Know Nevada Insects

Common name: aphids
Scientific name: Order: Hemiptera
Family: Aphididae

Fact Sheet 20-30

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Aphids are one of the most common groups of insects found in the garden, and they can be one of the most destructive groups of insects on crops when populations grow to large numbers. While there are many species of aphids, most species only feed on a few types of plants, so knowing your plants can be important in identifying aphid pests. With the stressful growing climate in the Great Basin and Mojave Deserts, many crops in Nevada are especially susceptible to aphids in the early summer. However, most plant species can tolerate low levels of aphids on them. Monitor by looking for curled leaves, honeydew or dead aphids. Consider using a set of nonchemical techniques together to reduce chemical use.

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Description and Life Cycle

Aphids are small oval-shaped insects with long legs and antennae in the very diverse order Hemiptera, a group of insects with many plant pests. Depending on the species and plants they are feeding on, aphids can be green, yellow, black, brown or white. All aphids have a piercing and sucking mouthpart, called a stylet, used to extract sap from inside plants as their nutrition. Aphids can be distinguished from other true bugs by the two projections at the hind end of the body called cornicles, which can secrete defensive compounds.

Aphid life cycles have many adaptations that are different from typical insects and make them especially difficult to control as crop pests. Aphids go through incomplete metamorphosis, starting as small nymphs and molting into larger nymphs before finally turning into reproductive adults. In many species, the nymphs feed at first on a noncrop host for one or more generations. This generation of females may be wingless and can reproduce through parthenogenesis, meaning they produce genetically identical offspring without fertilization by a male. Later generations will often have winged individuals, capable of moving to crop plants in the summer as numbers increase. Populations can increase rapidly, often with a new generation every 14 to 21 days.

Green peach aphid (*Myzus persicae*) giving live birth to a nymph. Photo by Jim Baker, North Carolina State University, Bugwood.org.

Aphids take in sugar from plant feeding, and excrete excess sap, often called honeydew. Honeydew is attractive to ants for their diet, so many species of ants and aphids have created a mutualistic relationship where the ants collect the honeydew released from the aphids and also protect the aphids from ladybird beetles, lacewings, and other predators.

Host Plants and Damage

Aphid diets are typically restricted to one species or a closely related set of plant species. This means it is less likely to have aphid species on native plants become pests of agricultural crops, and unlikely to have the same species of aphids on unrelated crop plants. In addition, knowing the host plant may be the best way to identify the aphid species. For example, one of the more commonly seen aphid species is the bright yellow oleander aphid (*Aphis nerii*). This species is commonly seen in Nevada on milkweed plants (*Asclepias spp.*), especially in the late spring and early summer, though populations often decrease by August. Many species of wild and ornamental roses are attacked by the rose aphid (*Macrosiphum rosae*). Aphids generally prefer new succulent growth or seedlings, frequently fertilized or high-nitrogen content plants, and plants that are environmentally stressed.

Aphis nerii, the oleander aphid, often found on milkweed plants. Photo by Joseph Berger, Bugwood.org.

Macrosiphum rosae, the rose aphid. Note the leaf curling due to stress. Photo by Anne W. Gideon, Bugwood.org.

Aphids can be found on the underside of leaves, as well as on flower stems and fruits. When aphid numbers do reach economic thresholds that require chemical controls, they can cause significant crop damage and loss. Visible effects on plants at this point include stunted growth, leaf curling, yellowed leaves, and the sticky honeydew on leaves and on the ground, sometimes fostering black sooty mold. Extensive damage can reduce fruit production. In addition to this, some aphids transfer plant viruses and can be responsible for their spread.

In Nevada, crops in the mustard family (Brassicaceae, e.g. cabbage, Brussels sprouts, collards, kale and turnips) are particularly susceptible to infestation by the pale green aphid (*Brevicoryne brassicae)*. The black-colored bean aphid (*Aphis fabae)* uses many legume crops as hosts. Many peach trees in northern Nevada are susceptible to damage in late spring and early summer by several species including the green peach aphid (*Myzus persicae*). Some aphids, such as the poplar tree gall aphid (*Pemphigus spp.*), make external plant structures to protect themselves from predators.

