

PECAN PESTS in the Home Orchard



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Several significant diseases, insects, and mites attack pecan trees in backyard orchards. These pests can diminish the trees' appearance and reduce nut production.

For example, webworm webs and caterpillar feeding on the leaves can create an aesthetic concern in trees grown primarily for shade. These pests usually do not threaten the health of established trees. However, owners interested in protecting the nuts from damage must identify the pest problem and take the appropriate action.

Although planting a pest-resistant variety, removing old pecan shucks, and adopting other cultural practices can minimize some pest damage, backyard growers may also consider pesticides when cultural controls are inadequate.

Cultural controls

Three nonchemical approaches to pecan pest management are choosing an adapted pecan variety, keeping the soil moist and fertile, and conserving beneficial insects.

Adapted varieties: One of the most important decisions in growing pecans is choosing a pecan variety that is adapted to the climate of your region of the state. Also, look for adapted varieties that are less susceptible to pecan scab, a serious fungal disease that attacks leaves and nuts.

For a list of varieties adapted to different regions of Texas, including their susceptibility to scab, check the map (Fig. 1) and refer to the Texas AgriLife publication *Texas Fruit and Nut Production: Improved Pecans*, which can be found at <http://www.agrilifebookstore.org/>.

Soil moisture and fertility: Providing adequate irrigation and soil fertility can help the trees grow vigorously and defend against insect and disease attack. For instance, trees under drought stress are especially vulnerable to infesta-

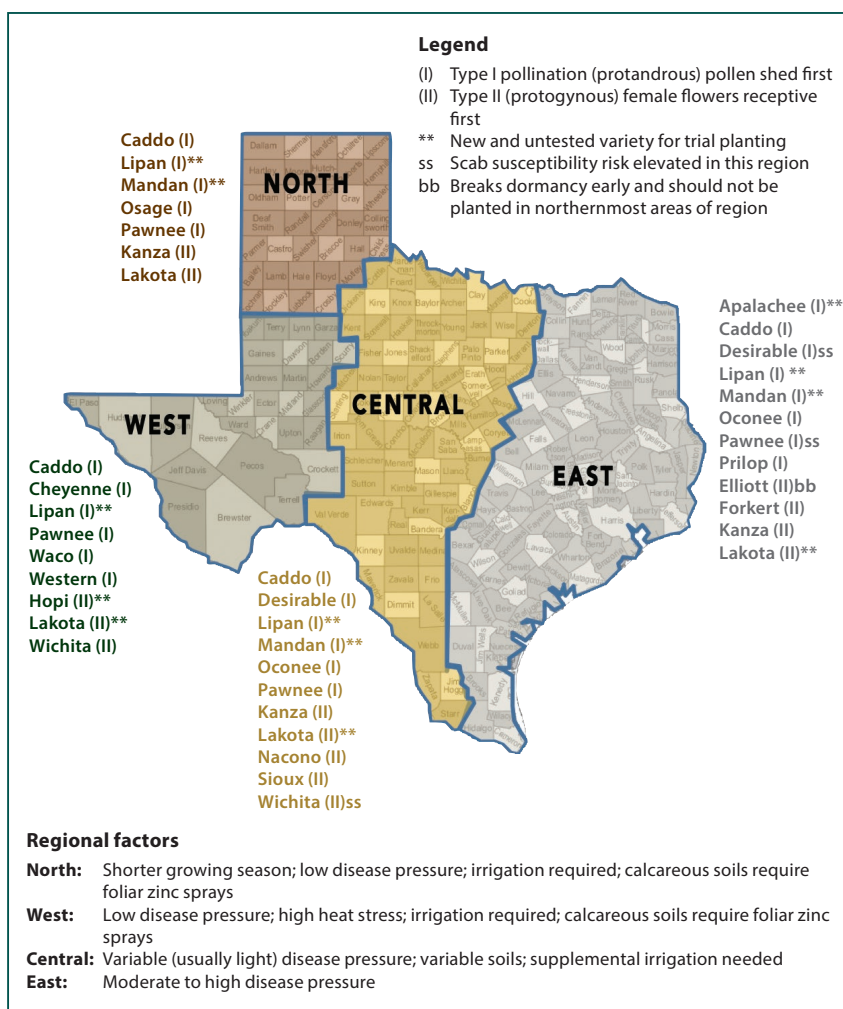


Figure 1. Pecan regions of Texas (Source: *Texas Fruit and Nut Production: Improved Pecans*)



Figure 2. Common beneficial insects (clockwise from top left): lacewing egg, larva, and adult; harmonia larva; wheel-bug adult; and Asian lady beetles

tion by tree borers. The *Improved Pecans* publication, referenced above, provides guidelines on growing pecans in Texas.

Beneficial insects: Predatory and parasitic insects that attack pecan insect pests include assassin bugs, lacewings, lady beetles, predatory mites, spiders, and many kinds of tiny wasps that parasitize insect pests (Fig. 2).

These beneficial insects exist naturally and can help reduce pest numbers. Conserve their populations by minimizing insecticide applications and using selective insecticides that control the pest with minimal damage to natural enemy populations.

As examples, spinosad and *B.t.* formulations are less toxic to most beneficial insects and other nontarget species than are broad-spectrum insecticides such as esfenvalerate and other pyrethroids.

However, research has shown that buying and releasing lacewings, convergent lady beetles, or *Trichogramma* wasps does not provide significant pest control in pecan.

Pesticide use in home orchards

Some insecticides are available in small quantities and marketed for use by those with a few backyard pecan trees.

