



Aphid Control

Pesticide Research Institute Aphid Control

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Are aphids attacking your garden?

Low to moderate aphid population levels do not usually cause significant damage and rarely kill mature plants. However, large infestations can reduce plant yields and produce sticky “honeydew,” warranting pest control. Aphids are best managed by working with nature’s predators and utilizing low-impact approaches.



See [PRI's Top-Ten List for Keeping Pests Out and Kids Safe](#). Use PRI's tool, [Pest Smart](#), to find low-hazard insecticide products.

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Preventing and Managing Aphid Infestations

Identification



- Aphids are tiny pear-shaped, soft-bodied insects that suck the juices out of leaves, stems and tender plants– though some species attack lettuce roots and the woody parts of apple tree roots and limbs. Aphids can be green, brown, golden, orange, red, white, grey or black.
- Aphids like to feed in dense clusters and do not move rapidly when disturbed. Although generally wingless, when aphids become too crowded or stressed, some will grow wings and fly to colonize new plants.
- There are at least 4,000 aphid species, and almost every plant will attract aphid pests. Although aphid species are difficult to distinguish from one another, management is similar for most.
- Aphids are often found under curled leaves, where they hide from their natural predators.

Damage

Aphids are well known for their ability to quickly colonize your prized plants. Their thick clusters and sticky honeydew are not only unsightly; aphids can transmit plant viruses and cause serious damage to your garden as their population size increases.

- Large numbers of aphids can weaken sensitive seedlings and cause leaf stunting, yellowing and curling on mature plants.
- Aphids excrete large quantities of sticky honeydew, which promotes the growth of sooty mold and attracts ants.
- Aphids can transmit plant viruses, inject toxins into plants that distort growth, and cause gall formations.
- Many species of aphids cause the greatest damage when temperatures are warm but not hot (65-80°F), typically in late spring.



Preventing an Aphid Attack

- **Plant nectar-producing flowers:** Alyssum, cilantro, hyssop, and others near aphid-susceptible plants will attract beneficial insects, such as hoverflies, lady bugs, lacewings, and parasitic wasps, that prey on soft-bodied insects. Yellowjackets are great aphid-eaters too!
- **Provide bird habitat:** Provide habitat and nesting boxes for insect-eating birds, such as warblers, wrens, nuthatches, titmice, and hummingbirds.
- **Monitor regularly:** Check plants for aphids to catch infestations early in the growing season. Look for aphids on the undersides of leaves and new growth. When plants are growing rapidly, check at least twice a week.
- **Remove attractive weeds:** Aphids often collect on weeds like sowthistle and mustard.
- **Do not over-fertilize:** Excess nitrogen encourages the new leafy growth that aphids love to feed on. Use slow-release fertilizers or organic materials such as compost to feed plants.
- **Use barriers:** Protect seedlings with floating row covers and check new transplants for aphids.
- **Schedule pruning to avoid infestations:** Do severe pruning to encourage new growth only after natural enemies are present. Encouraging a flush of new growth too early is an invitation for an infestation.



Pest Smart mobile app

Read on for information on low-impact methods for aphid control. Also included is a comparison of products commonly used in aphid insecticides.

Interested in finding out more about specific aphid insecticide products? [The Pest Smart app](#) is now available in the [iTunes Store](#). Conveniently access pesticide data on your iPhone and iPad while on the job, in the store, and at home.

- Search by product name or registration number.
- Search by pest to find pesticide products that target common household and garden pests like ants, fleas, cockroaches, lawn weeds and aphids.
- Quickly verify the eligibility of a pesticide product for use in the [LEED v4-certified](#) Integrated Pest Management (IPM) program.
- Compare products and find least-toxic alternatives to streamline decision-making.
- Link to PRI's Pest Management Bulletins to learn about low-impact methods of pest control that minimize pesticide use and exposure.



