

Aphids, Scales and Mites on Home Garden and Landscape Plants

Division of Plant Sciences

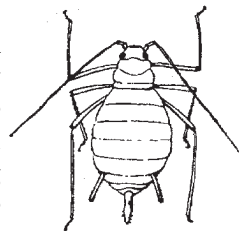
Some of the most commonly encountered arthropod pests found on plants are those that feed on plant juices, i.e., sap-sucking pests. These pests all have needlelike “piercing-sucking” mouthparts that allow them to puncture plant tissue and remove sap or cell contents. Examples of sucking pests include aphids, scales, mites, leafhoppers and plant bugs. Some of these pests can also act as vectors of plant diseases.

Sucking pests usually are small and delicate in appearance. Many species cover their bodies with waxy or wool-like substances. They usually are found in great numbers, covering foliage, twigs or whole stems. Typical plant damage associated with sucking pests includes wilted leaves or stems, dying branches and reduced growth.

The purpose of this publication is to discuss the damage, biology and control of three commonly occurring groups of sucking pests found on home garden and landscape plants: aphids, scales and mites.

Aphids

Hosts. Aphids are common pests that can attack a variety of home garden and landscape plants. They are typically found clustering on succulent young shoots and leaves, although some species occur on flowers, twigs, branches and roots. Some of the home garden plants frequently attacked by aphids are beans, cabbage, cucumber, melons, peas, potato, pumpkin, squash and tomato. Examples of trees and shrubs often infested with aphids are ash, birch, elm, euonymus, hydrangea, linden, maple, oak, pine, tulip tree, viburnum, walnut, and many others (see MU publication M145, *Controlling Tree and Shrub Pests Around the Home*).



Typical aphid

Damage. Aphids seldom kill a plant, but when abundant they remove large quantities of sap, which reduces the vigor of the plant and can result in stunted plant growth. Leaves often become curled, puckered and yellowed due to aphid feeding. Some aphid species produce galls on stems and roots. Others transmit viruses or inject toxins into the plant when feeding.

Many aphid species take in more plant sap than they can absorb and use. The excess is excreted as a clear, sweet, sticky substance known as “honeydew.” Some tree-feeding aphids can produce such large amounts of honeydew that it often can be seen covering leaves, pavement or other surfaces below the infested tree. Often found growing on the honeydew is a black, sooty mold (fungi) that not only disfigures the appearance of plants but may also restrict photosynthesis. Honeydew is attractive to ants, flies, wasps and bees, whose populations around infested plants can become a nuisance.

Biology. Aphids are small, usually $\frac{1}{8}$ inch or less in size, soft-bodied, pear-shaped with long legs and antennae; their color can vary from green, yellow, black, gray or red. They may have a pair of transparent wings held rooflike over the body, but wingless forms are more common. Also, aphids can be recognized by their cornicles, a pair of tubelike structures projecting from the rear of their bodies. These projections vary in length and width, depending upon the species.

Aphids can reproduce very quickly. The life cycle of most aphids can be as short as 1 to 2 weeks. Females usually reproduce without mating and give birth to living young — usually more females. Males are produced by some species only during the fall months. A typical species will produce several wingless generations in the spring, followed by a generation of winged forms. These fly to other plants where many more wingless summer generations are produced. As the days become shorter and cooler, a generation of winged aphids is produced which flies back to the winter host plant. Some species overwinter as eggs; others survive as immature or adult females.

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Aphid control measures

Biological control. Many naturally occurring predators and parasitic wasps prey upon aphids. Examples of aphid insect predators (which consume the entire aphid) include ladybird beetle (ladybug) adults and larvae, green lacewing larvae and syrphid fly larvae. Certain tiny parasitic wasps are among the most effective natural enemies of aphids. The adult female wasp (non-stinging to humans) deposits an egg inside the aphid's body. The egg hatches into a larva that grows and consumes the aphid's internal parts. As the wasp larva matures, the aphid becomes stationary, dies, and looks mummy-like. The larva pupates inside the aphid and emerges as an adult wasp through a small exit hole it chews through the aphid's outer skin.

Under many conditions, these beneficial predators and parasitic wasps provide very effective control of aphids, especially as the season progresses. Before any insecticide application is made, check the plants for the presence of natural enemies and make sure that they are not already reducing aphid numbers. If pesticide treatments are warranted, confine the applications to only those plants most seriously infested; this will help conserve the natural enemy populations. Some natural enemies may be purchased from commercial operations for release around the garden and yard.

