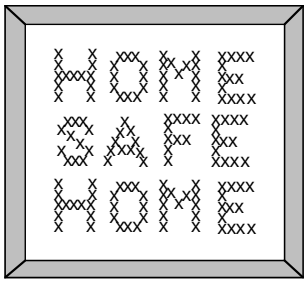
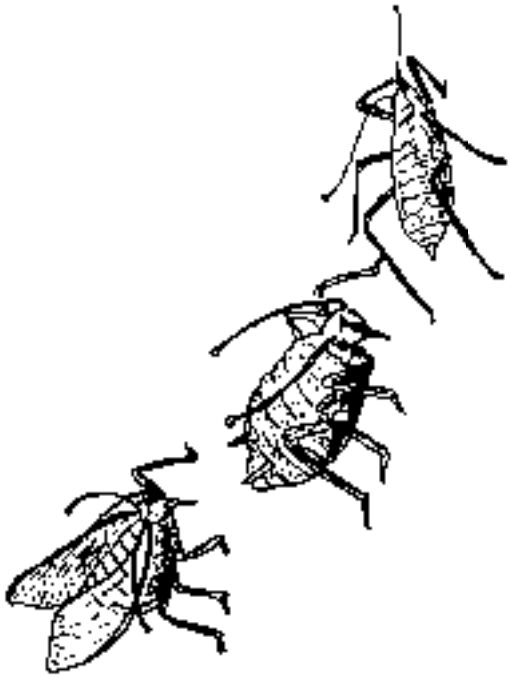
Alternatives
A Washington Toxics Coalition Fact Sheet



Aphids—Safe and Successful Control

by David Johnson



Some aphids have wings and others do not, but most have a soft body about 0.1 inch long. Notice the specialized mouth part which allows them to extract plant juices.

Aphids are probably the most-recognized garden insect in existence. More than 4000 species have been described, and it can almost be said that there is an aphid species for every house and garden plant. Gardeners spend a great deal of time and money attempting to eradicate this pest without much success. Nevertheless, there are a number of strategies which can be employed to keep aphid damage at a minimum without resorting to toxic chemicals that may pose a danger to pets and family members, as well as to the aphids' natural enemies.

The physical appearance of aphids is variable. They come in a rainbow of colors—black, brown, red, purple, pink, green, and yellow. Some have wings and some do not. Most have naked bodies, but some may excrete a protective cottony substance over their bodies. What they have in common is a soft body about 1/10 of an inch long with a mouth part adapted for extracting plant juices.

Most aphids are selective in the plants they attack, but about 10% feed on a variety of plants. Some aphid species do relatively little damage to the host plants, while others may present a serious threat if allowed to multiply unchecked. Aphid populations vary widely throughout the year in response to seasonal factors and the attack of natural predators. For these reasons it is difficult to generalize about the need for intervention in controlling aphids. Because there are so many different kinds of aphids and because their life cycle and interactions with other insects in the ecosystem are complex, the methods of control may vary.

Life Cycle

A generalized life cycle begins in the spring with the hatching of overwintered eggs just as the new growth on plants is developing. These aphids are all wingless females, each of which without fertilization bears succeeding generations of as many as 100 more live wingless females. Incredibly, the aphids are actually born pregnant—even before birth, the female's own daughters are developing within her. This strategy of bearing live young without fertilization accounts for the extreme rapidity with which aphid populations can grow, making control difficult. Young plant shoots can quickly be completely covered with a teaming colony of aphids.

As the colony grows it may begin to run out of room or food may become limited. When this occurs the aphids adapt by producing winged females which can colonize surrounding plants. Late in the fall, sexual males and females are produced. After mating the female lays one or more overwintering eggs. Protected in plant crevices, these eggs withstand inclement weather to hatch in the spring, repeating the cycle. Aphid species found on indoor plants or in tropical climates do not need to produce eggs, and thus males—whose only function is fertilization—may never appear.

Aphids can feed on all plant parts, but most prefer young shoots and leaves. They feed by inserting their soda-straw like mouth into the plant tissue and sucking out the nutrient-rich juice. Aphids become a pest when their feeding begins to affect plant health. A plant may gradually weaken as fewer nutrients become available to it. Aphids can also cause stunting and distortion of plant parts, further weakening the plant.

Most aphids excrete a sweet, sticky substance called honeydew as they feed. This sugary protein mixture can coat the plant and everything under it. Honeydew serves as a food source for ants, bees, and flies. Some of the insects attracted to the honeydew prey on the aphids, but others—ants, for example—attack the beneficial predators. For this reason, controlling ants is an important part of aphid reduction. Honeydew also serves as a medium for the sooty mold fungus which appears as a black film growing over it. Aphids often go unnoticed in the landscape until a tree begins dripping honeydew onto the sidewalk, roof, deck, and parked cars. The health of the plant may not be threatened by large aphid populations, but the honeydew is such a nuisance that controls become necessary. In the vegetable garden aphids can seriously affect plant growth, and controls are usually required.

