

**Leaf and Stem Feeding
Aphids**

Order:

Homoptera (aphids, white-flies, scales, mealybugs, cicadas)

Family:

Aphididae (aphids)

Metamorphosis:

Simple (egg-nymph-adult)

Mouthparts:

Piercing-sucking in nymphs and adults

Leaf and Stem Feeding Aphids

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Aphids are widespread in temperate zones and occur on most plants at non-injurious levels. All aphids suck plant sap from conductive tissue, and plant response varies from no effect to localized discoloring of leaf or stem tissue (chlorosis) to severe reduction of plant vigor, leading to death. Some plants produce leaf, stem, or petiole distortions called galls in response to aphid feeding. Natural enemies and plant tolerance maintain most aphid populations at non-injurious levels. Some species are at

times injurious because outbreaks may occur under favorable environmental conditions or because the feeding activity of the aphid induces extreme plant harm on a highly susceptible plant.

Body Form

Egg: Eggs are laid singly or in small clusters. They are round, typically translucent, and the surface is smooth without ridges or other markings. In some species, eggs are not laid, and females give birth to live young. When eggs occur, they are typically laid at the end of the growing season on a plant host where the eggs will pass the winter. For all species, live birth is common during the spring and summer.

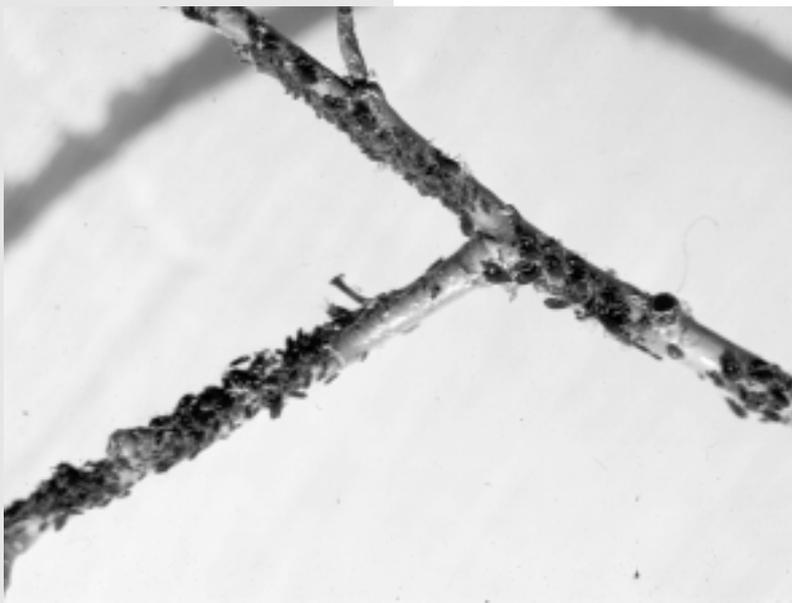


Figure 1. Giant willow aphid.

Nymph: Nymphs range in size from less than 1/16 inch (e.g., newly born aphids) to about 1/4 inch in length (e.g., adults giant conifer aphids or giant willow aphids). Nymphs are pear-shaped, and a pair of tubular structures of variable length called cornicles extends from the body wall near the anus. Nymphs are wingless, but wing pads may be visible on those individuals that will mature into winged adults.

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Adult: Adults have the same basic characteristics as nymphs with the exception of wings, if present. Adults may be winged with a hardened and darkened thorax to support the wing structure. Non-winged adults are more uniform in color and do not have a hardened thorax.

Life History

Commonly in this region and for most species of aphids, only female aphids occur during the spring and summer. They reproduce asexually and give birth to live young. Both winged and wingless females may be produced. The formation of winged individuals may be triggered by changes in host quality, day length, or other environmental cues. Young will mature to adults in about 10 to 14 days depending upon weather; therefore, multiple generations will occur during the growing season. During the growing season aphids feed on annual plants and new growth (expanding leaves and stems) of perennial trees and shrubs. Some aphids, such as the green peach aphid, thrive on



Figure 2. Plant responses to aphid feeding. Spotty discoloration with aphids.

many unrelated plants and have therefore become endemic pests in garden and greenhouse settings. Most aphid species occur on a single host plant species or a closely related group of plants, or alternate generations between two unrelated host plants during seasonal changes of plant growth and occurrence.

For those that alternate hosts, woody perennial plants are typically the overwintering hosts and annual plants are the summer hosts. Often these hosts are specific for a particular aphid species (e.g., the sugar beet root aphid occurs on beets and many garden plants in the spring and summer but only on narrow-leaved cottonwood in the fall and winter). At the time of host alternation, major production of winged aphids occurs. Both winged females and males are produced when switching from the annual to woody perennial host at the end of the growing season. The aphids mate and produce overwintering eggs on the woody host. In the spring at about the time of initiation of new plant growth, eggs hatch and nymphs begin feeding on the elongating stems and leaves. After several generations and production of winged individuals, migration to annual hosts occurs. Usually only females occur at this time, and they give birth to live young. An example of a host-alternating aphid is the poplar vagabond aphid which uses cottonwood, aspen, and other *Populus* species as its overwintering host and unknown annual hosts, possibly members of the primrose family, as its summer host.

Aphids that occur on only one host or a closely related group of plants may produce eggs for overwintering or may overwinter in the nymphal or adult stages. An example of an aphid that occurs only on closely related plants is the Russian wheat aphid. This aphid occurs on barley, wheat, and several non-cultivated grasses.