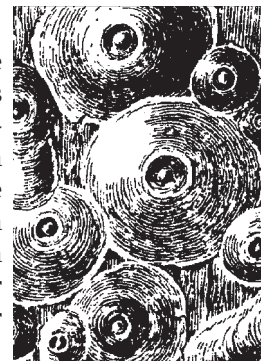
Cultural control. Strong, durable plants can be sprayed with a forceful stream of water to dislodge aphids. Most will not be able to return to the plant after this treatment, and the water will also remove recently deposited honeydew. This tactic can be used as often as needed.

Pruning aphid-infested new growth can also be effective. Some populations grow to large numbers in the dense inner canopy of large trees, and thinning out the tree will make the habitat less suitable. Aphids on house and other small plants can be removed by gently rubbing the infested plant part with a damp cloth. In addition, vegetable and weed plants that were badly infested during the season might act as sites for overwintering aphid eggs and such plants should be destroyed in the fall.

Chemical control. When natural enemies are not abundant enough to provide effective aphid control, despite your efforts to encourage their presence, insecticide applications are sometimes needed to prevent plant injury. Table 1 lists insecticides (both conventional and alternative) that should be effective in controlling aphids in home garden plants, trees and shrubs. The chemicals listed should be, with few exceptions, readily available to the homeowner. Examples of trade names are found in parentheses. **Please check the label to make sure that "aphids" and the name of the host plant are listed before any insecticide application.**

Scale insects

Hosts. Scale insects are common pests of many trees and shrubs, but not of vegetable plants. Home owners can have difficulty controlling these insects, because scales are often overlooked since they remain immobile for most of their lives and do not resemble other insects.



San Jose scale

Heavily infested plants are often covered with small, disklike or waxy coverings, and underneath each covering is the scale organism feeding on the juices of the plant. Trees and shrubs that can become infested with scale include arborvitae, azalea, birch, box elder, euonymus, honeylocust, juniper, magnolia, oak, pine, yew, and many others (see MU publication M145, *Controlling Tree and Shrub Pests Around the Home*).

Damage. There are two general types of scales: armored scales (e.g., oystershell scale, San Jose scale, euonymus scale and pine needle scale) and soft scales (e.g., cottony maple scale, magnolia scale and tulip-tree scale). Trees heavily infested with armored scale often look water stressed. Leaves turn yellow and drop, twigs and limbs may die and the bark cracks and gums. Armored scales can kill trees and must be controlled when their populations rise.

Soft scales also reduce plant vigor, but usually not enough to kill the tree. The main problem this type of scale causes is that unlike armored scales, they produce large amounts of honeydew (like aphids) that can cover leaves and fruit and act as a growth medium for black, sooty mold. Honeydew also attracts ants, flies, wasps and bees, whose populations around infested plants can become a nuisance.

Biology. Armored scales usually have several generations a year, while soft scales typically have a single generation. Scales spend most of their lives underneath a covering feeding on the same spot of the plant. Eggs hatch underneath the mother's cover into "crawlers." At this stage, scales are motile because they have legs. New plants can be infested when crawlers walk or are blown by the wind to other plants. Armored scale crawlers settle down permanently after a few days, molt (and lose their legs), and begin to form the species' characteristic cover. As the scale continues to grow, it remains underneath its waxy covering. In a relatively short time, winged adult males crawl out from beneath their covers and mate with covered females. Adult male scales are tiny, winged and seldom seen.

Soft scale crawlers move about the plant a little longer after hatching before they settle down at a permanent feeding site. Some soft scale species move around during their immature stages and retain their legs for life. Their covers may be smooth or cottony,

but they are firmly attached to their bodies. Soft scales tend to be larger than armored scales. Mature scales never move once they firmly attach themselves to the plant.

Scale control measures

Biological control. Natural enemies, such as the predatory ladybird beetle (ladybug) and small parasitic wasps, can play a major role in controlling many scale species. You can estimate the extent of parasitic wasp activity by checking scale covers (a small 10x hand lens would be helpful) for round exit holes made by the emerging adult parasites. Before any insecticide application is made, check the plants for the presence of the natural enemies and make sure that they are not already reducing scale numbers. If pesticide treatments are warranted, confine the applications to only those plants most seriously infested; this will help conserve the natural enemies.