Pesticides for commercial growers are typically more concentrated and more expensive than products marketed for backyard use. They also are usually sold in large quantities, which make it a challenge for backyard growers to store the unused pesticides safely. For hobbyists with more than a few trees, access to a larger

selection of more-effective pesticides may justify the additional costs of buying commercial quantities of agriculturally labeled products and becoming certified to use them.

Some insecticides when applied to the soil act systemically as they are transported in the sap to the leaves and as a result control aphids. Other insecticides are applied to the leaves (foliar sprays), which requires investments in time and spray equipment. You also must adhere to the instructions on the label, apply the pesticides safely, and avoid pesticide drifting to neighboring property.

Pesticides available

Table 1 (page 18) lists pesticide products packaged for homeowner use on pecans. For several pests, such as scab disease, no effective pesticides are available in small quantities. Many pesticides labeled for backyard trees have not been evaluated in university trials and may not provide the level of control required in commercial orchards.

Pesticides marketed for commercial use are listed in the Texas A&M AgriLife publication *Managing Insect and Mite Pests of Commercial Pecans*, available online at <http://agrilifebookstore.org>. People who buy or apply restricted-use insecticides must be licensed pesticide applicators with Texas Department of Agriculture.

Pesticide use precautions

Always read the product label for full directions for the pesticide's contents, use, and restrictions. Product names change often. Read the label carefully to be sure that:

- The pesticide contains the appropriate active ingredient(s).
- The product label lists pecans.
- The pecans from trees treated with the pesticide can be eaten safely. Some pesticides are labeled only for nonbearing pecans—young trees that do not produce nuts yet.

When spraying insecticide on tree foliage, wear protective clothing to avoid contact with the pesticide, and do not allow the spray to drift from the tree.

Choose the pesticide that provides the safest, most effective, and most economical control. All pesticides can be hazardous to people, animals, and nontarget plants. Use them with caution, and comply with the manufacturer's label directions for handling them.

Symptoms of pesticide poisoning include cramps, diarrhea, headaches, nausea, muscular twitching, blurred vision, and weakness. If you notice any of these symptoms while or after handling a pesticide, call a doctor immediately.

Store all pesticides out of the reach of children, irresponsible people, livestock, and household pets.

Dispose of leftover spray materials and containers properly.

Policy statement on pest management suggestions

The information and suggestions in this publication reflect the opinions of Extension entomologists based on research, field tests, and use experience. Our management suggestions are a product of research and are believed to be reliable.

However, unforeseen or unexpected conditions or circumstances may result in less than satisfactory results, even when these suggestions are used. The Texas A&M AgriLife Extension Service assumes no responsibility for risks. Such risks shall be assumed by the user of this publication.

Suggested pesticides must be registered and labeled for use by the U.S. Environmental Protection Agency and the Texas Department of Agriculture. The status of pesticide labels is subject to change; it may have changed since this publication was produced.

The *users* are always responsible for the effects of pesticide residues on their animals and crops as well as for problems that could arise from drift or movement of the pesticide from their property to that of others.

Always follow the instructions on the label carefully.

Diseases

Pecan scab

Pecan scab is a common fungal disease of pecans. Symptoms include black lesions and tissue death on twigs, leaves, and nuts from early spring until late summer (Fig. 3).

Wind and rain spread spores of the disease organism. Because rain and high humidity increase scab infection, pecan scab is more severe in Central and East Texas.

Control: Planting pecan varieties with resistance to pecan scab can reduce disease incidence in Central and East Texas. Other actions to minimize pecan scab are proper pruning and wide spacing between the trees, which can improve air circulation and speed leaf drying.

Fungicides applied as a foliar spray on young trees can prevent pecan scab. To maintain control, they must be applied early and then reapplied. The fungicides labeled for control of pecan scab on bearing trees are not available in small quantities marketed for backyard trees.



Figure 3. Pecan scab symptoms

Other diseases

Several other diseases can infest pecans, including bacterial leaf scorch, downy spot, powdery mildew, shuck dieback, and stem-end blight. Soil-borne diseases include cotton root rot, crown gall, and root-knot nematodes.

These diseases are often difficult to diagnose and control. For assistance, contact your local office of the Texas A&M AgriLife Extension Service or a certified arborist. Diseased plants can be submitted for disease identification to the Texas A&M Plant Disease Diagnostic Lab at <https://plantclinic.tamu.edu/>.

Insects that feed on the pecan nut

Pecan nut casebearer

Damage: The most damaging pest of pecans is the pecan nut casebearer. It infests all pecan-growing areas of Texas.

The larva feeds directly on the developing nut in the spring, soon after pollination in April (South Texas) through early June (North Texas). This spring generation is the most damaging, as a single larva often destroys all the nutlets in a cluster (Fig. 4).

Biology: The adult casebearer is a gray moth about $\frac{1}{3}$ inch long (Fig. 5). The moths deposit eggs on pecan nuts at night.

Before hatching, the greenish-white to white eggs change to pink or red. The eggs hatch in 4 to 5 days, and the empty white eggshell remains on the nut.

After feeding for a day or two on a nearby bud below the nut cluster, the tiny larvae tunnel into the pecan nut. They often leave visible silk and black excrement (*frass*) (Fig. 4) on the outsides of infested nuts. The larvae feed inside the pecan nuts for 3 to 4 weeks.

The larvae are olive gray and reach about $\frac{1}{2}$ inch long (Fig. 5). Full-grown larvae pupate in the pecan nut; adult moths emerge about 9 to 14 days later.

Control: Apply a labeled insecticide as the eggs begin to hatch (Table 1, page 18). Look for eggs on the nutlets in the spring just after pollination when tiny nuts are forming. Flag egg-infested nut clusters to monitor egg hatch.

