

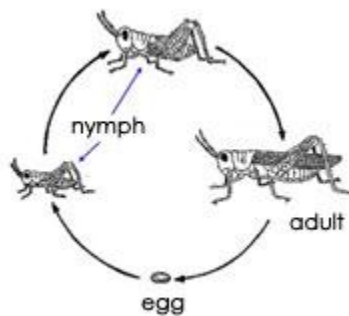
Pests of Ornamentals and Turfgrass

Insects and Other Arthropods

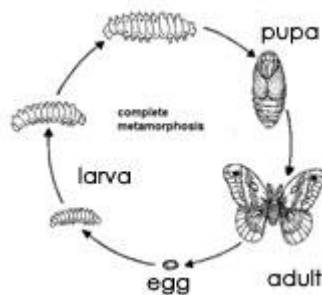
Insects, spiders, scorpions, millipedes, centipedes, ticks, and mites are arthropods. They have hard external skeletons and segmented legs and bodies. Most insects have 3 main body regions and 3 pairs of legs; they are the only arthropods that can fly.

Insect Life Cycles and Growth

Insects go through a series of changes during their development from egg to adult in a process called **metamorphosis**. When the insect hatches from an egg, it is either a **nymph** (gradual metamorphosis) or a **larva** (complete metamorphosis). The immature stage must shed its external skeleton, a process called **molting**, in order to grow.



Grasshoppers undergo **gradual metamorphosis**, passing through three stages of development: egg, nymph, and adult. Nymphs resemble adults. They eat the same food and live in the same environment. The change in form from nymph to adult is gradual. Only the adult state has wings. Other examples are aphids, stink bugs, and leafhoppers.



Insects with **complete metamorphosis** include butterflies and moths, beetles, flies, bees, and ants. There are **four stages in complete metamorphosis – egg, larva, pupa, and adult**. The larvae are specialized for feeding and look very different from the adult. They have general names such as caterpillar, maggot, white grub, or wireworm. **Larvae usually live in very different situations and often feed on different foods than adults.**

A variety of insects and mites can attack plants but most are not pests. Some are beneficial, providing natural control or pollination services. Others are scavengers on dead or dying plants so they recycle nutrients. **Just because an insect is around damage does not mean it was the cause.**

Mouthparts and Feeding - Ways Insects Can Damage Plants

Pest insects may be divided into major groups according to how they feed:

1. piercing-sucking
2. chewing
3. rasping plant tissue

Sap feeders with piercing-sucking mouthparts can cause wilting, leaf curl, or stunted foliage. Chemicals injected by some species of leafhoppers can cause leaf burn. Stink bug feeding can cause distorted leaves or fruit. Several aphid and leafhopper species can carry virus diseases.

Rasping tiny thrips tear plant cells and feed on sap. These tiny insects may leave feeding scars or distorted leaves; some can carry plant disease.

Chewers include caterpillars and beetles. They feed on foliage. The amount of feeding a plant can tolerate without significant impact on growth or yield varies with a plant's age, growth stage, or stress (drought, etc.).

Arthropod Pests of Trees and Shrubs

Sap Feeders (Piercing-Sucking)

Pests with sucking mouthparts cause similar types of damage. Using their mouthparts, the pests pierce or rasp tissue so they can suck plant juices. **Damaged foliage is usually mottled, but other symptoms may be wilting, scorched leaf tips, or puckering and curling.** When sooty mold occurs on plants, it is almost always associated with “honeydew” that is excreted by certain kinds of sucking insects.



photo: Kansas State University

Aphids or “plant lice,” are small, soft-bodied insects that usually cluster on stems or undersides of terminal leaves. Aphids may be green, black, or red, but sometimes their color is hidden by a white waxy coating. Much of the sap that aphids suck passes through them undigested and is excreted as “honeydew.” Honeydew makes the leaves sticky, and sooty mold may grow on these deposits. Feeding by some kinds of aphids will cause leaves to pucker, curl, or twist.



During most of their lives, **scale insects** are legless and motionless and do not resemble insects at all. They may be circular, oval, or pear-shaped. Some are flat, others convex. **Two major groups of scales are most common in Kentucky.** The **armored scale** produces a waxy shell that gives the soft-bodied insect under it some protection. The **soft scales** do not produce a shell, but their bodies may be tough.

Scales reproduce by giving birth to “crawlers” or by laying eggs that hatch into crawlers. **Crawlers** have legs, eyes, and antennae, all of which allow them to move out from under the mother’s shell or body and seek a suitable place of their own on the plant. Soon after inserting their beak to feed, they molt and lose their legs, eyes, and antennae and remain motionless for the rest of their lives.