Cultural control. Keep your trees and shrubs well watered and fertilized. Scales will thrive on plants that are under stress. For plants that are fast growers, pruning out heavily infested shoots or limbs will help reduce the population and foster the growth of uninfested shoots. Scales can also be rubbed off plants by using your hand or a toothbrush. When adult scales are rubbed off, their mouthparts are broken and they will not be able to reinfest the plant.

Chemical control. When natural enemies are not abundant enough to provide effective scale control, insecticide applications are sometimes needed to prevent further plant injury. Many scale species on deciduous trees can be effectively controlled with a dormant spray of a refined horticultural, superior-type oil. If during the growing season you notice light leaf discoloration, minor production of honeydew and branch dieback from scales, apply an oil or insecticidal soap spray. Oils and insecticidal soaps work by smothering the insect, both adults and crawlers. In addition, such alternative pesticides are less harmful to natural enemies than conventional insecticides.

Because of their protective covering, scales can be fairly resistant to many conventional pesticides. Broad-spectrum insecticidal treatments are most effective when applied during crawler emergence. Make a thorough search of the plant to determine crawler activity. This can be aided by wrapping two-sided sticky tape tightly around some branches throughout the tree or shrub. Emerging crawlers migrating to new locations will stick to the surface of the tape. These crawlers will appear as tiny, pale yellow specks on the tape.

Nearly all scale species go through a crawler stage in late spring and early summer. But by midsummer, some scale species (especially armored species) can have overlapping generations, and the population may contain scales in every stage of development. In such a case, multiple spray applications, such as two to four applications at 10-day intervals, are

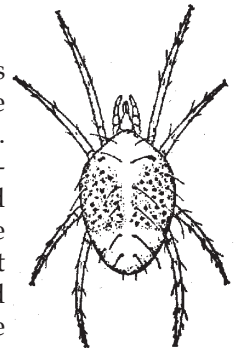
needed so that the scales are killed as they reach the susceptible crawler stage.

Scale coverings may remain harmlessly on the plant for some time after the death of the insect. To evaluate the effectiveness of treatments, slide your thumb across a group of scales. If scales are dead, they will be hollow and the coverings will flake off easily. If still alive, the crushed scales will be wet from the body fluids.

Table 1 provides a list of insecticides (both conventional and alternative) that should be effective in controlling scales on trees and shrubs. The chemicals listed should be, with few exceptions, readily available to the homeowner. **Please check the label to make sure that the type of scale and the name of the host plant are listed before any insecticide application.**

Mites

Hosts. Several types of mites can cause damage to foliage; the most common are spider mites. These mites are capable of infesting many garden, tree, shrub and bedding plants found around the home. Mites are not insects, but arachnids, related to ticks and spiders. Garden plants that are typically susceptible to mites are asparagus, beans, melons and squash and other cucurbits, peas, tomatoes and strawberries, as well as several weed species. Some landscaped trees and shrubs that are often attacked are arborvitae, azalea, cotoneaster, crab apple, linden, mountain ash, rose, spruce and walnut (for others, see MU publication M145, *Controlling Tree and Shrub Pests Around the Home*).



Damage. Mites damage plants by sucking cell contents from leaf tissue. The initial damage appears as a stippling (or peppering) of light dots on the leaves. As feeding continues, the leaves turn yellow or bronze in color and drop off. Heavily infested leaves and branches can be enclosed in fine silken webbing, although mites infesting conifers generally do not produce large amounts of webbing.

The premature loss of leaves on fruit trees, especially during mid to late season, will not typically affect the yield of the current year's crop; however, such damage may adversely affect next year's crop. On annual vegetable plants, the loss of leaves can have a serious, immediate impact on production.

Because spider mites are very small, they can be difficult to see on plants. You can determine the presence of mites by holding a piece of white paper underneath a branch or shoot and shake or tap the branch sharply. If mites are present, some will be dislodged from the leaves and fall onto the paper, where they will be seen as tiny moving specks.

Biology. Spider mites are small (ca. 1/20 to 1/60 inch long), eight-legged arthropods that may be brown, red, green or cream-colored. They live in colonies, mostly on the lower surface of leaves. Adult females deposit small, red to cream-colored eggs on a leaf, bark, or in webbing. Immature mites resemble adults, except they have only six legs during the first instar stage. Spider mites reproduce rapidly in hot, dry weather. With favorable temperatures and adequate food, a generation can be completed in seven to 10 days. Mites can catch wind currents and disperse to other plants when the foliage quality declines on heavily infested plants. Mites can overwinter in several stages of development, such as adult females under rough bark scales or ground litter, or as eggs deposited near dormant buds.