Insecticides containing spinosad are effective, leave a residue that remains effective for some time (have some *residual* effect), and harm beneficial insects less than do other insecticides.

To maximize the insecticide's residual activity, delay treatment until you see the first egg hatch. Once inside the nuts, the larvae are protected from insecticides.



Figure 4. Black frass on top of a nutlet infested with pecan nut casebearer



Figure 5. Pecan nut casebearer adult (left) and larva



Figure 6. Hickory shuckworm damage



Figure 7. Hickory shuckworm larva

Hickory shuckworm

Damage: Shuckworm larvae tunnel in the shuck, interrupting the flow of nutrients and water needed for the kernels to develop normally. Infested nuts are scarred, mature more slowly, and are usually of poor quality (Fig. 6).

Damaged shucks stick to the nuts and fail to open, creating *sticktight*s. Infestations before shell hardening may cause the nuts to fall.

Biology: Adult shuckworms are dark-brown to grayish-black moths about $\frac{3}{8}$ inch long. Female moths attach single eggs to the shuck using a creamy white substance that is visible on the shuck surface.

The tiny larva hatches in a few days and burrows into the shuck to feed for about 15 to 20 days. Mature larvae are about $\frac{1}{2}$ inch long and cream colored with light-brown heads (Fig. 7). They pupate in the shuck, and the moth soon emerges.

Shuckworms overwinter as full-grown larvae in old pecan shucks on the tree or the orchard floor. Several generations are completed each year.

Control: Pecans are most susceptible to hickory shuckworm damage during the water through gel stages (Fig. 30, page 19).

If the orchard has a history of shuckworm damage, apply an insecticide such as spinosad when pecans reach the half-shell hardening stage. You may need to spray again 10 to 14 days later.

To reduce shuckworm infestations, remove and destroy old shucks and dropped nuts, where the shuckworms overwinter.



Figure 8. Stinkbug damage

Stinkbugs and leaffooted bugs

Damage: Brown and green stinkbugs and leaffooted bugs have piercing-sucking mouthparts and penetrate the shuck to feed on the developing kernel.

Nuts injured before the shells harden fall from the tree. Feeding after shell hardening causes brown or black spots on the kernel (Fig. 8). The affected areas taste bitter.

Biology: These bugs overwinter as adults (Fig. 9) under fallen leaves and in other sheltered places on the ground. Populations increase in the summer, when the adults lay eggs on many crops and weeds.



Figure 9. Brown stinkbug (from left), green stinkbug, and leaffooted bug

Fields of soybeans, other legumes, and sorghum may be sources of adults that fly to pecans in late summer and fall. Infestations are usually largest from September through shuck split.

Control: Stinkbugs and leaf-footed bugs are difficult to control with insecticides, especially those labeled for use in backyard orchards.

Pecan weevil

Damage: The pecan weevil is found throughout most of Texas (Fig. 10). Where present, this weevil is the most damaging late-season pecan pest.

Adult weevils feed on pecans in August and September, causing nut drop. However, this loss is usually insignificant.

A much greater loss results from pecan weevil grubs feeding on developing kernels in September, October, and November. Once the grubs have completed feeding, they exit the pecan, leaving a neatly drilled hole (Fig. 11), which is evidence of weevil feeding. However, before the grubs exit, there is no obvious external evidence that a whole pecan contains developing weevil grubs. When the nut is later cracked, the damaged kernel is visible. Some pecan weevil larvae may still be inside the nut at cracking time.

Biology: Adult weevils (Fig. 11) emerge from the soil from mid-August through early September or later if delayed by drought. The adults feed on nuts and live for several weeks.

Once the nuts reach the gel stage (Fig. 30), they are suitable for egg laying. For this reason, early-maturing varieties are often infested first.

The female weevil drills a hole through the shell and deposits three or four eggs within the developing kernel. The larvae hatch from the eggs and feed inside the nut, destroying the kernel (Fig. 11).

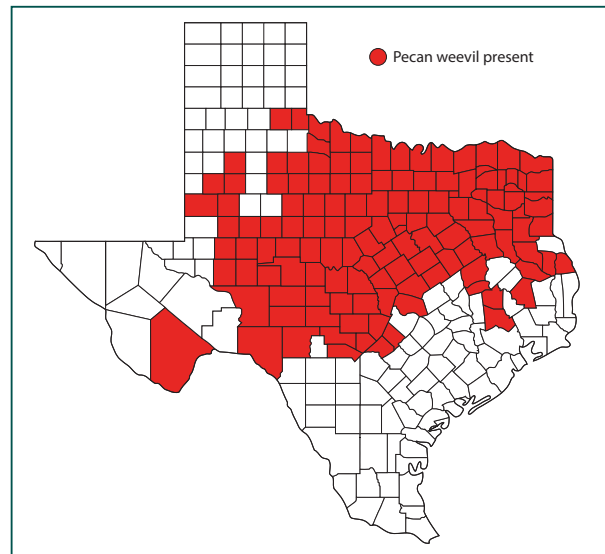


Figure 10. Pecan weevil presence in Texas counties, 2018



Figure 11. Pecan weevil adult (from left), holes drilled by the full grown larvae to exit the pecan, and grubs and damage

The larvae emerge from the nuts about 42 days after the eggs are deposited. Larvae chew a clean, round, BB-sized hole in the shell—easily identified as pecan weevil damage (Fig. 11). Finding pecans on the ground with these characteristic holes is evidence that pecan weevils are in the orchard.

Full-grown larvae emerge from the nuts in late September and continue until as late as December. Emerged larvae fall to the ground, burrow 4 to 12 inches into the soil, and build cells, where they remain for 8 to 10 months. Most of the larvae then pupate and transform to the adult stage within a few weeks.