Plants infested with scales may lack vigor and appear sickly. Soft scales, like aphids, produce honeydew and cause the same symptoms as mentioned for aphid honeydew. **It is easier to control most scales while they are in the crawler stage because they are not protected by a shell or waxy coat.** Treatment applied for scale control should coincide with crawler activity. A second treatment in 2 to 3 weeks often is recommended. Timing of systemic insecticide applications is not so critical.

On oil-tolerant plants, **oil sprays** can be used to control all stages of scales, including eggs. Summer oils may be effective during the warmer months. Apply dormant oils in winter. **Insecticidal soaps** are another alternative for controlling scale crawlers as well as aphids, mealybugs, whiteflies, thrips, and mites.



photo: Washington State University

Mites are not insects, but their damage and the methods of control are similar to those of insects. They differ from insects in that they have 8 legs, not 6, and have only 1 body region instead of 3. All mites are tiny and usually cannot be seen without the aid of a magnifying lens. **By tapping infested twigs over a sheet of white paper, the dislodged mites are much easier to detect.** They vary widely in color. Some mites spin fine, delicate webbing on the host plant. This webbing is usually easier to detect than the mites themselves.

Spider mites feed by sucking cell contents from individual leaf cells. Initial damage appears as fine light dots on the leaves. A small number of mites usually is not reason for concern but very high populations can cause significant damage.

Mite damage often appears as a **bronzing of the foliage**, which sometimes gives it a dusty appearance. Leaf drop may also occur. As feeding continues, the leaves turn yellowish or reddish and drop off. Often, large amounts of webbing cover infested leaves. Damage is usually worse when plants are under drought stress.

Many kinds of plants are attacked by the **two-spotted spider mite**, and almost all coniferous plants are hosts to the **spruce spider mite**. The **Southern red mite** is primarily a pest on broadleaf evergreens such as azaleas and camellias.

Foliage Feeders (Chewing)

Beetles vary considerably in size, shape, color, and habits but all have chewing mouthparts. One of their most distinctive features is that their front wings are hard or leathery and meet in a straight line down the center of the back.

Beetles may attack any part of a plant and in various ways. Some are typical leaf feeders and bite off pieces of leaf, while others are leaf miners or skeletonizers. With some beetles, the adults and larvae both are leaf feeders on the same plant; other beetles may be foliage feeders as adults and root feeders on other plants while in the larval stage. Some feed during the day and some feed only at night, such as the May beetles.

Beetles



photo: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

The adult **Japanese beetle** causes serious damage to the foliage of many landscape plants.

The larvae stage of the Japanese beetle is a **white grub** that feeds below ground on plant roots and is a serious pest of turfgrasses.



photo: Daniel Herms, The Ohio State University, Bugwood.org

Some beetles, such as the **bronze birch borer**, feed as the larval stage in the cambium of trees and shrubs. This boring activity leaves “galleries” underneath the bark, usually causing serious damage to host plants. Girdled plants usually die.

Caterpillars

Caterpillars are the worm-like immature stages of moths and butterflies. They range in size from tiny to 5 inches long. They usually have a distinct head and 4 pairs of fleshy legs on the middle of the body. The body may be fuzzy, naked and smooth, or spiny.

Caterpillars are primarily foliage feeders and eat out irregular areas or they may entirely strip the leaves. Some caterpillars, because of their special habits, are also referred to as webworms, tent caterpillars, leaf rollers, leaf folders, skeletonizers, bagworms, and leafminers. Some feed as individuals; others feed in groups or colonies.



photo: Steven Katovich, USDA Forest Service, Bugwood.org

Fall webworms build tents at ends of branches. When only a few large caterpillars are present, handpicking is effective. **Webworms and tent caterpillars can either be pruned out or burned out with a torch.** If pruning would adversely affect a plant or if the infestation of any caterpillar is generally distributed over a plant, **a single treatment of an approved insecticide applied when the caterpillars are young** will usually give control.



photo: Daniel Herms, The Ohio State University, Bugwood.org

A group of small moths, usually referred to as **clearwing moths**, cause serious boring damage to certain plants. The active adults often resemble wasps. The larvae bore through the cambial layer, causing stress, decline and, occasionally, death of plants. **Dogwoods, lilacs, and ash are affected by clearwing borers.**



photo: Steven Katovich, USDA Forest Service, Bugwood.org

Sawflies are wasp-like insects and are related to typical wasps, bees, and ants. The larval stages of most sawflies resemble naked caterpillars, but they have more than 5 pairs of fleshy legs on the body while caterpillars have only 4 or fewer pairs. Some sawfly larvae are slug-like in appearance, such as the pear slug and rose slug.



photo: William A. Carothers, USDA Forest Service, Bugwood.org

Most sawfly larvae are foliage feeders that eat the entire leaf but **slug sawflies** are skeletonizers. A few types of sawflies are wood borers or leafminers. These differ further from typical sawflies in that they do not have fleshy abdominal legs. The **most serious sawfly pests in our area are those that attack coniferous shrubs and trees**. They feed in groups and can quickly defoliate a plant. This defoliation often leads to the plant's death. A single application of an approved insecticide is usually sufficient for control.