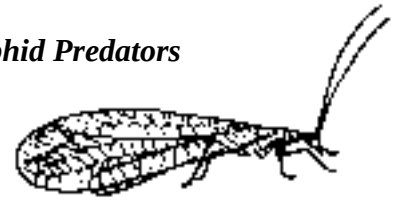
Natural Predators

Were it not for the natural controls that limit aphid population growth, we would soon be overwhelmed by them. Their major predators are green lacewings, lady bird beetles, and syrphid flies. These predators may be observed feasting on aphid colonies. Lacewings are noticeably larger than winged aphids, so you should be able to tell them apart. Another effective (and fascinating) predator is the braconid wasp, which lays an egg inside the aphid. The egg hatches and the larval wasp eats its way out leaving only the exoskeleton of the aphid. As it emerges, the wasp leaves a small round hole on the aphid's abdomen. These holes may be seen with the naked eye and serve as a reliable indicator that the aphids are being controlled naturally. In fact, what may appear at first glance to be a heavy infestation might upon closer examination turn out to be a colony dominated by empty aphid skeletons.

In the majority of landscapes natural controls do an adequate job of keeping aphid populations in check. Natural controls may not be adequate in areas such as decks and patios where honeydew drippings interfere with the area's prime function. Since predator populations lag somewhat in time behind aphid populations, there may be periods in the year—particularly in the spring—when the aphids appear to be out of control, but often the predators can catch up and restore control. In landscapes that receive a series of pesticide applications it is often found that aphid problems actually increase. This occurs since aphids can reproduce very rapidly following a pesticide application whereas the predators respond much more slowly.

Predators can be introduced into the landscape as a means to control aphid populations. This technique can be very effective if done properly, but it is tricky because the predators may fly away, be attacked by their own enemies, or be unable to control an aphid population already out of control. Before trying to introduce predators, be sure you understand the factors involved so that your predators are given the conditions they need to be effective.

Aphid Predators



Lacewing, top, and lady bird beetle.

Braconid wasp laying eggs, top; After eggs hatch, young wasp eats its way out of aphid, leaving a dead skeleton, bottom.

Some Common Aphid Species

The **spruce aphid** is very small and dull green. It appears on spruce in February when few predators are about. Its feeding can cause extreme needle drop which is not apparent until after the pest has declined in April. A severely affected spruce can appear totally denuded. Fortunately the buds are still closed and protected during aphid feeding and emerged unscathed in March, allowing the tree to recover. Spruce aphids are not a problem in some years, but successive infestations can result in tree death.

Two common vegetable garden aphids are found on beans and members of the cabbage family. In the vegetable garden the appearance of aphids necessitates a quick response. The black **bean aphid** is often seen coating the top growth of bean plants. Without control the pest will rapidly increase and affect plant production. As with all garden plants, the best defense is to grow healthy plants. Be sure beans have enough soil nutrients, light, and heat. If aphids appear, you can try to hose them off, but this may be difficult since bean aphids tend to stick to the shoots. Some gardeners cut off the tips if infestation occurs late in the season. If physical controls fail, repeated spot treatment

On vegetable crops, the appearance of aphids necessitates a quick response. On vegetables with smooth leaves, such as cabbage family plants, a water spray should do the job. Pole beans, which have sticky leaves, may require a soapy water spray.

The primary non-chemical method for aphid control is the water spray, which physically removes aphids from the plant. Use a spray strong enough to knock off the aphids but gentle enough not to damage the plant. Be sure to spray both sides of leaves and new shoots. House plants can be taken outside or placed in the bathtub for spraying. The treatment may need to be repeated periodically.

with soap and water or insecticidal soap should do the job. As with all pesticides, read the label and follow directions exactly.

The **cabbage aphid** is grey and up to 1/8 inch in length. They usually first appear on the underside of the leaves of broccoli, cabbage, and cauliflower as a soft grey colony. In this stage the aphids may be washed off with a strong stream of water. If treatment is delayed the aphids will spread onto the stems and into the crown where they are protected and control becomes more difficult.

The green **peach aphid** is frequently encountered on indoor house plants and is one of the most difficult indoor plant pests to control. It can appear pale green, yellow, or pink, both winged and non-winged—all on the same branch. Monitor your plants regularly to spot these aphids before they cause much damage. Controls include hosing the plant outside, where aphids will fall off but not be carried back inside in the pot, and spot treatment of affected areas with soapy water or insecticidal soap.

Control Strategies

Aphids are pests that will always be present in the landscape. Eradication is not a realistic option. However, by selecting resistant plant material, maintaining plant vigor, and applying certain controls to reduce population levels, it is a pest we can easily live with. The following aphid control strategies should be adequate to deal with most problems. An integrated pest management approach to aphid control utilizes these techniques in the order listed, reserving pesticides as the last resort. Over time you will learn what level of aphid population is tolerable and when action is needed. The key is careful monitoring and quick action when the pests become too numerous.

