a soil drench around the roots or ornamental plants rather than as a foliar spray. Imidacloprid is especially effective against sucking pests, such as aphids, whiteflies, soft scale, and lace bugs when applied as a soil drench. It is relatively slow acting but often provides long-term control. Imidacloprid is also sold as a premix, in combination with cyfluthrin, for application as a foliar spray.

dinotefuran: Dinotefuran is a systemic insecticide labeled for homeowner use. It is sold as Greenlight Tree and Shrub Insect Control, which is a granular product that contains 2% dinotefuran. The granules are applied to the soil around the plant and watered in. Dinotefuran is slow-acting but provides long-term control. It is especially useful against armored scales. It also controls whiteflies, mealybugs, and some other sucking insects.

spinosad: Spinosad is a relatively new microbial insecticide that is very effective against most caterpillar pests. Two commonly available brand names that are labeled for use in the home landscape are Monterey Garden Insect Spray and Fertilome Bore, Bagworm, Leafminer, and Tent Caterpillar Spray. Spinosad is very effective against most caterpillar pests, but it is not effective against most other types of insects. However, it is also effective against thrips and certain types of leafminers. Some formulations of spinosad are acceptable for use by organic gardeners.

insecticidal soap: insecticidal soaps are potassium salts of fatty acids. They control insects they contact by disrupting cell membranes. They are most effective against soft-bodied pests such as aphids, mites and thrips. Direct contact with the pest is necessary for control. Safer Insecticidal Soap is an example of one brand name. Many plants can be injured by insecticidal soaps. Be sure to read the label carefully before treating.

neem oil: Neem oil is a botanical product primarily useful against aphids, mites, whiteflies, and scale crawlers. It is labeled for use on most landscape plants and is sold under several brand names (Monterey 70% Neem Oil is one example). Thorough coverage of the pest is necessary for control.

horticultural oils: Horticultural oils are highly refined paraffinic oils used to control scale insects, spider mites, and other small insects. They work through contact activity. Horticultural oils may be applied as dormant sprays as well as during the growing season. Be sure to read and follow the label carefully to avoid plant injury. Horticultural oils can be especially useful against infestations of hard-to-control armored scales. Commonly available brand names include Bonide All Seasons Horticultural Spray Oil and Volck Oil Spray.

pyrethrin: Pyrethrin or pyrethrum is a botanical insecticide used primarily by organic gardeners. Monterey Take Down Garden Spray is one common brand name. It provides rapid knockdown of most insects, but insects often recover. Piperonyl butoxide (PBO) is often mixed with pyrethrin to act as a synergist. Bonide Pyrethrin Garden Insect Spray is one example. This increases the overall effectiveness, and helps prevent pests from recovering. Pyrethrin or pyrethrum + PBO is active against a wide range of insects and is labeled for use on most ornamental plants. However, its efficacy is limited by its very short residual activity.

pyrethroids: The term “pyrethroids” refers to a group of synthetic insecticides modeled after the botanical pyrethrum molecule. These products are effective against a wide range of insect pests and are used at very low rates. The following pyrethroid insecticides are currently labeled for use in the home landscape.

permethrin: Permethrin is the oldest and most common of the pyrethroid insecticides. It is widely available and is sold under many different brand names (Bonide Eight Vegetable, Fruit and Flower Concentrate, and Hi-Yield 38 Plus, Turf, Termite, and Ornamental Spray are two examples). Permethrin is labeled for many different ornamental plants and is effective against a wide range of pests. Note that permethrin is often confused with pyrethrin, but there are considerable differences in their overall effectiveness and residual control.

cyhalothrin: Lambda cyhalothrin is one of the newer pyrethroid insecticides. Spectracide Triazicide Insect Killer Concentrate is the most common brand name. It is effective against a number of different insect pests and is labeled for most ornamental plants.

cyfluthrin: Cyfluthrin is another relatively new pyrethroid insecticide. It is sold under the brand name of Bayer Advanced Garden Power Force Multi-Insect Killer Concentrate. Like cyhalothrin, it is effective against many different insect pests and is labeled for most landscape plants.