Low Impact Approaches

Remove, Separate, and Persevere

- **Wash down plants:** Knock aphids off an infested plant by spraying it with a jet of water from a spray bottle (for seedlings) or a hose (for established plants). Repeat as necessary until the predator insects take over the job of killing aphids.
- **Dispose of infested plants:** Remove heavily infested leaves and stems, and even whole plants that may serve as aphid reservoirs for the rest of your garden. Dispose of the infested plants in the trash or bury them deep in your compost pile.
- **Control outdoor ants:** Ants “farm” aphids to feed on the excreted honeydew and will protect the aphids from their natural enemies. Separate aphids from their ant protectors by placing a band of sticky material around the trunks of aphid-infested trees or woody plants, and remove other access routes.
- **Wait them out:** Most aphids cannot tolerate the high temperatures of mid to late summer, especially in very dry areas. Aphid activity is also limited by cool weather.



Biological Control



Natural enemies are organisms that work to reduce the numbers of another organism through predation, parasitism and other means. The most important tools for aphid management are natural enemies that prey on aphids, such as lady beetles, lacewings, syrphid flies, soldier beetles and small parasitic wasps. Follow the steps below to attract them to your yard by providing suitable habitat, a source of water, and a variety of flowering plants. Flowers provide the nectar, pollen and shelter natural enemies need to thrive and support their complete life cycle. These valuable insects provide the best control when aphid populations are high and can reduce the likelihood of an infestation if they are present in your garden early on.

Recruit beneficial bugs to help control aphids in your garden.

- **Provide floral resources:** Plant flowers that provide beneficial insects with the resources they need to maintain healthy resident populations when aphid populations are low. Select flowers that are good nectar sources, including alyssum, lavender, blanket flower (*Gaillardia*), cosmos, clover, buckwheat, and hyssop.
- **Release beneficial insects:** Build a population of beneficial insects in your yard with releases of lady beetles, lacewings, and parasitic wasps, available from garden or specialty stores. Beneficial insect suppliers include [ARBICO Organics](#) and [Koppert Biological Systems](#).
- **Avoid insecticide use:** Protect these good bugs by avoiding the use of insecticides.



Insect Predators: Soldier beetles, lady beetles, lacewings and syrphid flies prey on aphids, so keep an eye out for them when inspecting your plants and allow them to do their work.



Parasitoids: Small wasps that lay their eggs inside of aphids are among their most important natural enemies. A parasitized aphid becomes brittle and golden brown as it turns into a form called a mummy. Most parasitoids reproduce rapidly when the weather is warm, so when you begin to see mummies on your plants, the aphid population is likely to drop dramatically within a week or two.



Pathogens: [Fungal diseases](#) can kill whole aphid colonies when weather is humid. Look for aphids that are off-color (reddish or brown) and have a fuzzy/shriveled texture. Disease-killed aphids may also appear bloated or flattened.

Insecticidal Soap and Horticultural Oils

Insecticidal soap and horticultural oils can provide effective control if applied thoroughly. Oils work by smothering soft-bodied insects, and soaps kill these pests by removing their protective surface coating.

- **Get thorough coverage:** Spray these materials with a high volume of water and target the undersides of leaves, coating the tops as well. More than one application may be needed.
- **Take caution:** These materials will kill soft-bodied beneficial insects hit by the spray. Because they leave no toxic residue, they do not harm beneficial insects that migrate in after treatment.
- **Read the product label:** Sprays may be damaging to some plants, so check the product label and test on a leaf before applying to the entire plant.
- **Avoid use during hot weather:** Do not apply these treatments to water-stressed plants or when temperatures are high.



Aphid-Control Pesticides

If your garden has a serious aphid infestation, you may decide a pesticide is necessary. Avoid the use of broad-spectrum insecticides, as they will contaminate all plants within the treated area and harm beneficial insects.