■ Landscape Design—Planning Ahead

Avoid designing pest problems into the landscape. The most effective treatment for aphids or other pests begins in the design stage. The basic rule is simple: **do not use plants that attract pests in areas where the pest cannot be tolerated.** Birches are notorious feeding stations for aphids. If you simply must have a birch in your landscape, do not plant it over the deck or next to the driveway. Plant it out back where you won't notice the aphids—or, better yet, substitute a tree that has the same qualities but does not attract aphids. The Katsura is an example of a tree which has almost no pest problems.

■ Plant Health—Maintaining Resistance

Plants that receive levels of nutrients, water, and light adequate for the species will usually thrive. Improper levels produce stress on the plants. Air pollution and physical damage also contribute to plant stress. Plants under environmental stress will usually exhibit increased disease and insect problems, which in turn compound the existing stress load and lead to a decline in plant health. The presence of excessive aphids may indicate an unhealthy plant. Check first to be sure you are providing the correct growing conditions. Surprisingly, an excess of nitrogen can stress plants—particularly indoors—and result in aphid attack. Use slow release fertilizer in appropriate amounts to maintain slow, steady growth of houseplants. Small, frequent feedings are preferable to widely spaced, more concentrated doses.

■ Physical Controls—Removing Aphids

The simplest control method is physical removal of aphids. This can be accomplished most easily by a strong spray of water from a garden hose, repeated periodically when the aphids return. Particularly infested plant parts may have to be cut off and discarded. Another method is to use aphid traps, colored panels covered with a sticky substance, which attact and bind aphids to them.

If ants are a problem—they kill beneficial insects—build a sticky barrier (see "Products" box) between the plants and the pests. This is most practical indoors. Establish a quarantine area for new or severely infested houseplants.

Products

Insecticidal Soaps
Safer™ Insecticidal Soap
Concern™ Insect Killing Soap

Aphid Traps
Safer™ Flying Insect Traps
Sure Fire traps

Sticky Barriers
Tanglefoot™ and Tangletrap™

(The products listed above are available at many garden stores.)

Aphid Predators
(The companies below offer a wide range of products for Integrated Pest Management via mail order, including live predators.)

Integrated Fertility Management
1422 N Miller St
Wenatchee, WA 98801
800-332-3179
www.agecology.com

Gardens Alive!
5100 Schenley Place
Lawrenceburg, IN 47025
(513) 354-1483
www.gardensalive.com

Territorial Seed Company
P O Box 158
Cottage Grove, OR 97424
541-942-9547
www.territorial-seed.com

■ **Biological Controls—Assisting Nature**

Aphid predators may be introduced into the landscape to supplement existing populations. The most common predator sold is the lady bird beetle. Unfortunately these beetles have a tendency to disperse when released. Their presence will benefit the general area but probably won't do much to affect the aphid population in the immediate vicinity.

A better choice for introducing predators is the green lacewing. These are available both as eggs and as larvae. The larvae are more expensive and harder to obtain, but they are more effective at aphid suppression.

Do not expect introduced predators to be able to overcome already damaging levels of aphids. Before introducing any predators, reduce aphid numbers by pinching off severely affected plant parts or hosing off most of the aphids. A single predator release may not be sufficient.

■ **Chemical Controls—The Last Resort**

This should be the last resort in any pest control program. The least-toxic chemical for aphid control is insecticidal soap. This should be applied carefully, according to label directions, only to the affected plant areas. It will kill aphids on contact, but does not provide any lasting preventative effect so applications will probably have to be repeated. It is effective in bringing aphid numbers down so that natural predators can regain control. For a cheaper alternative, try mixing several tablespoons of a simple liquid soap with a gallon of water and squirt with your plant sprayer. On food crops, be sure to rinse thoroughly with water before eating.

Pyrethrum or pyrethrin-based insecticides are widely advertised as "natural" pesticides. Derived from plants or laboratory synthesized analogs, these pesticides are less toxic than some other commercial products but are nonetheless potent insecticides and are toxic to humans. They are wide-spectrum insecticides which can kill beneficial insects. These contact insecticides have to be sprayed on the plant to be effective. Protective equipment is required and control of the spray is difficult. For these reasons we do not recommend the use of such products for aphid control. ■

Disposal of Pesticides

Insecticides, such as those used to control aphids and other household insect pests, are pesticides and if no longer wanted should be disposed of at a household hazardous waste collection site. Contact your local solid waste or public health agency for more information. In the Seattle/King County area, call the Hazards Line at 206-296-4692.

The Washington Toxics Coalition is a non-profit organization dedicated to protecting public health and the environment by preventing pollution. Please write or phone for information: WTC, 4649 Sunnyside Ave N, Suite 540, Seattle, WA 98103. Phone: 206-632-1545. Visit our Internet Web site at www.watoxics.org.