

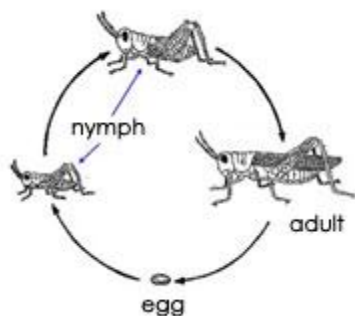
Agricultural Insect Pests

Insects and Other Arthropods

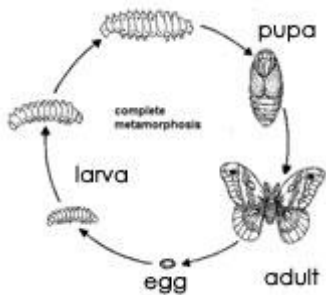
Insects, spiders, scorpions, millipedes, centipedes, ticks, and mites are arthropods. They have hard external skeletons and segmented legs and bodies. Most insects have 3 main body regions and 3 pairs of legs; they are the only arthropods that can fly.

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

Piercing-Sucking

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.



photo: Herb Pilcher, USDA Agricultural Research Service, Bugwood.org

Stink bugs are sap feeders that are attracted to a variety of cultivated crops and weeds. Soybeans are a favorite late summer host, and dramatic growth in soybean acreage during the recent years has contributed to steadily increasing numbers of these insects. The principal damage comes from loss of plant fluids, injection of digestive enzymes that can deform plant parts or kill developing seeds. Feeding wounds can provide entry points for plant pathogens.



photo: Jim Occi, BugPics, Bugwood.org

Aphids are soft-bodied insects that use their piercing sucking mouthparts to feed on plant sap. They usually occur in colonies on the undersides leaves and on tender terminal growth. Heavily-infested leaves can wilt or turn yellow because of excessive sap removal. Some aphids produce lots of liquid waste (honeydew) that supports the growth of sooty mold. This can reduce yield quality. Some aphids can move virus diseases from infected to healthy plants.

Chewing

Chewers include caterpillars and beetles. They feed on leaves, fruit, or grain. 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.).

Caterpillars



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

The **armyworm** is a common early season pest that occasionally causes significant damage in corn, wheat, or pastures. Infestations usually develop in fields of small grains, pastures, or in crops planted into grass cover crops. These insects chew inward from leaf edges. Moths lay masses of eggs on grasses so large numbers of the worms can be present in "hot spots" in fields. After eating all of the plants in an area, large numbers of armyworms will crawl as a group in search of food plants. Cool, wet, spring weather usually favors armyworm development.



Photo: Phil Sloderbeck, Kansas State University, Bugwood.org

The **fall armyworm** looks similar to the armyworm but cannot survive the winter in Kentucky. Moths arrive from the Gulf Coast states in mid-summer and lay eggs on late-planted whorl stage corn. Large larvae eat large amounts of leaf tissue leaving ragged leaves, similar to grasshopper damage. The worms usually found deep in the whorl often below a "plug" of yellowish brown frass. The frass protects them from insecticide applications. Plants often recover from whorl damage without any reduction in yield unless the caterpillars feed on developing ears.



Daren Mueller, Iowa State University, Bugwood.org

The **green cloverworm** is one of the most common leaf feeding insects in Kentucky soybeans. However, it rarely reduces yield because of the soybean plant's ability to compensate for foliage losses.

The slender, light green caterpillars have three pairs of white stripes that run the length of the body. There are three pairs of legs near the head, three pairs of fleshy legs near the middle of the body, and a pair of fleshy legs at the tail end. Most soybean caterpillars have four pairs of legs near the middle of the body. GCW larvae wiggle violently when disturbed.



R. L. Croissant, Bugwood.org

The **corn earworm**, also called the **soybean podworm**, is common in corn and soybean fields. The caterpillar feeds in the tips of corn ears damaging some kernels but control is usually not practical. However, this insect **can cause significant yield loss in late-planted soybeans where it feeds on pods**. Pod feeding directly reduces yield and is much harder to notice than leaf feeding.



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The **black cutworm** is an early season pest that can cause stand loss in corn and tobacco **fields that had significant infestations of winter annual weeds prior to planting**. Cutworm moths lay their eggs on weeds. The larvae feed on crop seedlings when the weeds are removed by herbicide application or tillage. **Cutworm problems tend to be worse when wet springs allow weed growth and delay planting**. Cutworms feed mostly at night and hide during the day under clods of soil or in burrows below the soil surface. Regrowth of cut seedlings is possible in some instances in corn depending on where the damage occurred relative to the growing point.

Beetles



The **Japanese beetle** feeds on many plants, including corn and soybeans. These insects will congregate in corn fields during pollination. There is concern that **silk feeding** by this insect can interfere with pollination. Pollination can occur as long as there is at least one-half inch of silk present during pollen shed. Large numbers of adults also will feed on soybean leaves, especially in fields where smartweed is present.

The **larval stage of the Japanese beetle is a white grub that feeds below ground on plant roots**. Females usually lay their eggs in pastures and grassy areas but may deposit some in corn and soybean fields. The grubs do most of their feeding in late summer. There is rarely enough damage to the root systems of these crops to affect yield. The grubs feed little, if any, in the spring so there is no danger to crops planted the following year.



photo: Virginia Polytechnic Institute and State University

Wireworms are the larval stage of other beetle species that will feed on seeds and tunnel into plant stems. They are **most common in crops planted into sod or grassy fields**.

Rasping



photo: Whitney Cranshaw, Colorado State University, Bugwood.org

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



Joseph Berger, Bugwood.org

Slugs are soft-bodied non-arthropod creatures with rasping mouthparts that destroy seedlings in reduced tillage fields that have a significant amount of crop residue on the surface. The residue, such as corn stalks, provides food and shelter. Slugs are active during cool, moist periods in the spring and move below ground as the soil becomes warmer and drier. Molluscicides, pesticides that are toxic to slugs, may provide some control.

Beneficial Insects

Beneficial insects play an important role in regulating populations of crop pests. Parasitic wasps and flies hunt and attack specific caterpillars. Four species of lady beetles feed on aphids in Kentucky's major crops. General predators like spiders and damsel bugs eat what they can catch but also have an impact on pests.



Robert M. McPherson, University of Georgia, Bugwood.org



Lenny Wells, University of Georgia, Bugwood.org



Frank Peairs, Colorado State University, Bugwood.org

Vertebrate Pests

Birds, moles, raccoons, deer, or other animals may eat or injure agricultural or horticultural crops. The usual management strategy is to keep their numbers to a level where the damage or injury is economically acceptable. **Local and state laws may prohibit the killing or trapping of some vertebrate animals without special permits. Before you begin a control program, check with local authorities.**

Methods of vertebrate pest control include: mechanical control, baits, sanitation, and exclusion. Few pesticides are available for control of pests other than rodents and most of them require special local use permits. Most are applied as baits. Examples of chemicals used to control vertebrate pests include rodenticides and avicides (birds).