Mite control measures

Biological control. Some of the natural enemies that feed on spider mites are small, black ladybird (ladybug) beetles, lacewing larvae, some thrips species, minute pirate bugs, and predatory mites. These enemies often occur naturally, but sometimes they do not prevent mite populations from reaching damaging levels. Because mite predators are extremely susceptible to many insecticides (especially conventional pesticides), do not apply pesticides until the health or appearance of the plant is threatened by the mites. If pesticide treatments are warranted, confine the applications to only those plants most seriously infested; this will help conserve the natural enemies. Some natural enemies, such as predatory mites, may be purchased from commercial operations for release around the garden and yard.

Cultural control. Spider mites flourish on plants under stress. Keep plants well watered and fertilized,

because damage is increased when the plant does not receive sufficient water. In trees, mite outbreaks can be triggered by dusty conditions along unpaved roads, for example. Because these conditions adversely affect mite predators, water at regular intervals, when necessary, any dirt pathways that might be next to infested plants. Mite populations can also be reduced by forcefully spraying plants with water, especially on the underside of leaves, to break up the webs and wash the mites off. You can apply this technique as often as necessary.

Chemical control. On deciduous fruit trees, a dormant oil (superior-type) spray will help control mite populations by smothering any overwinter adults or eggs found on the tree. However, some spider mite species do not overwinter on woody plants and would not be affected by a dormant oil spray. Multiple applications of a horticultural oil or insecticidal soap, applied every seven to 10 days, to many tree fruit and ornamental woody plants during the growing season will also provide good mite control.

When natural enemies are not abundant enough to provide effective spider mite control, conventional miticide applications are sometimes needed to prevent further plant injury. Table 1 provides a list of miticides (both conventional and alternative) that should be effective in controlling mites on home garden plants, trees and shrubs. Because mites can reproduce rapidly, they may develop a tolerance to a conventional miticide used repeatedly. Consequently, it is recommended that you alternate the use of conventional miticides with other types of pesticides, such as soaps and oils. The chemicals listed should be, with few exceptions, readily available to the homeowner. **Please check the label to make sure that "mites" and the name of the host plant are listed before any pesticide application.**