Plant Injury

Plant response varies from little to no apparent injury (such as limited localized discoloration of leaf or stem tissue), moderate reduction of plant vigor due to more extensive discoloring, and loss of photosynthetic capability, to more severe damage, leaf curling, and production of leaf and stem distortions on new growth called galling. All stages of plant development and leaf maturity are susceptible to aphid attack to some degree, but aphid feeding on new growth results in the most visible plant responses. In addition to plant injury, aphids produce large amounts of sugary excrement called honeydew. Excessive honeydew may result in nuisance amounts dripping from trees and growth of sooty mold.

Galling is the most distinctive plant response to aphid feeding. Galls may vary in size, but they are usually very characteristic in form for a particular plant/aphid species combination. In these cases, the gall is often the first noticed indication of aphid presence and is diagnostic of a particular aphid species. As the aphid feeds on elongating stems and leaves, the plant responds by growing around the feeding site, enclosing the aphid within a



Figure 3. Plant responses to aphid feeding. Severe streaks of discoloration with aphids.

characteristic gall. The galling activity is actually beneficial to the aphid because the aphid can feed and reproduce within the protected environment of the gall. Although possibly alarming in appearance, galls usually do not adversely affect overall plant health, but may change plant growth patterns. Because the galls occur on new growth, secondary growth adjacent to the affected shoot will become dominant, resulting in a denser pattern of plant branching. This dense pattern of growth may not be desired, particularly in young woody perennials. If galls occur on the main stem of an annual plant, apparent severe deformity of the growth pattern may occur. Honeydew is of little concern because it is largely contained in the gall.

Management

Some species of aphids become significant pests due to their great potential to rapidly increase in number and/or due to high plant susceptibility to aphid feeding.

When human intervention to control aphids is needed, control choices depend on the type of plant response that occurs and tolerance of these aphids and plant response.

For aphids in which feeding activity results in galls, determine whether the altered pattern of plant growth is tolerable or not. Likewise, determine whether the physical presence of the galls is an undesirable feature. In situations where the aesthetic value of the plant is not important, such as with wind break plantings, aphids that produce galls on trees can usually be tolerated in high numbers on mature healthy trees without adverse consequences to plant health. For aphids that reduce plant vigor but do not create galls, determine if some reduction of plant vigor and presence of honeydew can be tolerated.

Several non-insecticidal methods of control can reduce aphid populations. For aphids that produce galls, gall removal can be an effective control measure. Re-



Figure 4. Plant responses to aphid feeding. Stem gall on cottonwood caused by *Pemphigus* spp. gall aphids.

moval of the galls must be timed when the aphids are still feeding within the gall, usually during early- to mid-season plant growth. Aphid presence can be confirmed by cutting into the gall. Later in the season, there are usually openings in the gall where aphids have emerged. For gall-forming and non-galling aphids, some cultivars of the same plant species are less susceptible to aphid feeding than others. When planning a garden, landscape, or other planting, choose cultivars that have a history of vigorous growth in your area.

Aphid natural enemies often will cause high aphid mortality mid- to late-season. These natural enemies include syrphid flies (hover flies), lacewings, lady bird beetles, and parasitic wasps. These natural enemies are less effective against gall-forming aphids.

If use of insecticides is considered, several options are available. Contact insecticides kill when the toxins directly contact the pest and can be used during any time of year on aphids that feed and are exposed on the plant surface. If contact insecticides are used on gall-forming aphids, the insecticide must be sprayed at the time of terminal expansion (new growth) in the spring and summer. At this time the aphids are exposed on the new growth and the gall has not yet enclosed them. Expanding stems and leaves should be inspected for aphid activity soon after initiation of new growth.

Available contact insecticides vary greatly in activity. Activity of insecticidal soaps and oils is limited to soft-bodied insects

such as aphids, mealybugs, and whiteflies. Other insecticides have much broader spectrums of activity that affect many more species of insects, including both pest and beneficial insects. The label on the product will provide you a list of insects controlled.

Systemic insecticide activity results when the product is translocated through plant conductive tissue to the region where the aphid is feeding. The aphid comes in contact with the insecticide while it is feeding on plant sap. Therefore, these insecticides function equally well on gall-forming and non-galling aphids and other insects that predominantly feed on new growth. Systemic insecticides are injected into the soil for root absorption or injected directly into the tree. A few products have foliar systemic activity (that is, they are absorbed through the leaf surface).

There are differences in insect activity of all insecticides, and plants may be negatively affected by these products. After reading all product precautions and recommendations, it is advisable to apply a test amount of insecticide on a few plants or tree limbs to determine insect efficacy (ability to kill the target insect) and plant susceptibility (for example, some oil-based products may burn leaves of sensitive plants).

Some other types of arthropods (insects and eriophyid mites) induce gall formation. Generally, plant health effects and management considerations are similar to those of gall-forming aphids. Often the insect is identified by the characteristic



Figure 5. Plant responses to aphid feeding. Leaf galls on cottonwood caused by Poplar vagabond aphid.

form of the gall. Information about a particular species will assist in making a specific management decision.

Sources of further information

Insects that Feed on Colorado Trees and Shrubs (PSIS-4) and *Management Recommendations for Insect Pests of Trees and Shrubs* (PSIS-5) are available from the University of Wyoming Bulletin Room, Merica Hall (307-766-2115). These guides provide specific life history information on many types of aphids. Information on the beneficial insects and selected other aphids mentioned in this bulletin can be found on fact sheets in the bulletin series *Pest and Beneficial Insects of Wyoming's Principal Crops*, B-1013. Other guides on aphid pest management are available from various sources. University of Wyoming or Wyoming Department of Agriculture representatives may be of assistance in locating literature.

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