Potential Consequences of Using Aphid-Control Pesticides

If you choose to use pesticides, you should be ready to deal with these potential consequences:

- Using pesticides can lead to resistant aphid populations. This will only worsen an infestation as higher proportions of the aphid population become pesticide-resistant.
- Many pesticides kill beneficial predator insects. Harming natural enemies through the use of broad-spectrum pesticides is counterproductive for aphid management.
- Certain chemicals may cause injury to your plants; always consult the label for limitations.
- Some insecticides are quite toxic to humans and pets. Exposure to certain chemicals can increase the risk of both immediate illness and longer-term chronic effects like cancer or birth defects in a developing fetus. Check PRI's [PestSmart Web](#) site to assess the hazard potential for products you are considering for use.
- Insecticides applied near ponds or waterways can potentially poison fish and other aquatic organisms.

Precautions to Take When Using Aphid-Control Pesticides

If you determine that pesticides are necessary, take these precautionary steps to reduce the potential for adverse effect:

- Use the least-toxic product for the job. Check PRI's [Pest Smart Web](#) site to assess the hazard potential for products you are considering for use in your yard.
- Apply sparingly to reduce harm to natural predators and avoid pesticide resistance.
- Use only US EPA approved products (see [Regulatory Update](#) below for details) or exempt products containing only “minimum risk” ingredients.
- Always read and follow the label instructions on the pesticide product. The label is the law and you could be liable for any damages resulting from not following the label instructions.

Types of Aphid Control Pesticides

There are several aphid control products on the market that are commonly available as either a liquid concentrate or ready-to-use spray. When using these chemical products, take precautions to minimize human, pet, and environmental exposure, as well as runoff to waterways. The tables below provide information on the risks associated with the active ingredients in these products.

Low Toxicity Aphid-Control Pesticides

Type of Active Ingredient	Representative Chemicals*	Hazards	Formulation
Insecticidal Soap	Salts of fatty acids (e.g., Potassium Laurate)	Using insecticidal soap poses a low acute toxicity risk to humans, pets and wildlife. Pollinators and other beneficial insects are also unlikely to be affected by its application in your garden. However, do take care when using around ponds and waterways since insecticidal soaps are toxic to fish.	Liquid concentrate, Spray
Horticultural Oils	Soybean oil Canola oil Mineral Oil (refined)	Both petroleum and vegetable based products pose a low acute toxicity risk to people, pets, wildlife and bees. Be careful when applying near ponds and waterways—horticultural oils are toxic to fish.	Liquid concentrate, Spray
Botanicals	Azadirachtin Abamectin Capsicum oleoresin Garlic Limonene Neem Oil of rosemary Oil of thyme Oil of jojoba Oil of wintergreen Oleic acid Peppermint oil Phenylethyl propionate Pyrethrins	Several naturally occurring substances are available in products sold for whitefly control, including garlic and capsicum (from pepper plants). Contamination of surfaces with these common components of foods is not hazardous, but inhalation of the spray or dust can be problematic. Be careful to limit your contact with essential oils, as they may cause irritation to the eyes and skin. Neem is a natural tree oil containing azadirachtin that is practically non-toxic to humans, pets, wildlife and plants. However, its use may harm beneficial insects present in your garden. Lastly, Pytherins have been proven to be highly toxic to bees making any insecticide containing them a pesticide concern.	Emulsifiable Concentrate, Ready-To-Use Solution, Dust, Soluble Concentrate, Flowable Concentrate

Aphid-Control Pesticides of Concern

Type of Active Ingredient	Representative Chemicals	Hazards	Formulation
Organophosphates and N-Methyl Carbamates	Acephate Carbaryl Malathion	Organophosphates and carbamates are toxic to the nervous system, especially for children, and are highly toxic to humans at low concentrations. Also moderately toxic to birds and highly toxic to aquatic life, honey bees and other beneficial insects. Carbaryl is classified as a likely human carcinogen by the EPA.	Liquid concentrate, Spray, Dust