The adults remain in the underground cells for a second year before emerging from the soil the following summer. This is a 2-year life cycle.

About 10 percent of the larvae do not pupate after the first year but remain as larvae for 2 years. They emerge from the soil as adults the third year (3-year life cycle).

Control: Apply an insecticide spray to the foliage to kill the adults before they deposit eggs into pecans. Spraying large pecan trees may not be practical in a home orchard.

Applying an insecticide or sticky barrier to the trunk of pecan trees can sometimes help control pecan weevil. As the adults emerge from the soil, they crawl or fly to the trunk and crawl up it into the canopy, where they infest the nuts.

Spraying the pecan trunk with an insecticide (bifenthrin) leaves a residue that can kill pecan weevils climbing up the trunk. Spray the insecticide on the trunk from the ground level to about 8 feet above the ground, and reapply it weekly during weevil emergence.

A sticky band of Tree Tanglefoot Insect Barrier applied around the tree trunk can also capture weevils crawling up the trunk and prevent some from reaching the canopy. Place the barrier about 5 to 6 feet above the ground and reapply the barrier as dust and leaves stick to the band.

Because pecan weevils from untreated trees can fly directly from tree to tree, trunk barriers using an insecticide or Tree Tanglefoot may not be effective under these conditions.

Research is under way to evaluate nematodes and other biopesticides to control pecan weevils. The current biopesticides proven effective by research are expensive, up to \$80 per tree.

For the most effective control, spray insecticide into the tree canopy to kill the adults before they deposit eggs inside pecans. Bifenthrin is labeled for pecan weevil control (Table 1).

Make the first application when the nuts reach the gel to early dough stage and adult weevils are present. The timing of gel stage/early dough formation varies by cultivar maturity and can range from early to late August. To monitor kernel development, cut pecans and check for gel and dough formation (Fig. 30).

A second application, 7 to 10 days after the first, is usually necessary unless drought has delayed weevil emergence from the soil. A good watering under the tree canopy will help reduce drought-delayed emergence of adults.

If weevils emerge late, continue to monitor emergence and reapply the insecticide at 7- to 10-day intervals as the weevils continue to emerge.

For information on how to monitor pecan weevil emergence, see the Texas A&M AgriLife publication *Managing Insect and Mite Pests of Commercial Pecans*, available online at <http://agrilifebookstore.org>. Watch for aphid infestations, which may increase after you apply insecticide for pecan weevil control.

Do not transport nuts infested with pecan weevils to weevil-free areas, as they can be the source of a new infestation. Also, destroy infested nuts after harvest.

Harvesting early, before weevil grubs have exited the nuts, physically removes the grubs from the orchard and can reduce weevil infestations if done every year.

Insects and mites that feed on leaves

Yellow and blackmargined aphids

Damage: Aphids are small, soft-bodied insects that suck sap from pecan leaves. Two species of “yellow” or “honeydew” aphids that attack pecans are the blackmargined aphid and the yellow pecan aphid.

Both species have piercing/sucking mouthparts that remove water and plant nutrients from the leaf veins. As they feed, the aphids excrete large amounts of excess sugars. This sticky material, called *honeydew*, collects on leaves. Honeydew is a food source for a black, sooty mold that can cover leaves when humidity is high.

Yellow pecan aphids: Compared to the blackmargined species, yellow pecan aphids usually increase later in the season. Also, they hold their wings roof-like over the body and lack the black stripe along the wing margin (Figs. 12 and 13).

Outbreaks of this species can cause late-season defoliation and reduce nut yield and quality.

Biology: The biology of both species is similar. The eggs overwinter in bark crevices on twigs and tree trunks. Immature aphids, called *nymphs*, hatch in spring and begin to feed on newly expanded leaves. The nymphs mature in about a week and give birth to live young. All individuals are females that



Figure 12. Yellow pecan aphid life stages (top) and infestations



Figure 13. Blackmargined aphid infestation (top) and winged adult

reproduce without males during spring and summer. In late September and October, males and females develop, and the females deposit overwintering eggs (Fig. 12).

Control: Insecticide treatment may not be advisable for aphids because it can destroy their natural enemies, enabling the aphids to increase to even greater densities than before treatment. Also, yellow aphid infestations often decline rapidly (*crash*) because of natural enemies or rains and wind, which can dislodge the aphids from the leaves.

When yellow aphid control is necessary, consider products containing acetamiprid or imidacloprid and labeled for aphid control on bearing pecans (Table 1), such as:

- Bayer Advanced Fruit, Citrus and Vegetable Insect Control, which is applied to the soil
- Ortho Fruit, Flower and Vegetable Insect Killer, which is applied to the foliage

Blackmargined aphids: Winged adults have a black stripe along the outside margin of their wings, which they hold flat over the body (Fig. 13).

Blackmargined aphid infestations typically increase and may develop large populations from June to August. They often decline after about 3 weeks without causing measurable damage to foliage or yield.



Figure 14. Black pecan aphids and damage

Black aphids

Damage: The black pecan aphid is much more destructive than the two yellow aphid species that attack pecan trees. An infestation averaging only three black pecan aphids per compound leaf can cause severe leaf damage and defoliation.

While feeding, black pecan aphids inject a toxin that turns the leaf tissue between the major veins bright yellow (Fig. 14). These damaged areas, up to ¼ inch across, turn brown. The leaves die and soon fall.

Premature defoliation often reduces nut fill and can reduce nut production the following year.

Biology: The adult is tiny and pear shaped (Fig 15). The nymphs are dark olive green, and the adults are black and may be winged.

Black pecan aphids can feed on the upper and lower leaf surfaces. Infestations often increase in August or September.

