

Diagnosing Apple Problems During Fall Harvest Season

In the fall of the year people are harvesting the fruits of the gardening season. However, sometimes the harvest is neither the quality nor abundance we would like. Apples have many potential problems that can accumulate during a lengthy growing season. A few problems, such as the bruises and broken skin caused by a hail storm, are difficult to avoid. However, insect and disease problems can be dealt with quite effectively. A key to proper protection of apple fruit is to understand that there are many very common pest problems of apple and that effective control of these pests requires correct diagnosis of the insect or disease that causes the damage. While the harvest time of the year is too late to protect this year's apple crop, it is the ideal time to identify the problems present in your garden so that you can deal with them effectively in the future.

No specific control recommendations are provided in this web article, but we refer you to University of Wisconsin – Extension's publication *Apple Pest Management for Home Gardeners*.



These apples (L and C) are typical representatives of the quality of fruit that can occur if the trees are not protected from pest and disease problems throughout the year. Apples that drop from the tree prematurely (R) may be infested with insects such as codling moth and apple maggot.

Common Apple Diseases

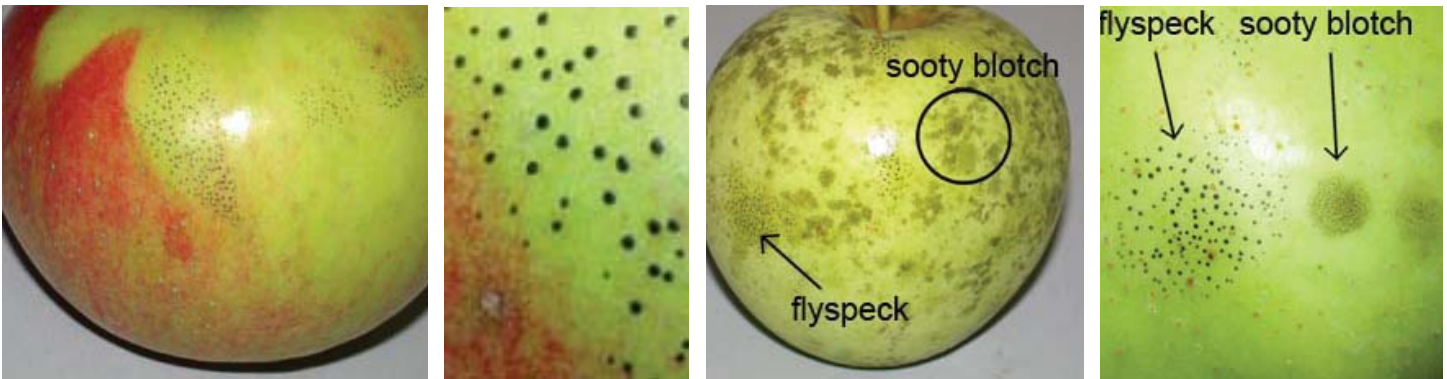
Apple scab. Apple scab is a fungal disease; it is common wherever apples are grown. The fungal spores are carried on the wind and fungal colonies can develop on foliage and on fruit. Scab lesions



The apple scab fungus can result in small, smooth grey lesions or heavier damage that results in fruit splitting.

may be relatively small and few in number, but often unprotected fruit will have very large scab lesions that may crack open, exposing the apple flesh to secondary rotting organisms. On unprotected trees, literally 100% of the fruit can be damaged. Apple scab can start occurring on leaves early in the season, before bloom, and very young fruit can be infected during and immediately after the blossom period. Apple scab resistant cultivars are available, but if you have scab-sensitive varieties, you must protect the foliage and fruit with fungicides starting before bloom.

Flyspeck and sooty blotch. Flyspeck and sooty blotch, sometimes called “summer diseases”, are caused by several different species of fungi. Fruit become infected starting in mid June, but symptoms are not usually visible until late August or September. These diseases are favored by high relative humidity and dewy nights, which are common in late summer. The fungi grow superficially in the waxy cuticle of the skin of the fruit, and in some cases can be wiped or washed off. The symptoms are primarily cosmetic and do not affect the inner quality of the apple; affected fruit are safe to eat. The term “flyspeck” refers to the appearance; the spots are not at all related to insects or insect activity.



Flyspeck (circular areas of small black spots) and sooty blotch are caused by various types of fungi. Symptoms are on the surface of the fruit and the fruit are safe to eat. Photos by Patty McManus.