Borers

Wood-boring insects are among the most destructive pests of ornamental trees and shrubs. Borers are the larvae, or immature stage, of certain moths and beetles. They tunnel and feed under the bark in living wood, destroying water- and sap-conducting tissues. This causes girdling, branch dieback, structural weakness, and decline and eventual death of susceptible plants. Infestation sites also provide entry points for plant pathogens.

Clearwing (moth) and flatheaded borers (beetles) are the two main types that attack woody ornamentals.



photo: Bob Oakes, USDA Forest Service, Bugwood.org



photo: Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org

Flatheaded borers are so named because their first body segment, behind the head, is flattened laterally. The adults are fast-moving, flattened, metallic-colored beetles with short antennae. The whitish, legless larvae make winding tunnels beneath the bark, destroying phloem and cambium and girdling the trunk or branches. The tunnels may be visible externally as spiral ridges or cankers on the limbs or trunks. Unlike clearwing borers,

which expel frass from cracks in the bark, **flatheaded borers pack their fine, sawdust-like frass in their tunnels**. Examples are the emerald ash borer, bronze birch borer, and flatheaded appletree borer.



photo: Whitney Cranshaw, Bugwood.org

Adult **clearwing borers** are delicate, day-flying moths that resemble small wasps. The moths feed only on nectar or not at all, so they do not cause damage. The larvae are whitish, hairless caterpillars with a brown head. There are a number of different species, but **the most damaging clearwing borers are associated with dogwood, lilac, ash, oak, rhododendron, and ornamental Prunus species, including flowering peach, plums, and cherries**.

These groups differ somewhat in their habits and host preferences, but similar management tactics are used for both. The keys to controlling these pests are to keep plants healthy and, if necessary, to treat during those brief times of the year when the insects are vulnerable to insecticides.

Borers rarely infest healthy plants growing in their natural environments. However, **when trees or shrubs are transplanted into the landscape, stresses such as drought, soil compaction, sun scald, or injuries can weaken them and make them more susceptible to attack**. Research has shown that the adults may locate suitable egg-laying sites by responding to volatile chemicals that emanate from stressed trees. **The invasive emerald ash borer is an exception. It attacks healthy ash trees**.

Adult borers emerge from infested trees in the spring or summer. After mating, the females fly to a suitable host and lay eggs on the bark, often in crevices or around wounds. Hatching occurs about 10 days to 2 weeks later, and the young larvae quickly tunnel beneath the bark where they feed and grow. **Once inside the tree, borer larvae are no longer vulnerable to insecticide sprays and are seldom detected until serious damage has been done**. Systemic insecticides can protect some trees and shrubs from attack by some borers.

Several species of clearwing and flatheaded borers can infest landscape plants. While some are attracted to a wide range of hosts, most attack only particular kinds of trees and shrubs. **In order for treatment to be effective, it is important to know when the adults of each species are active and which plants are vulnerable**.

Gall Makers



When some insects or mites lay eggs in tissue, they may inject a chemical into the plant that causes it to grow abnormally, producing a **gall**. Plant parts affected include roots, crown, bark, branches, twigs, buds, and leaves. **Each species of insect or mite produces a characteristic gall on host plants.** With the exception of horned and gouty oak galls, **most galls do not harm tree health.**

Insect Pests of Turf

Lawns often include a variety of insects, some of which are direct pests of grass, or nuisances and pests to humans and pets. Some may be predators or parasites of other insects, or harmless scavengers. Through complex interactions between the insects and other factors, the lawn ecosystem becomes more or less balanced. If we are not satisfied with the balance, we may use maintenance practices to improve our lawns.

However, the solution may trade one problem for another. For instance, fertilization to increase grass lushness may favor the development of certain insect and disease problems. Insecticidal control for one kind of insect may kill predators or alter competition, allowing a different insect pest to flourish. **Often, the side effects of management practices cannot be precisely predicted, so lawn situations need to be monitored over time and maintenance practices modified, if necessary.** Some of these interactions and problems are demonstrated in the case of white grubs as lawn pests in Kentucky.



photo: Alton N. Sparks, Jr., University of Georgia, Bugwood.org

White grubs are the larval stages of scarab beetles such as masked chafers, rose chafer, May beetles, green June beetle, and Japanese beetle. White grubs look more or less alike. They have brown distinct heads and thoracic legs, and the body is whitish, fat, and usually curled into a C-shape. Size varies from 1/8 to 1-1/2 inches long depending on the age and species. The grubs occur in large patches of sod an inch or so below the soil line where they consume the anchoring roots of grass. During dry weather, the infested sod may die for lack of water.