Control: Look for black pecan aphids and their characteristic leaf injury, especially in the interior of the canopy where infestation often begins. If black pecan aphids average three or more per compound leaf, consider applying an insecticide using acetamiprid (Table 1, page 18).



Figure 15. Black pecan aphid adult

Fall webworm

Damage: Fall webworm caterpillars build large, silken webs in pecan trees (Fig. 16). Each web may hold 100 or more caterpillars, which feed on pecan leaves. Large infestations may cover the tree with webs and cause extensive defoliation.

Although their webs and damage are unsightly, fall webworms do not harm established trees. However, caterpillar feeding can reduce nut production.

Biology: The adult is a white moth with dark spots on the wings (Fig. 17). Female moths emerge in the spring and deposit eggs in masses of several hundred. The greenish-white eggs, laid on the undersides of pecan and other tree leaves, are covered with gray hairs left by the female.

Mature larvae are about 1 inch long, pale yellow or green, and covered with tufts of long, white hairs (Fig. 17).

There are two generations in the northern regions of Texas and four generations in South Texas. The final, or fall, generation is usually the largest and most damaging.

Control: Use a long stick to tear the webs open, which will expose the caterpillars to the birds and insects that feed on them. Sprays of spinosad or B.t. insecticide (Table 1) must penetrate the web to contact the caterpillars. Tearing open webs before spraying will improve control.

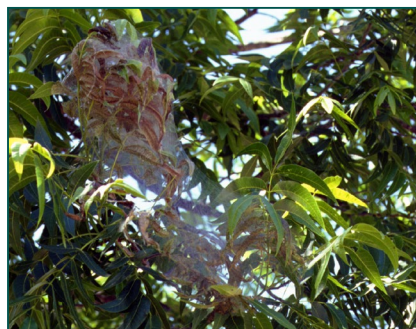


Figure 16. Fall webworm web and larvae



Figure 17. Fall webworm adult and larva

Grasshoppers

Damage: Grasshoppers can move into pecan trees from nearby crops, pastures, and weedy areas (Fig. 18). They feed on pecan leaves and developing nuts.

Control: Insecticides containing bifenthrin and esfenvalerate and labeled for use on pecans will kill grasshoppers (Table 1). However, you may have to repeat the treatment if grasshoppers continue to move into the orchard from nearby areas.

It is very difficult to control late-season grasshoppers completely, and it may be impractical in years when grasshopper infestations are large and quickly invade treated areas.



Figure 18. Grasshopper and chewing damage

Pecan leaf scorch mites

Damage: Pecan leaf scorch mites feed on the undersides of leaves, causing irregular brown spots. Infestations often develop first along the leaf midrib (Fig. 19). Damaged leaves appear russeted or scorched.

Large infestations can cause leaf loss, especially if the trees are under moisture stress. Premature defoliation often reduces nut fill and can reduce nut production the following year.



Figure 19. Damage by pecan leaf scorch mites

Biology: Scorch mites overwinter as adults in the rough bark of limbs. Adult females begin laying eggs in the spring. Mites can complete a generation in 5 to 15 days and are more numerous during hot, dry weather.

Control: Because scorch mites prefer the shady, interior part of the tree, they can damage it significantly before you notice the infestation. To detect infestations early, check the shady lower branches and water sprouts (shoots that arise from the trunk or branches that are several years old).

Mites may increase after some insecticides (esfenvalerate, permethrin, zeta-cypermethrin) are applied for control of other pests. Monitor the trees for mites when the weather is hot and dry and after insecticides are used.

No insecticides or miticides packaged for backyard use are effective against pecan leaf scorch mites. Insecticidal soap applied as a foliar spray may provide some benefit.



Figure 20. Galls caused by pecan leaf phylloxera



Figure 21. Galls caused by pecan phylloxera

Phylloxera

Damage: Phylloxerae are tiny, soft-bodied insects closely related to aphids. These insects cause conspicuous swellings, called galls, to form on leaves, twigs, and nuts in the spring and early summer:

- The **pecan leaf phylloxera** forms galls on leaves only (Fig. 20); extensive infestations may cause some defoliation.
- Another species, the **pecan phylloxera**, attacks shoots and nuts and is therefore more damaging (Fig. 21). Extensive infestations of pecan phylloxera can reduce yield, impair the tree's vitality, and curtail subsequent production.

Biology: Both species survive the winter (overwinter) as eggs in bark crevices. In the spring, tiny nymphs emerge during bud break and feed on new growth.

As they feed, the nymphs secrete a substance that stimulates plant tissue to develop galls. The nymphs are soon completely enclosed in the galls, which range from $\frac{1}{10}$ to 1 inch in diameter.

Nymphs feed and develop inside the gall. The galls then crack open and winged, adult phylloxerae emerge. Large infestations reduce leaf area and tree vigor.

Control: Apply an insecticide labeled for phylloxerae (Table 1). Use it in the spring to kill immature phylloxerae after they hatch from overwintering eggs but before they cause the galls to appear. Apply it after bud break when the leaves have grown 1 to 2 inches long.

Only infested trees need treatment because phylloxerae cannot fly far, and infestations move slowly from tree to tree.



Figure 22. Walnut caterpillar young (left) and full-grown larvae (middle and right)

Walnut caterpillar

Damage: Walnut caterpillars feed in large numbers on pecan leaves but do not build silken webs as do fall webworms. The larvae eat the leaves, leaving only the midribs and leaf stems. Premature defoliation can reduce nut fill and nut production the following year.

Biology: Walnut caterpillar moths deposit masses of 500 or more eggs on the undersides of leaves. The masses are round, hairless, free of scales, and about the size of a half dollar. The eggs hatch in about 10 days.