Common Apple Insects

Apples can be attacked by insects throughout the entire growing season, from shortly after pollination until harvest. The larval stages of two insects, codling moth and apple maggot, actually tunnel through the fruit resulting in decay. Other insects feed at the fruit surface, leaving scars which often are at the surface only.



The adult plum curculio is a bit less than ¼” long, mottled brown, bumpy, and with a distinct snout.

Plum curculio. This insect causes damage both early and late in the growing season. Overwintering plum curculio beetles emerge from hibernation about the time fruit trees such as apple and plum are blooming. For about 2-3 weeks immediately after pollination, when the fruit are still small, females lay eggs within the developing fruits of stone fruits (such as plum) and apples. Although females lay eggs within apple fruit, apple is not a good host plant for this insect and the growing



apple fruit kills the egg or very young larva. Therefore, the injury to apple is primarily caused by the physical act of egg-laying. The female cuts a crescent-shaped slit about 1/8-3/16” across and lays her egg at the base of the resulting flap of flesh.

The crescent-shaped egg-laying scar seen shortly after it was created, early in the season. Although this is a plum fruit, the scars look similar on young apples.



These surface scars were created early in the season when the fruit were small. As the fruit grew, so did the scars.

This is a physical injury to the fruit surface, and young fruit can heal this wound and continue to develop normally. However, a surface scar will be visible at harvest. Usually beneath the surface the fruit is sound and edible.

From mid summer to early fall, the next generation of adults are preparing for hibernation and will feed from the surface of apple fruit. The damage typically consists of small, rather symmetrical round holes about 1/8-3/16" in diameter and about the same depth, often near the stem end of the fruit. Such holes can be attractive to other insects such as yellowjackets and multicolored Asian lady beetles.



Late in the growing season, adult plum curculios chew round holes in apples, often near the stem end of the fruit. L photo by Phil Pellitteri.

Codling moth. This is the proverbial "worm in the apple." It is the most serious insect pest of apple worldwide and is very common throughout the United States. In Wisconsin, there are two generations per year, from late spring into early summer, and late summer into fall. Damage is very diagnostic. The eggs are laid externally and the very tiny young hatchling larva tunnels into the fruit to the core area where this insect prefers to feed. Most of the damage is to the seeds and surrounding tissues in the



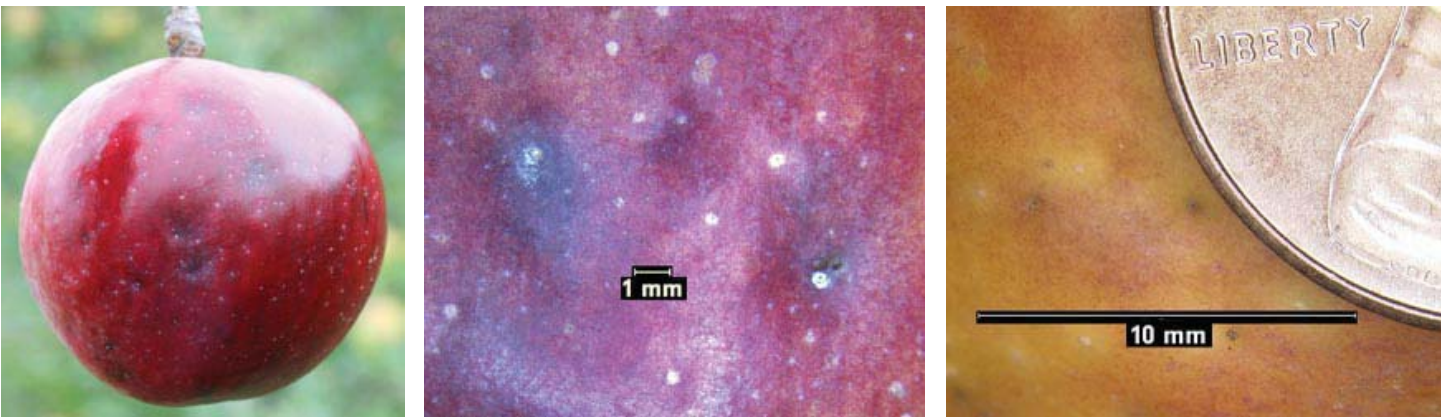
Codling moth waste material (frass) may accumulate at the surface of the fruit, often at the flower end.



Larval feeding by codling moth is mostly in the core area.

core, but some feeding can occur outside this area. There is always a tunnel to the outside, through which the larva pushes waste material (frass) that accumulates on the fruit surface until it weathers. Often this tunnel opens at the flower end of the fruit, but it can go out near the stem, or anywhere on the side of the fruit. Infested fruit often fall from the tree. Larvae can still be in fruit well into September. When fully grown they are about 1/3" long and cream to pinkish in color.