Soil insecticides for white grub control should be applied in August before the grubs cause serious damage. Most instances of control failures are a result of poor timing or techniques of insecticide applications.



photo: Michigan State University Extension

Sod webworms graze baseball-sized patches of grass that turn brown and die. Patches of grass that are clipped off at the soil surface may be numerous and run together to form large dead areas. **Dirty silk tubes containing the inch-long caterpillar or pupa can usually be found in the thatch of killed spots.** The adult stage of the pest is a **small buff moth** that is often seen fluttering over lawns at dusk and at night around lighted doorways about two weeks before larvae become numerous. There are up to three generations per year.



photo: Frank Peairs, Colorado State University, Bugwood.org

Armyworms, including the **true armyworm** and the **fall armyworm**, are characteristic caterpillars about 1-1/2 inches long when full grown. They vary in intensity from year to year, but during outbreaks they may move across an area in army fashion completely stripping grasses in their path. Fescue is more often attacked than bluegrass. These insects are also important pests of grain crops.



photo: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

Various species of **cutworms** occur in turf and some are hard to distinguish from armyworms based on body characteristics. However, they never occur in large numbers as do armyworms.

Beneficial Insects

Beneficial insects can help to regulate pest populations. Predators generally are not very selective and may feed on non-pest species. Some species of wasps and flies are very selective in the prey that they attack including leaf feeding caterpillars and wood boring beetles. Four species of lady beetles feed on soft-bodied insects such as aphids and scale crawlers.



Photo: R. Bessin, University of Kentucky

The pink spotted lady beetle has a medium-sized, oblong pink to red body marked with black spots. Adults and larvae are important aphid predators but they also eat mites, insect eggs, and small larvae. Unlike most lady beetles, plant pollen may make up to 50% of the diet.



Photo: R. Bessin, University of Kentucky

Multicolored Asian lady beetle is a large orange lady beetle with a variable number of spots. It can be recognized by the black 'M' on the white segment over the head. Aggregations of these insects find their way into homes in the fall, where the beetles are a nuisance. Their secretions can ruin rugs and other furniture. Fortunately, they do not breed or feed inside the home.



Photo: R. Bessin, University of Kentucky

The convergent lady beetle is an important natural enemy of aphids, scales, thrips, and other soft-bodied insects. It will also feed on pollen and nectar from flowers when prey is scarce. Larger larvae are voracious feeders and may consume between 30 and 50 aphids per day.



Photo: R. Bessin, University of Kentucky

The seven-spotted lady beetle is a medium-sized, orange beetle with seven black spots. It is a European species that was introduced into the US to aid in managing some aphid pests.



*Jumping spider with grasshopper
Photo: Black Diamond Pest Control*

Spiders are general predators that feed on many types of prey including pest and beneficial species.



Beneficial wasp laying its eggs in a caterpillar
Photo: S. Bauer, USDA

The larvae of many beneficial wasps develop in the bodies of caterpillars. Adult wasps can be very selective when choosing prey.

Other Pests



Worm castings on golf course
(Penn State)

Earthworms and nightcrawlers are not insects but they can be abundant in soil. These annelids help to recycle organic matter and their burrows allow oxygen and water to enter the soil more easily. However, when many are present, their activities and casting can cause the surface to be very lumpy. In addition, new species (green stinkworms, Asian yellowworms) are beginning to appear in some locations. These worms can cause significant problems in lawns, athletic fields and on golf greens.

Earthworms and night crawlers are generally found in the top 12" to 18" of the soil because this is where food is most abundant. They swallow soil and organic matter and grind it in the gizzard section of the digestive tract. Undigested material (castings) is used to line the burrow or is eliminated on the surface. They are most active when the soil is warm and moist. The worms move deeper as the soil dries in summer. Control strategies for these pests are being developed.



photo: Alfred Viola, Northeastern University, Bugwood.org

Skunks damage turf when they discover abundant white grub populations. Skunks dig through the sod and feed on the white grubs, thereby uprooting the sod and aggravating the damage already begun by the grubs. Skunks also may spray a disagreeable smelling substance on unwary people or pets who disturb them.



photo: Terry L. Spivey Photography, Bugwood.org

Birds, especially crows, starlings, and grackles, commonly tear up infested turf in search of grubs. Flocks of blackbirds frequenting a turf site, or holes left in the turf by their beaks, may indicate a grub problem.



Moles feed primarily on earthworms, but they may also feed on white grubs, wireworms, beetles, and many other invertebrates. They do not feed on plant roots or other underground plant growth.

However, as they tunnel along in their surface runs, moles damage turf roots and may destroy newly seeded lawns. In established turf, the mower may skin the tops of the runs and dull the mower blade as well as create gaps in the sod. Moles also tunnel deep, throwing the excavated soil out of surface openings, thus forming molehills.