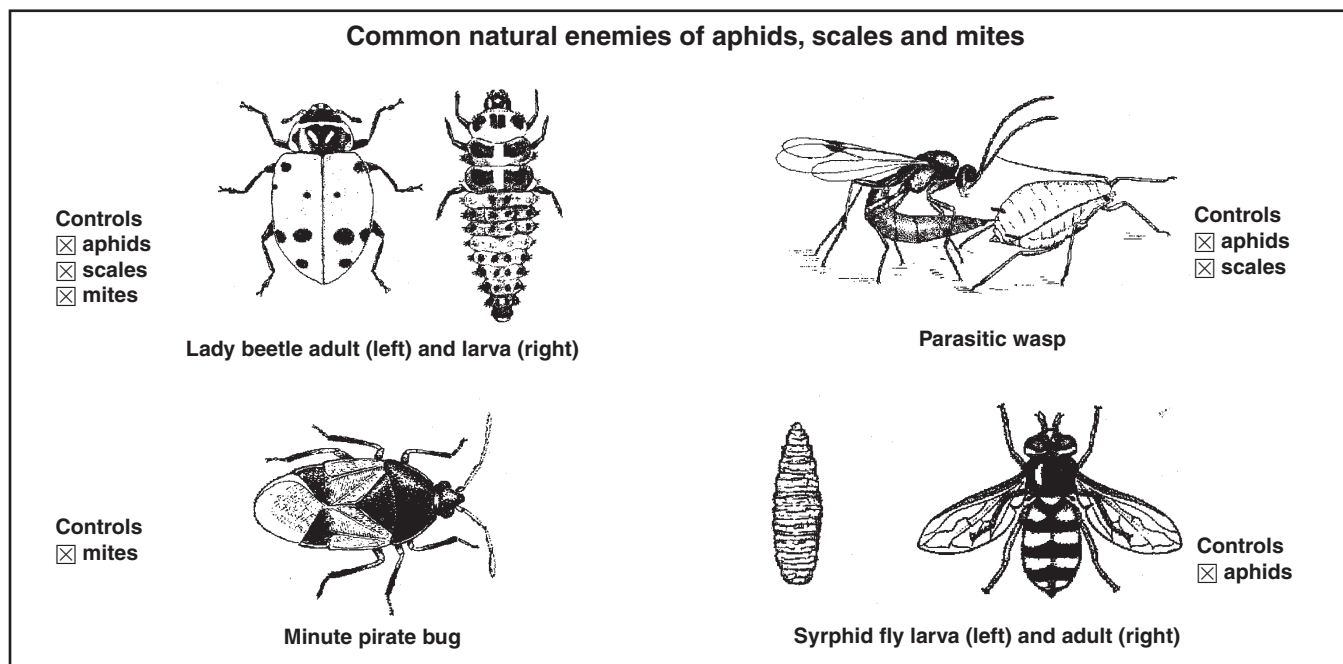


Table 1. Some common over-the-counter insecticides labeled for aphid, scale and mite control on home vegetable and ornamental plants.

Insecticide	Site	Pests			Examples
		Aphids	Scales	Mites	
acephate	Ornamental	X	X	X	Ortho® Systemic Insect Killer
carbaryl	Ornamental	X	X		Bayer Advanced™ Complete Insect Killer for Gardens Ferti-lome® Liquid Carbaryl Garden Spray GardenTech® Sevin® Concentrate Bug Killer Gordon's® Liquid Dura-Spray Carbaryl
cyfluthrin	Garden	X			Bayer Advanced™ Triple Action Insect Killer for Lawns & Gardens
	Ornamental	X	X		
esfenvalerate	Garden	X			Ortho® Bug-B-Gon® MAX® Garden & Landscape Insect Killer
	Ornamental	X			
imidacloprid	Ornamental	X	X		Bayer Advanced™ Tree & Shrub Insect Control Bonide® Annual Tree & Shrub Insect Control Gordon's® Tree & Shrub Insect Killer
insecticidal soap	Garden	X	X	X	Bonide® Insecticidal Soap Safer® Insecticidal Soap
	Ornamental	X	X	X	
malathion	Garden	X		X	Bonide® Malathion Bonide® Fruit Tree Spray Gordon's® Malathion 50% Spray Hi-Yield® 55% Malathion Spray Ortho® Malathion Plus Spectracide® Malathion Insect Spray
	Ornamental	X	X	X	
neem	Garden	X	X	X	Bonide® Bon-Neem® Insecticidal Soap Ferti-lome® Triple Action Plus Green Light® Neem
	Ornamental	X	X	X	
oil	Garden	X	X	X	Bonide® All Seasons Horticultural Spray Oil Ferti-lome® Dormant & Summer Oil Spray Gordon's® Dormant Oil Spray Green Light® Horticultural Spray Oil Ortho® Volck Oil Spray
	Ornamental	X	X	X	
permethrin	Garden	X	X	X	Bonide® Eight Vegetable, Fruit & Flower Concentrate Hi-Yield® Lawn, Garden, Pet & Livestock Insect Control
	Ornamental	X	X	X	
pyrethrins	Garden	X			Bonide® Liquid Rotenone-Pyrethrins Spray Gordon's® Garden Guard® Green Light® Fruit Tree Spray Spectracide® Garden Insect Killer
	Ornamental	X		X	
rotenone	Ornamental	X			Bonide® Rotenone Dust
sulfur	Ornamental			X	Ferti-lome® Wettable Dusting Sulfur

Note. All chemical information is presented with the understanding that no endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

Warning on the use of chemicals

Before using any chemical, please read the label carefully for directions on application procedures, appropriate rate, first aid, and storage and disposal. Make sure that the chemical is properly registered for use on the intended plant and pest.

Phytotoxicity

Certain chemicals may cause plant injury if used at the wrong stage of plant development or when temperatures are too high. Injury may also result from excessive amounts or the wrong formulation or from mixing incompatible materials. Please read label carefully for phytotoxicity warnings.

Dormant and summer oil applications

If applied properly and at the recommended rates, a dormant oil spray will not be phytotoxic to any species of deciduous tree or shrub commonly found in Missouri. This is true for most conifers, except for the blue spruces in which the oil removes the bluish frosted material (glaucus bloom) from the needles. There are additional precautions when applying oils during the summer. Please read and follow the label directions before you apply any oil spray.