The larvae feed for about 25 days. Young larvae are reddish brown with yellow lines running the length of the body. Full-grown larvae are about 2 inches long, black with grayish lines, and covered with long, soft, gray hairs (Fig. 22).

The larvae congregate in large masses on the trunk (Fig. 23) and scaffold branches to shed their skins before crawling back to finish feeding on leaves. These final-stage larvae consume most of the leaves and can defoliate a tree very quickly. Mature larvae crawl to the soil to pupate.

Control: Because walnut caterpillars do not build tents or webs, infestations often go unnoticed until leaf damage becomes obvious.

To find the egg masses (Fig. 24), shine a flashlight on the undersides of the leaves at night. Look for white spots about 1 inch in diameter.

Caterpillars cause 80 percent of their damage during the last 3 to 4 days of feeding. Smaller larvae are easier than larger larvae to kill with insecticides; controlling the younger ones prevents serious damage.

If large infestations threaten to defoliate the trees, consider applying an insecticide containing esfenvalerate or spinosad (Table 1).



Figure 23. Walnut caterpillars congregating to shed their skins



Figure 24. Walnut caterpillar egg mass

Insects that feed on twigs and branches

Scale insects

Damage: Scale insects feed by sucking plant sap. Infested branches drop their leaves prematurely, die back, develop rough bark, and may die. Scale-infested trees lack vigor and are more susceptible to borers.



Figure 25. Obscure scales on pecan trunk

Biology: Scale insects are tiny and live beneath a wax covering, or *scale*, attached to the bark of a branch or twig. The wax covering of the obscure scale is about $\frac{1}{8}$ inch in diameter and dingy gray-brown. It has a dark cap slightly off center (Fig. 25).

As its name implies, this scale is difficult to see on branches and stems because its color blends with the bark. Infestations often go unnoticed. Large infestations of obscure scale appear as if wood ash were sprinkled along the branch.

Immatures that emerge from eggs are called crawlers, the only mobile stage of this insect. Once a crawler has moved and settled in a new location, it begins to feed and excretes the waxy covering. It will never move again.

Females lay eggs beneath the scale cover. There is only one generation per year.

Control: Tree stress can favor scale infestations. Minimize stress by maintaining proper irrigation and fertility for optimum plant health. To reduce spread, prune out branches with large infestations of scale.

Scales are difficult to kill with insecticide sprays because their waxy covering protects them. The crawlers move about on branches for several days before selecting a feeding site and secreting their waxy covering. Although insecticides (Table 1) can be effective if applied when the crawlers are active, this period can last 4 weeks, and later-emerging crawler populations may require repeated treatments.

To determine when the crawlers become active, wrap double-sided sticky tape around small branches beginning in May. Every few days, use a magnifier to look for crawlers stuck on the tape. Once you see crawlers, apply a contact insecticide to all of the branches.

Another control measure is to apply dormant oil in late winter or early spring but before the buds begin to swell. Apply the oil spray thoroughly to penetrate the bark crevices on the trunk and all branches.

Twig pruners, hickory spiral borer, and twig girdler

Damage: Three species of small beetles girdle or bore into pecan twigs and branches, causing the branch or twig to break off and fall from the tree:

- **Twig pruners:** The larvae cut the branch ends smoothly (Fig. 26).
- **Hickory spiral borer:** The larvae cut the end of a severed branch in a characteristic spiral pattern (Fig. 27).
- **Twig girdlers:** The adults, not the larvae, cut twigs (Fig. 28).

Biology: The female beetle deposits its eggs in a twig or branch, and they hatch into larvae that feed in the cut part of the branch or twig. The larvae continue to feed and develop in the branch as it hangs in the tree or after it breaks off during a windstorm.

Control: Reduce infestations of all species by quickly collecting and destroying fallen branches and twigs, which harbor the eggs and larvae.

Red imported fire ant

Concerns: Fire ant stings can seriously injure people mowing around trees and harvesting nuts. Red imported fire ants (Fig. 29) may also damage equipment such as electrical motors and irrigation systems.

Control: To reduce fire ant numbers, broadcast fire ant bait across the tree area. Fire ants collect the bait particles and carry them back to the colony. Ants eventually feed the insecticide to the queens, which become sterile or die. The ant colony dies over a period of weeks or months, depending on the bait product used.

Although many products are available for fire ant control, only some are labeled for use around pecan trees. The label should list *pecan* or *tree nut* as a treatment site.

Fire ant baits containing methoprene (Extinguish) can be used in residential areas around flowers, trees, and shrubs and in nut-bearing trees in orchards. Baits containing hydramethylnon (Amdro Pro) and pyriproxyfen (Distance) can also be applied around homes but only to nonbearing pecan trees.

For more information on fire ants, see the Texas A&M Entomology website at <https://www.texasinsects.org/>.