bifenthrin: Bifenthrin is one of the more effective pyrethroid insecticides. It is labeled for use on most ornamental landscape plants. One of the more common brand names is Hi-Yield Bug Blaster Bifenthrin 2.4 Concentrate. Bifenthrin is a broad spectrum insecticide that has more activity against aphids and spider mites than most pyrethroids.

cyfluthrin + imidacloprid: This is a premix sold under the brand name Bayer Complete Insect Killer, which is labeled as a foliar spray on most ornamental plants. Cyfluthrin is a pyrethroid insecticide that controls a wide range of insect pests. Imidacloprid is a systemic insecticide that is especially effective against sucking pests, such as scales, whiteflies, aphids, and lace bugs. Because of its broad label and the broad spectrum of insect pests controlled, this is a very useful product for control of insect pests in the home landscape. It is not effective against spider mites.

COMMON INSECT PESTS OF POPULAR ORNAMENTAL TREES & SHRUBS IN MISSISSIPPI

PLANT	INSECT	SCOUTING
Arborvitae	Bagworm	Check for small larvae in May and June. Early detection and treatment can help prevent damage. Spring egg hatch often begins about the same time crape myrtles begin to leaf out.
Azalea	Azalea lace bug	Check for adults, spiny nymphs, or shiny fecal droppings on undersides of leaves. Stippling or bleaching of leaves indicates infestation.
	Azalea caterpillar	Check for clusters of small yellow and red-striped caterpillars skeletonizing leaves in late spring through mid summer. Treat promptly to avoid defoliation by larger caterpillars.
	Azalea bark scale	Check for large white scales at crotches of twigs and branches.
	Azalea leafminer	Check for mines, leaf tying, and tattered defoliation of leaves at tips of branches.
Boxwoods	Spider mites	Be alert for stippling, yellowing, or bleaching of leaves. Use a hand lens to check for mites.
	Boxwood leafminer	Leaves appear yellow to rust-colored. Closer examination reveals mines containing small yellow to orange-colored larvae.
Bradford Pear	Asian ambrosia beetle	Curved, toothpick-sized columns of tightly packed frass extruding from the trunk of the tree are signs of attack by Asian ambrosia beetle. This beetle also attacks many other species of hardwood trees.
	Fall webworm	These caterpillars produce large unsightly webs that enclose the leaves at the end of a branch. They are most abundant beginning in late summer.
Camellia	Tea scale	Check for yellowing leaves and scales on undersides of leaves. First generation crawler hatch often coincides with blooming of Chinese wisteria and tulip poplar.
	Southern red mite	Found on undersides of leaves. Causes leaves to turn gray or brown and fall off. More common in cool spring and fall.
	Camellia bud mite	Scales of flower buds turn brown, and bud fails to develop properly or produces distorted blooms. Mites are too small to be seen without significant magnification.
Canna	Lesser canna leaf roller	Infested leaves fail to unroll properly and are damaged by larvae feeding inside the leaf roll. Activity begins shortly after canna leaves emerge in the spring.
Crape Myrtle	Crape myrtle aphid	Check for aphids on undersides of leaves. Be alert for accumulations of honeydew or sooty mold. More common on older, "indica-type" varieties.
	Flea beetle	Be alert for small blue-green metallic beetles feeding on leaves in midsummer.