Gall formation by the poplar tree gall aphid, *Pemphigus sp.* Photo by Jason R. Eckberg, Bugguide.net.

Leaf curling due to aphids; the aphids are hidden on the leaf underside. Photo by John A. Weidhass, Virginia Polytechnic Institute and State University, Bugwood.org.

Integrated Pest Management

Many plants can survive temporary aphid infestations, even ones that seem severe, for short periods of time. As with many true bug pests, regular monitoring and preventative measures as described below are key to keeping aphid populations manageable. Many beneficial insects feed on aphids, and insecticides may have nontarget effects on these insects. Consider using a set of nonchemical controls together to minimize the chances of severe infestations, and resist the urge to use insecticides unless absolutely necessary.

Prevention

Several techniques can help prevent aphids from reaching crop sites. Protective coverings such as fabric-based row covers are effective barriers to aphids landing on new plants and are one of the cheaper options available to gardeners. Larger structures such as windbreaks also knock these individuals down before they reach crop or garden areas. Planting nectar-providing plants for beneficial insects, such as wasps and flies (described more in biological control), may act as a living barrier to aphids that arrive on site. Certain crop plant varieties may also be resistant to aphids, so these varieties can be chosen if aphids may be a problem in your region. Finally, aphids are often attracted to new plants by small chemicals released by plants that are stressed and have limited herbivore defenses, or that have high levels of nitrogen. Ensuring that your plants are healthy and using slow-release fertilizers are some of the best techniques for preventing pest establishment, both for aphids and other insect pests.

Monitoring

Regular monitoring is the other key aspect to prevention. Regular inspection (twice weekly during seedlings stage) of upwind crop areas can help identify new individuals. The most common parts of plants to check include stems of small seedlings and under leaves of seedlings and trees. Evidence of aphid presence can include curled leaves, honeydew or sooty mold, or a combination. Tending ants and dead aphids should be paid special attention. Aphids that contain parasitic wasp larvae may look discolored or enlarged, and should be left in place for adults to emerge. If aphids are discovered, correct identification is needed to determine the correct action to be taken, if any. No action may be needed for small aphid populations, and each crop species has a different threshold for requiring additional treatments, so check with your location Extension office for species-specific action thresholds.

Cultural Control

Cultural techniques are adaptations to current practices that reduce the chances for establishment of pest populations. Examples of common techniques that can minimize aphid establishment include interplanting different crops and interannual crop rotation. For example, planting nonmustard family crops between kale can reduce the potential for *Brevicoryne brassicae* to establish, and rotating crops between areas or between years deprives overwintering females of their host in the spring. Weeding is a second important component to cultural aphid control; *B. brassicae* may use weedy non-native mustards that are prevalent in disturbed areas as a host and then later move to mustard crops. Pruning the inner canopy of fruit trees can prevent the growth of some aphid species. Finally, minimizing nitrogen fertilization or using slow-release fertilizers can make plants less susceptible to aphids.

Mechanical Control

Localized aphid infestations are easily controlled with physical techniques. In some settings, a strong spray of water can be very effective in removing aphids from trees and some crops, and is often the best first removal method. This can be done on a regular basis to reduce the need for other control tactics. In fruit trees, heavily infested leaves should be trimmed, and infested branches can be pruned early in the season. Seedlings that show severe damage should also be removed.

Biological Control

Biological control can be a cost-effective and efficient way to control aphid damage. However, maintaining populations of biological control agents requires the presence of aphids, so relying on biological control will not lead to complete aphid eradication. Nevertheless, most plants can withstand low levels of aphid damage, making biological control feasible.