Figure 26. Twig pruner larva and damage



Figure 27. Hickory spiral borer larva (top) and damage



Figure 28. Twig girdler and damage



Figure 29. Red imported fire ants

Table 1. Some insecticides labeled for control of insect pests in pecans and available in small quantities for use by backyard growers

Active ingredient	Brand name ¹	Targeted pest	Notes
acetamiprid 0.5%	Ortho Flower, Fruit and Vegetable Spray	Aphids, phylloxera, scale, and others	Wait 14 days after application before harvest.
<i>Bacillus thuringiensis</i> , B.t.	Bonide Thuricide B.t.	Fall webworms, other leaf-feeding caterpillars	—
bifenthrin	Fertilome Broad Spectrum Insecticide, 0.3%	Aphids, fall webworm	Wait 21 days after application before harvest.
bifenthrin and zeta-cypermethrin	Ortho Bug B Gone Insect Killer for Lawns and Gardens	Grasshoppers, pecan nut casebearer, pecan phylloxera, pecan weevil, stinkbugs	Wait 21 days after application before harvest.
dormant oils	Hi-Yield Dormant Spray-98.8% mineral oil	Phylloxera, scale	Read the product label for guidelines on plant sensitivity and temperature restriction before using these products.
esfenvalerate	Monterey Bug Buster II, 0.425%	Grasshoppers, hickory shuckworm, pecan nut casebearer, pecan weevil, phylloxera, scale crawlers	—
horticultural oil	Bonide All Seasons Horticultural and Dormant Spray Oil	Scale	Read the product label for guidelines on plant sensitivity and temperature restriction before using these products.
	Fertilome Horticultural Oil Spray		—
	Monterey Horticultural Oil		—
imidacloprid	Bayer Advanced Fruit, Citrus and Vegetable Insect Control 0.235%	Aphids	Apply as a drench to the soil around the dripline of the tree. Wait 7 days after application before harvesting nuts from treated trees. Only 1 application per year
	Hi-Yield Systemic Insect Spray 1.47%	Aphids, phylloxera	Apply as a foliar spray. Wait 7 days after application before harvest.
malathion	Martins Malathion 57%	Pecan nut casebearer, phylloxera	Wait 7 days after application before harvest. Do not enter treated area for 24 hours.
permethrin	Bonide Eight Vegetable, Fruit and Flower Concentrate, 2.5%	Caterpillar pests, grasshoppers	—
	Martin's Vegetable Plus, 10.0% permethrin		Wait 7 days after application before harvest.
potassium salts	Fertilome Insecticidal Soap	Aphids, scale crawlers	—
	Safer Insect Killing Soap		
spinosad	Bonide Captain Jacks Dead Bug Concentrate, 0.5%	Hickory shuckworm, pecan nut casebearer, webworm	Wait 1 day after application before harvest.
	Ferti-Lome Natural Guard, 0.5%		Wait 1 day after application before harvest. Approved by OMRI ² for organic production
	Green Light Lawn and Garden Spray, 0.5%		Approved by OMRI ² for organic production; see label for pre-harvest interval
	Monterey Garden Insect Spray, 0.5%		Wait 1 day after application before harvest. Approved by OMRI ² for organic production

1: The effectiveness of many of these products has not been fully evaluated in university trials. This information is provided for educational purposes. Read and follow the product label directions.

2: Organic Materials Review Institute

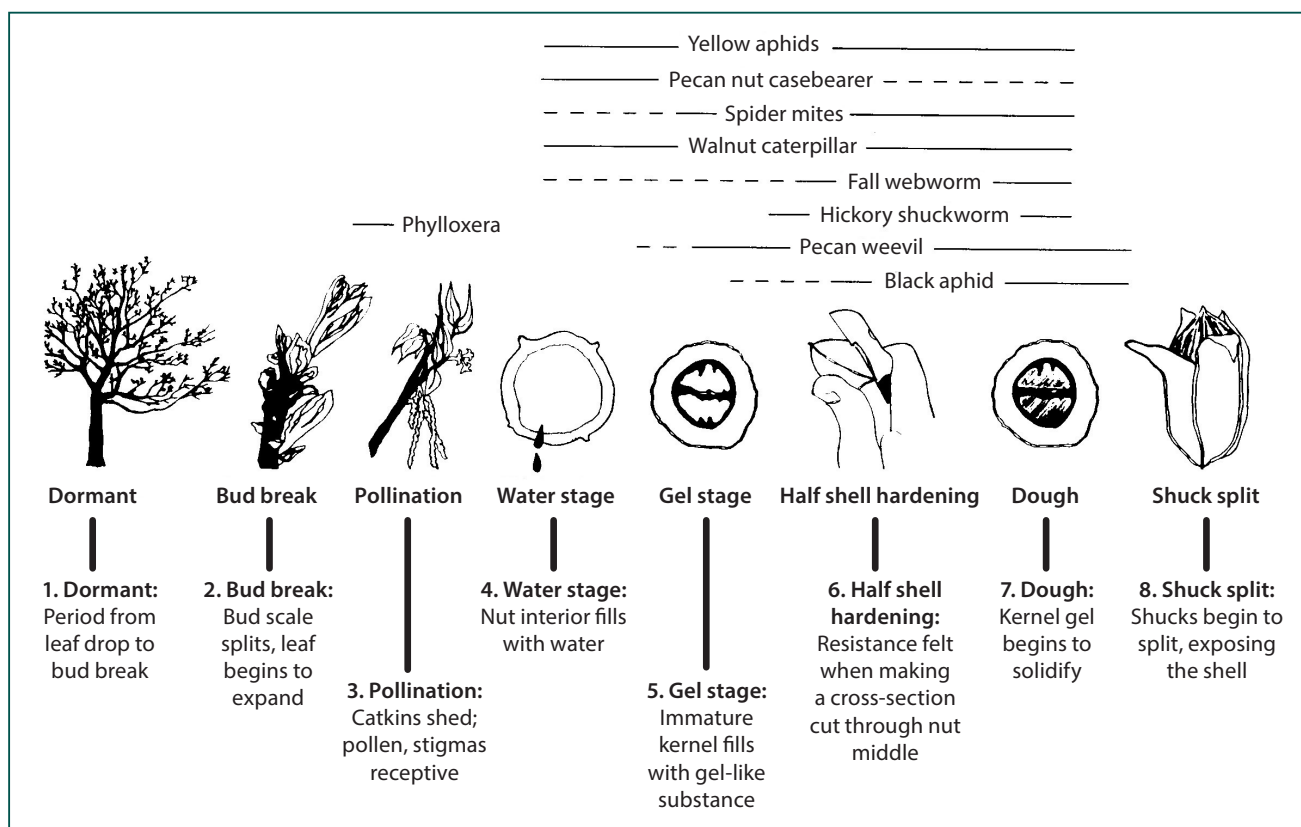


Figure 30. Developmental stages of the pecan

Additional resources

Several websites provide information about commercial pecan management:

- Texas A&M University Entomology Department, <https://www.texasinsects.org/>
- Texas Pecan Integrated Pest Management (IPM), <https://pecankernel.tamu.edu>
- Texas Pecan Growers Association, <http://tpga.org>
- Texas A&M University Horticulture Department, <https://aggie-horticulture.tamu.edu/>

The publications below can be downloaded or ordered from the Texas A&M AgriLife Extension Service Bookstore at <http://agrilifebookstore.org>:

- *Controlling the Pecan Nut Casebearer*
- *Controlling the Pecan Weevil*
- *Field Guide to the Insects and Mites Associated with Pecan*
- *Texas Fruit and Nut Production: Improved Pecans*

Figure credits

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2. Common green lacewing (*Chrysoperla plorabunda*) (Fitch, 1856) by Whitney Cranshaw, Colorado State University, Bugwood.org (CC BY 3.0 US); green lacewing larva, Salvador Vitanza, AgriLife Extension; green lacewing adult, Johnny N. Dell, Bugwood.org (CC BY-NC 3.0 US); harmonia, wheelbug, and Asian lady beetles, Bill Ree, Texas A&M AgriLife Extension Service
3. Pecan scab (*Venturia effusa*) (G. Winter) Rossman & W.C. Allen 2016), Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org (CC BY 3.0 US)
4. Pecan nut casebearer damage, (*Acrobasis nuxvorella*) Neunzig, Bill Ree, AgriLife Extension Entomology
5. Pecan nut casebearer (*Acrobasis nuxvorella*) Neunzig larva, Jonas Janner Hamann, Universidade Federal de Santa Maria (UFSM), Bugwood.org (CC BY 3.0 US); larva and adult, Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org (CC BY 3.0 US)
6. Hickory shuckworm damage, Bill Ree, AgriLife Extension
7. Hickory shuckworm (*Cydia caryana*) (Fitch) larva, Louis Tedders, USDA Agricultural Research Service, Bugwood.org (CC BY 3.0 US)
8. Stinkbug damage, Bill Ree, AgriLife Extension
9. Brown stink bug, leaffooted bug, Bill Ree, AgriLife Extension; green stink bug, popcorn thief, Sarah Zukoff (CC BY 2.0)
11. Pecan weevil (*Curculio caryae*) (Horn, 1873) adult, Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org (CC BY-NC 3.0 US); pecan weevil damage and grubs, Bill Ree, AgriLife Extension
12. Yellow pecan aphid nymphs, adult laying eggs (*Monelliopsis pecanis*) Bissell, 1983, Louis Tedders, USDA ARS, Bugwood.org (CC BY 3.0 US); infestation (*Monelliopsis pecanis*) Bissell, 1983, James D. Dutcher, University of Georgia, Bugwood.org, (CC BY 3.0 US)
13. Blackmargined aphid infestation (*Monellia caryella*) (Fitch, 1855), Louis Tedders, USDA Agricultural Research Service, Bugwood.org (CC BY 3.0 US); winged adult, Bart Drees, AgriLife Extension Entomology
14. Black pecan aphids and damage, Bill Ree, AgriLife Extension
15. Black pecan aphid, Louis Tedders, USDA Agricultural Research Service, Bugwood.org (CC BY 3.0 US)
16. Fall webworm web and larvae, Bill Ree, AgriLife Extension
17. Fall webworm moth, Katja Schulz (CC BY 2.0); larvae, (*Hyphantria cunea*) (Drury, 1773), James B. Hanson, USDA Forest Service, Bugwood.org (CC BY-NC 3.0 US)
18. Tiny predator, Bob Travis (CC BY-NC 2.0)
19. Pecan leaf scorch mite damage, Bill Ree, AgriLife Extension
20. Pecan stem phylloxera galls, Mike Merchant, AgriLife Extension
21. Phylloxera gall on pecan, Mike Merchant, AgriLife Extension
22. Walnut caterpillar young and full-grown larvae on bitternut hickory, Katja Schulz (CC BY 2.0); full-grown larva, Serious bad hair, Lisa Brown (CC BY-NC 2.0)
23. Caterpillar treebeard, Katja Schulz (CC BY 2.0)
24. Walnut caterpillar (*Datana integerrima*) Grote & Robinson, Lacy L. Hyche, Auburn University, Bugwood.org (CC BY 3.0 US)
25. Obscure scales on pecan trunk, Bill Ree, AgriLife Extension; obscure scale (*Melanaspis obscura*) (Comstock), J.A. Davidson, Univ. Md, College Pk, Bugwood.org (CC BY-NC 3.0 US)
26. Twig pruner (*Anelaphus villosus*) (Fabricius, 1793), James Solomon, USDA Forest Service, Bugwood.org (CC BY 3.0 US)
27. Hickory spiral borer larva and damage (*Agrilus arcuatus torquatus*) LeConte, 1860, James Solomon, USDA Forest Service, Bugwood.org (CC BY-SA 3.0)
28. Twig girdler (*Oncideres cingulata*) (Say, 1826), Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org (CC BY 3.0 US)
29. Red imported fire ant (*Solenopsis invicta*), Bart Drees, AgriLife Extension Entomology

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