COMMON INSECT PESTS OF POPULAR ORNAMENTAL TREES & SHRUBS IN MISSISSIPPI

PLANT	INSECT	SCOUTING
Crape Myrtle	Asian ambrosia beetle	Curved, toothpick-sized columns of tightly packed frass extruding from the trunk of the tree are signs of attack by Asian ambrosia beetle. Also attacks many other hardwoods.
Dogwood	Dogwood borer	Loose, scaly bark is often the first sign of borer infestation.
Elms	Elm leaf beetle	Skeletonizing defoliation is often the first sign of infestation. Check for adults and larvae feeding on leaves.
Euonymus	Euonymus scale	Check for scale on leaves and twigs. Occurs year round. Hatching of first generation crawlers often coincides with blooming of dogwoods and Oregon grape holly.
Gardenia	Citrus whitefly	Be alert for honeydew or sooty mold. Clouds of small white moth-like adults fly out when foliage is disturbed. Scale-like immatures occur on undersides of leaves.
	Mealybugs	Concentrations of white cottony or powdery material in crotches of twigs and terminals may indicate mealybugs. Check for small oval, soft-bodied insects.
Hibiscus	Hibiscus sawfly	Be alert for first signs of defoliation. Check for small green larvae on undersides of leaves.
Holly	Tea scale	Check for yellowing leaves and scales on undersides of leaves. First generation crawler hatch often coincides with blooming of Chinese wisteria and tulip poplar.
	Holly leafminers	Causes winding or serpentine mines in leaves of holly.
Hosta	Slugs	Be alert for feeding injury on leaves, especially as leaves are emerging in spring.
Lantana	Lantana lace bug	Bleaching or browning of leaf margins may indicate infestation. Check for the spiny nymphs and small, elongate, gray-brown adults on undersides of leaves.
	Whiteflies	Be alert for honeydew or sooty mold. Clouds of small, white adults fly out when foliage is disturbed. Scale-like immatures occur on undersides of leaves.
Ligustrum	Whiteflies	Be alert for honeydew or sooty mold. Clouds of small, white adults fly out when foliage is disturbed. Scale-like immatures occur on undersides of leaves.
Magnolia	Magnolia scale	Especially common on deciduous magnolias. Honeydew and sooty mold are often the first signs of infestation. Check for scales on small twigs.
	Yellow poplar weevil	Mostly occur on Southern Magnolia. Larvae cause blotch-shaped mines near tips of leaves. Adults feed on buds and tender young leaves, causing holes and distorted leaves. Adult weevils begin emerging when eastern redbud and dogwood are blooming.

COMMON INSECT PESTS OF POPULAR ORNAMENTAL TREES & SHRUBS IN MISSISSIPPI

PLANT	INSECT	SCOUTING
Magnolia	False oleander scale	This armored scale occurs on the upper and lower surface of leaves and attacks many other plants. The females are brown and oval-shaped with a larger white covering extending from one end. Yellow, chlorotic spots appear at the feeding site.
Pecan	Pecan phylloxera	Pea- to marble-sized knotty galls form on terminals in the spring. Egg hatch coincides with bud break on pecan.
	Yellow aphids	Honeydew and sooty mold accumulate on lawn furniture and other items beneath trees. Large numbers of small yellow aphids occur on undersides of leaves
	Black pecan aphids	This small black aphid causes angular shaped yellow spots on leaflets. Trees shed leaves prematurely.
	Fall webworm	These caterpillars produce large, unsightly webs that encase the ends of entire branches.
Pine	Pine tip moth	Infests pines under 15 feet. Check for larvae feeding in developing terminals. Activity begins in very early spring and may be as early as mid-February in the southern portion of the state.
	Black turpentine beetle	Watch for popcorn-sized masses of resin, "pitch tubes" on the lower trunk area of large pines. Attacks may occur from May through September.
	Red-headed pine sawfly	Red-headed caterpillar-like larvae chew needles of young pines.
	Pine tortoise scale	Black sooty mold on needles indicates infestation of scale or aphids. Check for presence of tortoise-shaped adult scales.
Pyracantha	Lace bug	Check for adults, spiny nymphs, or shiny fecal droppings on undersides of leaves. Stippling or bleaching of leaves indicates infestation.
Roses	Aphids	Check for heavy infestations on leaves and stems, especially in spring and fall. Causes wilting of terminals.
	Flower thrips	Check for feeding injury and distortion on flower petals, especially on light-colored blooms. Large numbers of thrips may move to roses as wild hosts dry in spring. Often found at base of flower petals.
	Spider mites	Found on undersides of leaves. Be alert for stippling of leaves or small webbing. Mites are more common in hot dry weather.

The information given in this publication is for educational purposes and preliminary planning purposes only. Always read and follow current label directions. Specific commercial products are mentioned as examples only, and reference to specific commercial products or trade names is made with the understanding that no discrimination is intended to other products that may also be suitable and have label clearances.



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