A large number of invertebrates eat aphids, including spiders, lacewings, ladybird beetles and other beetles, and a number of wasps. A few of these are available for purchase and release, including mantids, ladybird beetles, and lacewings. Ladybird beetle larvae and lacewing larvae are typically the most effective at controlling aphids. Convergent ladybird beetles (*Hippodamia convergens*) are most commonly available to release onto gardens and trees, but the effectiveness of these releases may be limited. Maximize the chances of beetles remaining in place and reproducing locally by misting them before release, and releasing them low on the plant and early in the morning, when temperatures are cool. Repeated applications may be necessary to gain control of large aphid populations.

Convergent ladybird beetle larva. Photo by Frank Peairs, Colorado State University, Bugwood.org.

Besides ladybird beetles, numerous other native beneficial insects exist in Nevada landscapes that can help control aphids. Many of these insects can be attracted to crop areas for pest control; this practice is called conservation biological control. Many wasp species, including those called aphid wasps (Crabronidae: Pemphredoninae) predate on aphids to use as provisions for their larval young. The young eat the aphids as their nutrition before emerging as adults. These adults are naturally attracted to areas with pests, and can be further attracted using nectar-providing plants very similar to those used to attract pollinators such as bees. Other examples of aphid-controlling insects attracted by nectar-producing plants include hoverflies, long-legged flies, minute pirate bugs, soldier beetles and immature lacewings.

A separate group of insects that control aphids and other pests are called parasitoids. These insects live inside a host for part of their life cycle and are free living for another part. They typi-cally kill the host upon completing the larval part of their life, emerging to pupate, and later reproduce as a free-living adult. A number of wasps, including those in the genus *Aphidius*, lay their eggs in young aphids and can be abundant in moderate-sized aphid populations. These wasps are very small (roughly 3 mm), do not sting, and may be mistaken for winged aphids by casual observ-ers. However, they can be extremely effective in keeping aphid populations under control and should be protected if possible. Other evidence of parasitic wasp presence includes “mummified” aphids, the exoskeleton remains of dead aphids that appear pale and swollen.

The braconid wasp *Aphidius colemani,* an aphid parasitoid. Photo by David Cappaert, Bugwood.org.

Live oleander aphid (left) and a parasitized or “mummified” aphid. Photo by David Cappaert, Bugwood.org.

Chemical Control

Always read and follow all warnings and label instructions on chemical products.

Chemicals that kill aphids by direct contact are called contact insecticides. Some of these, including some soaps and oils, such as neem oil, are produced organically. Other contact pesticides are synthetic, including many horticultural oils and pyrethroids. These chemicals all require direct contact with aphids, so repeated applications may be necessary, and they may not be effective when aphids are under curled leaves. In addition, these chemicals should be sprayed when temperatures are below 90 F to avoid plant damage. Some types of oils can be applied when a fruit tree is dormant during the late fall or winter to kill overwintering eggs in the bark, which may help control spring aphid populations.

Some synthetic insecticides, such as permethrin and malathion, will control aphids along with other insect pests and are often called broad-spectrum insecticides. These chemicals may also kill beneficial insects that are present, decreasing the ability of these insects to portentially provide long-term control. In addition, repeated applications of these insecticides may result in resistance of the aphids to the chemicals over time.

For more severe aphid infestations, systemic pesticides may be necessary to gain control. Systemic insecticides are chemicals applied to plants and ingested by aphids, rather than being applied to aphids directly. The most common systemic pesticides for aphid control are neonicotinoids, including imidacloprid. These chemicals offer multiyear control on woody perennials, and may be helpful for severe aphid infestations. These products are often diluted with water and applied to the soil, then taken up by the plant with additional irrigation over the course of weeks. However, these chemicals not only kill beneficial insects along with the aphids, but may also harm pollinators that visit the flowers. These products should be avoided if the plant is visited by pollinators, especially species such as locusts, lindens and fruit trees.

References

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