



Aphids & Their Relatives

O & T Guide [O-#01]

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Aphids are familiar, soft-bodied, pear-shaped insects with tremendous reproductive potential. As sap feeders, they can cause plants to wilt or seedlings to die; their excess fluid waste, called honeydew, attracts a variety of hungry flies, ants, wasps, bees and even rodents. Some species cause growth distortion or galls on their hosts, while others are vectors of certain plant pathogens. As a group, they demonstrate such a variety of host preferences and survival strategies that no generalized account can describe them adequately. Only a few common species affecting ornamentals are discussed below.

Scientifically: The insects in this fact sheet are all members of the Order Hemiptera, Suborder Sternorrhyncha. This classification may be quite different from that found in older entomology texts, yet it reflects recent revisions in certain insect orders and newer and accepted views on relationships among members of the order. The suborder name aptly describes the location of the mouthparts for aphids and their relatives---on the underside of the head and projecting between the bases of the first pair of legs, a feature that would require high power magnification to see clearly. All of the aphids described below belong to the family Aphididae with the exception of *Adelges*, the Cooley spruce

gall aphid, which is a member of the Adelgidae (pine and spruce aphid family).

Metamorphosis: Simple

Mouth Parts: Piercing-sucking

Pest Stages: Nymphs, adults



Wingless adult green peach aphid, *Myzus persicae*. Note the cornicles on the abdomen. Photo: Whitney Cranshaw, Colorado State University, www.forestryimages.org

Life Cycle: Over the course of a year, different species of aphids can have life cycles ranging from simple to elaborate. An example of a simple life cycle is described here:

For most species found on woody ornamentals, the egg is the overwintering stage. Laid in small clutches on the bark of their perennial host, these eggs hatch in spring, producing female nymphs that mature usually within a couple of weeks.

These female adults reproduce parthenogenetically, that is, without males and mating. They also give birth to living young (called vivipary), producing one to many female offspring daily for an average 30-day adult life span. The first few generations usually consist of wingless individuals (all female) but eventually, crowding occurs and winged aphids (also female) are produced. In many species, these winged forms migrate to a different host species where reproduction involving parthenogenesis and live birth continues. As fall approaches, winged aphids are produced; these migrate back to the original perennial host, where they produce a single generation of both male and female aphids. After mating, overwintering eggs are produced and the parent aphids die. With short life cycles, all female populations and live births extend over a 30-day adult life time, tremendous populations of aphids build up very quickly on host plants.

Description of Life Stages:

Egg: Eggs are retained for internal development in parthenogenetic females. For those species overwintering on the bark of perennial hosts, eggs are minute, nearly spherical and usually dark gray or black. Some species scatter their eggs while others lay them in lines or small clusters.

Nymphs: Nymphs have globose to pear-shaped bodies with 3 pairs of thoracic legs, relatively long, thread-like antennae, small, paired compound eyes and a pair of tubular projections (cornicles) on the rear of the abdomen. Most are slow-moving, spending most of their time feeding. Some species are bare while others are covered by a fine dust or filaments of white wax

produced by glands in their integument. Nymphs are various colors, depending upon species and sometimes hosts. Most are wingless; external wing buds may be visible in larger, older nymphs.

Adult: Most are wingless, looking like larger versions of nymphs; adults can reproduce, however. Parthenogenetic females give live birth to at least several nymphs daily for about 30 days in some species. Winged adults have two pairs of usually colorless wings; their hind wings are slightly smaller and shorter than their forewings. Aphids are usually green, yellow, black, brown, red, or pink, but may be almost any color, depending upon species and sometimes host plant. Veins on the leading edge of the forewing may be enlarged and black. Mouthparts are often absent on the last fall generation of aphids that will mate and lay overwintering eggs.

Habitat and Hosts: With over 1,000 described species in America north of Mexico, aphids exhibit a variety of habits, habitats and hosts. Indeed, nearly every species of ornamental grown in New Mexico nurseries, greenhouses, or anywhere outdoors will have at least one aphid or aphid relative that will use it for a host. Some aphids (e.g. Russian wheat aphid) are known from parthenogenetic populations of females only; presumably, these continue to feed over the winter in protected areas (roots?) of their hosts. Some common aphid species in greenhouses can continue parthenogenetic reproduction all year long, aided by warmer temperatures, availability of well-fertilized, succulent hosts and artificial lighting. Many other common aphid species overwinter as eggs on the bark of woody perennials but spend their summers on other species or herbaceous hosts.

Some species of aphids use very few species of hosts year-round; giant willow aphids (*Tuberolachnus salignus*) use only willow, rose aphids (*Macrosiphum rosae*) use various roses, ivy aphid (*Aphis hederae*) only English ivy, and conifer



Rose aphids, *Macrosiphum rosae*, on a rose bud. Overwintering eggs for rose aphids, *Macrosiphum rosae*, also on rose. Photos: Whitney Cranshaw, Colorado State University, www.forestryimages.org



Rose aphids, *Macrosiphum rosae*, on a rose bud. Overwintering eggs for rose aphids, *Macrosiphum rosae*, also on rose. Photos: Whitney Cranshaw, Colorado State University, www.forestryimages.org

bark aphids (*Cinara* spp.) are associated only with various pines, firs, spruce, etc. Other aphids have rather strange host affiliations; the introduced (from Europe) bright orange oleander aphid, *Aphis nerii*, is a common but apparently non-damaging pest of oleander, but it also does well on

milkweed. Quite a few species of aphids or close relatives of aphids use very different hosts for overwintering and the summer. The curly leaf aphids (*Prociphilus* spp.) on ash foliage in the summer use roots of fir during the winter. Woolly apple aphid (*Eriosoma lanigerum*) causes woody galls on twigs, branches and roots of apple, hawthorn, mountain ash and pyracantha; it may overwinter as nymphs or adults on the roots of plants in the rose family or possibly as eggs on American elm if it is present. Melon or cotton aphid (*Aphis gossypii*) and green peach aphid (*Myzus persicae*) have extensive host ranges, covering dozens of species in dozens of plant families. These latter two are probably the most common and persistent pests of plants grown in greenhouses.