Apple maggot. This insect has also been called railroad worm because of the tracks made through apple fruit. Apple maggot is a summer and fall pest. Eggs are laid from early July into September. To lay an egg, the female fly punctures the surface of the fruit with a hole about the size of a pinprick; just one egg is laid at a time. Soon after the egg hatches, microbial action starts to cause a small amount of decay. From the outside, this can appear as a slightly darkened, slightly sunken spot, often with a tiny pinhole near the center. Often, more than one larva occurs per fruit. These tunnel throughout the flesh of the fruit, resulting in an uneven surface and brown trails internally. Infested fruit often drop from the tree. Eventually, the entire fruit rots. When young the larvae are very tiny and nearly transparent, making them very difficult to see. Indeed, a fruit infested with a few very young larvae may look perfectly normal



The tiny punctures are where eggs were laid. Note that the area may appear sunken and darkened.



Early in an infestation of apple maggot, the fruit may appear relatively sound, with just a few faint brown trails.

Eventually, the fruit become substantially rotted when infested by apple maggot.

except for a few faint brown trails internally. Later the larvae are cream colored, without apparent legs or head, and about 3/16" long when fully grown.



Apple maggots are pale colored and about 3/16" long when fully grown.

Leafrollers and other caterpillars.

There are several types of caterpillars that can feed on both foliage and fruit. Usually, the fruit feeding is at the surface, which creates a scar that will be seen at harvest. These caterpillars are the larvae of various types of moths. In Wisconsin, these include two primary groups, leafrollers and fruitworms. Leafrollers are small (usually no more than 1/2" long). The body color varies from pale cream to pale yellow to pale green. The color of the head can be yellowish, brown, or black. A larva will use silken webbing to fold over a leaf or tie it to another leaf or a fruit. This creates a protected retreat for the insect, where it will feed on either the leaf or the fruit surface or both. Fruitworms are larger, up to an inch when fully grown, with a fairly stout body that is usually green in color. They do not fold leaves like leafrollers, but they do feed both from leaves and fruits. Other types of caterpillars may also be present in apple trees and cause similar damage.

Most of these caterpillars are active early in the growing season; many hatch from eggs before or during bloom and feed on foliage until fruit begin to develop. They may then feed on young fruit. Smaller caterpillars feed more on the surface; larger ones may eat deeper holes into the fruit. Unless the holes are deep enough to go to the core area, the young fruit will usually be able to heal its wound and continue growth. At harvest time, these early injuries result in smooth or slightly corky tan or yellowish scars at the fruit surface. There may be a slight depression or a deeper hole. However, if no other insects or pathogens are acting, the flesh of the fruit should be sound and useable.

There may also be caterpillar feeding later in the year, from mid summer to early fall. Such late season damage usually becomes infected with microorganisms that cause fruit decay, possibly affecting the entire fruit.



These three apples were damaged by caterpillars such as leafrollers or fruitworms early in the growing season. Generally with such damage, the majority of the apple remains useable.

Tarnished plant bug. Tarnished plant bug is a small insect with piercing mouthparts that puncture the surface of the apple allowing the insect to suck moisture and nutrients. The hole is about the size of a pin prick. Tarnished plant bug injury is usually done early in the season when the fruit are small. The



These narrow conical pits were caused by tarnished plant bug when the fruit were small. Most of the apple will be useable.

Multicolored Asian lady beetle. This lady beetle is beneficial through much of the growing season in that it feeds on aphids and other pests. However, late in the year it seeks sources of sugar to build reserves to survive the long winter, and fruits are a good source of such nutrients. Although commonly seen feeding on apples, studies have shown that this insect will usually not break the skin of apples. However, they will take advantage of injuries caused by other factors, such as birds or plum curculio adults.

fruit continues to grow naturally, except the very small area where the feeding occurred. As the apple grows, the damaged area becomes a narrow conical pit. The damage does not usually cause decay and most of the fruit is useable.



Multicolored Asian lady beetles will take advantage of already-damaged fruit but generally are not the cause of open wounds. The remainder of damage to this apple is from the apple scab fungus.

– Dan Mahr, UW-Extension Fruit Entomologist, and Patty McManus, UW-Extension Fruit Plant Pathologist, University of Wisconsin - Madison. All photos by Dan Mahr except where noted.

Additional Information:

Apple Pest Management for Home Gardeners – University of Wisconsin-Extension publication A2179 at learningstore.uwex.edu/pdf/A2179.PDF