Type of Active Ingredient	Representative Chemicals	Hazards	Formulation
Neonicotinoids	Acetamiprid Clothianidin Dinotefuran Imidacloprid Thiacloprid Sulfoxaflor Flupyradifurone	Neonicotinoids pose a moderate acute toxicity hazard to humans and are absorbed through the skin to some extent. Toxic to the nervous system, imidacloprid has also been shown to reduce sperm counts in laboratory animals with long-term exposure. Neonicotinoids are highly toxic to honey bees and aquatic organisms, and moderately toxic to birds.	Liquid concentrate, Granular, Spray
Pyrethroids	Allethrin Bifenthrin Cyfluthrin Cyhalothrin Cypermethrin Esfenvalerate Fenpropathrin Permethrin Phenothrin Prallethrin Tau-fluvalinate Tetramethrin	US EPA has classified permethrin as a likely carcinogen, cypermethrin and bioallethrin as possible carcinogens and resmethrin as a <u>probable carcinogen</u> . These chemicals are toxic to the nervous system and pose moderate acute ingestion and inhalation toxicity risks to humans. They also may cause allergic reactions and asthma in some people. Be aware that they are highly toxic to aquatic invertebrates and bees. Most products containing pyrethroids also contain a synergist that increases the insecticidal activity of the pyrethroid. Typical synergists include piperonyl butoxide (PBO) and N-octyl bicycloheptene dicarboximide. US EPA considers both of these synergists possible carcinogens.	Liquid concentrate, Spray, Dust
Insect Growth Regulators (IGRs)	(S)-Kinoprene Methoprene	Very low acute and longer-term toxicity to humans and pets. Take care if applying near fish tanks—IGRs are highly toxic to aquatic invertebrates. IGRs do not kill adult bees, but interfere with the growth and maturation of larval bees. Many IGR products also contain an insecticide, usually a pyrethroid.	Liquid concentrate, Wettable Powder, Spray
Microbials	Beauveria Bassiana Paecilomyces Metarhizium anisopliae Chromobacterium	Microbials have such minimal potential human health effects that there is no data available for them. However, Beauveria bassiana and Chromobacterium are highly toxic to bees.	Microorganisms are available in ready-to-use packets
Anthranilic Diamides	Cloranthraniliprole Cyantraniliprole Flubendiamide	No significant acute toxicity via the oral, dermal and inhalation routes of exposure for humans. However, both Cloranthraniliprole and Cyantraniliprole are moderately to highly toxic to bees.	
Keto-Enols	Spiromesifen Spirotetramat	In general, these chemicals have low acute toxicity via the oral, dermal and inhalation routes of exposure. Both Spiromesifen and Spirotetramat have a low toxicity rating for adult bees but are highly toxic to bee larvae.	
Spinosyns	Spinosad Spinetoram	Spinosyns have low acute toxicity via the oral, dermal and inhalation routes of exposure. However, they are considered pesticides of concern due to their high toxicity to bees and other pollinators.	

Regulatory Updates on Aphid-Control Pesticides

Effective September 14, 2011, the EPA issued an [order](#) to terminate certain uses of products containing the active ingredients formetanate HCl and acephate. Canceled uses include apple, peach, pear, and succulent green bean applications. Persons other than the registrant may sell, distribute, or use existing stocks of products whose labels include the deleted uses until December 31, 2013.

On July 13, 2009, the EPA issued a [Final Work Plan](#) (FWP) for the registration review of the active ingredient imidacloprid and is requiring field-based data on imidacloprid to better understand its potential impact on pollinators. The registration review decision is still pending.

References and Additional Resources

- [University of California, Davis IPM Online](#): Pests in Gardens and Landscapes, Aphids
- [University of California, Davis](#): Aphids: Pest Notes for Home and Landscape
- [University of Connecticut IPM Online](#): Managing Aphids in the Greenhouse
- [Oregon State University Extension Service](#): How to Control Aphids with Less Toxic Methods
- [Colorado State University Extension Service](#): Aphids on Shade Trees and Ornamentals
- [National Park Service](#): Integrated Pest Management Manual, Aphids
- Olkowski, William, et al. *The Gardener's Guide to Common-Sense Pest Control*. Newton: Taunton Press, 2013.

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