Giant conifer aphids, *Cinara* sp. on pine twig. Note the ants tending these aphids. Photo: E. Bradford Walker, Vermont Department of Forests, Parks and Recreation, www.forestryimages.org

Among the gall-making aphids and their relatives are: *Colopha ulmicola*, producing a cockscomb gall on elm foliage, *Pemphigus populitransversus*, producing a leaf petiole gall on poplar and cottonwood and the vagabond aphid, *Pemphigus vagabundus*, that produces a bunchy-leaf gall on foliage of poplar and cottonwood. Conifers also may be affected by these

pests; Cooley spruce gall aphids, *Adelges cooleyi*, create galls on spruce that resemble multi-chambered cones.

Damage: Aphids damage their hosts directly by removing sap, sometimes causing hosts to wilt. Salivary enzymes (proteins) injected into hosts during feeding can clog the vascular systems of some plants or injure surrounding tissue, causing yellowing spots, distorted growth or even necrosis (tissue death). Severely damaged foliage may fall from the plant, making it unsightly or unsaleable. Lost



Oleander aphid, *Aphis nerii*, with predatory coccinellid larvae. Photo: Anne W. Gideon, , www.forestryimages.org



Ash leaf-curl aphid, *Meliarhizophagus fraxinifolii*, on the underside of an ash leaf. Photo: Lacy L. Hyché, Auburn University, www.forestryimages.org

foliage may allow parts of the plant,

including buds, flowers or fruit, to sunburn. Lost foliage results in loss of photosynthetic machinery for the plant; perennials may not be able to compensate for the loss of sugars that should be stored, especially late in the growing season.



Woolly apple aphid, *Eriosoma lanigerum*, on an apple twig. Their white waxy filaments have been partially removed to expose the aphids. Photo: Joseph Berger, , www.forestryimages.org

Alternatively, plants may expend additional energy to produce a new flush of foliage. Some species of aphids are well known vectors (carriers) of certain plant viruses. Often carried on the insect's mouthparts, the viruses are spread by winged aphids landing on plants and probing them with their feeding stylets. Aphids consume large quantities of plant sap, a rather dilute source of nutrients. Thus, they excrete tremendous amounts of liquid sugary wastes, called honeydew. Honeydew can leave a shiny residue on plants as well as make them sticky to the touch. Honeydew can be an attractive food source to a variety of insects such as ants, bees, wasps and flies. In high humidity conditions, it can also serve as a substrate for the growth of sooty mold fungi that blacken foliage, often causing the foliage to fall off affected plants.

IPM Notes: Aphids are hosts for a variety of predatory insects and spiders including minute pirate bugs, predatory stink bugs, damsel bugs, smaller assassin bugs, big eyed bugs, syrphid flies, many species of lady beetles and others. They are also targets for several genera of small parasitic wasps in the families Aphelinidae and Braconidae. Given enough time, these beneficial insects often can significantly reduce aphid populations on plants; however, host plants may incur significant damage in the meantime.

For small numbers of plants or where homeowners desire to use less hazardous means of control, strong streams of water can be sprayed as needed on infested plants to provide acceptable control. The aphids are so disturbed when they are knocked off their hosts that they are unable to find the plants again or settle to feed.

Insecticidal soap solutions may be used similarly. Horticultural oils formulated for use on green vegetation can kill aphids on contact; dormant oils applied to leafless trees and shrubs during the winter will often asphyxiate overwintering eggs of aphids as well as other pests on branches or trunks.

A variety of general use insecticides are available to homeowners for use on popular ornamentals. These same materials and a few restricted use products are available to licensed applicators. While many of these materials are contact insecticides, some are systemic; that is, the active ingredient may be absorbed by the plant and/or translocated in various plant tissues where it can be ingested by aphids as they feed on plant sap.



Cotton aphid, *Aphis gossypii*, wingless adults, nymphs and one winged adult. Photo: Mississippi State University Archives, Mississippi State University, www.forestryimages.org



Gall on the base of a cottonwood leaf produced by a cottonwood gall aphid, *Pemphigus populitransversus*. Photo: Herbert A. "Joe" Pase III, Texas Forest Service, www.forestryimages.org



Cooley spruce gall aphid, *Adelges cooleyi*, damage on a spruce twig. The brown cone-like structures are the dried, mature galls produced by feeding of these aphids. Earlier in spring, these galls housed developing colonies of Cooley spruce gall aphids. Photo: John A. Weidhass, Virginia Polytechnic Institute and State University, www.forestryimages.org



Cooley spruce gall aphid, *Adelges cooleyi*, feeding externally on needles of its alternate host, Douglas fir. Photo: Petr Kapitola, Forestry and Game Management Research Institute - Czechia, www.forestryimages.org

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