

Why You Want These Bugs in Custody

Most insects found in your garden don't harm plants. In fact, 97% of the insects you see fall into this category! Such insects are called "beneficials" because they benefit the garden by pollinating plants, improving soil, and eating the pests that really harm plants. These hard-working "beneficials" can be a gardener's best friend by keeping problem pests under control naturally, without the use of harmful chemicals.

Making a Positive Identification

Before you stomp on or spray any unfamiliar bugs in your garden, make sure you know the good guys from the bad guys. Remember that most insects go through several changes during their life cycle, so the young (larva or nymph) may look totally different from the adult. And, keep in mind, it is often the "young" of the insect that eats the most pests. This brochure will help you to identify some of the most common beneficials (both adults and their young) found in local gardens. Here are some tips for attracting and keeping beneficials in your garden:

- **Go Undercover:** Provide beneficials with shelter and over-wintering sites by covering bare dirt with an organic mulch like leaves or bark. Remember to leave a small area of exposed soil to encourage solitary native bees that are "ground-nesters."
- **Lure Them Out of Hiding:** Include a variety of different pollen and nectar-rich plants to provide beneficials with a food source – in addition to pests.
- **Crack Down on Crime:** Pesticides (particularly broad-spectrum pesticides that don't target single pests) kill the beneficials as well as true garden pests. For example, if you use pesticides on buddleia (butterfly bush) to kill caterpillars, you won't get any butterflies! Encourage beneficial insects by not using pesticides! Such chemicals can also run off gardens and lawns with rain and over-watering, entering storm drains – a direct route to local creeks and the Bay where they can impact water quality and wildlife. If you must use a pesticide, use the least toxic product available. For a sample list, go to www.OurWaterOurWorld.org.

Bringing in the FBI: Flowers for Beneficial Insects

Most beneficial insects need to supplement their diets with pollen and nectar. You can attract them to your garden, and encourage them to stay and hunt for pests, by offering them a variety of nectar and pollen-rich flowers. Plants with daisy-like flowers or plants with clusters or umbels of multiple small flowers are especially attractive to beneficials. Choose a diversity of plants that bloom at different times so that the beneficials can feed throughout the year. Many common garden plants suited to our Mediterranean climate will attract beneficials, including oregano, alyssum, borage, dill, angelica, cosmo, tansy, calendula and rosemary.

Here are some California native plants guaranteed to draw in the 10 most wanted

Having a Good Defense

Many native plants have developed natural defenses to ward off insect pests and diseases. These defenses can eliminate the need for pesticides and reduce maintenance costs. Because native plants have adapted to grow in our specific climate, they often require very little care once established and are generally more tolerant of drought. The diversity of natives available offers gardeners great choices for both fragrant flowers and beautiful foliage – and provides food and habitat for our native birds, wildlife, butterflies, and beneficial insects.

Early Fall is an ideal time to plant natives. The cool weather and rainfall will help young plants establish a healthy root system before colorful Spring blooms emerge.

Photo Credits • Ed Ross: Green Lacewing + Larva, Ground Beetle, Bumblebee + Nest, Syrphid Fly + Larva, Soldier Beetle, Parasitic Wasp + Larva, Spider, Ladybeetle + Larva, Tachinid Fly, California Lilac • **Jack Kelly Clark** courtesy UC Statewide IPM Program: Dragonfly Nymph, Ground Beetle Larva, Soldier Beetle Larva, Tachinid Fly Eggs on a Caterpillar © by the Regents of UC • **Mostly Natives:** Yarrow, Buckwheat, Goldenrod, California Aster • **Susan Van Der Wal:** Dragonfly, Seaside Daisy • **Saint Mary's College of California:** Slender Sunflower © 1995

FLOWER	PLANT ATTRIBUTES	BENEFICIALS ATTRACTED
 Seaside Daisy/ Fleabane (Erigeron glaucus)	Evergreen, low-growing perennial has daisy-like flowers that bloom in pinks, whites and lavenders.	butterflies bees lacewings syrphid flies
 Yarrow (Achillea millefolium californica)	Small perennial to 1' tall, with clusters of tiny, whitish flowers and feathery, green foliage. Some cultivars have yellow or pink flowers.	butterflies bees ladybugs parasitic wasps tachinid flies
 Slender Sunflower (Helianthus gracilentus)	Perennial with hairy stems and large, yellow daisy-like flowers. Fall blooming.	bees butterflies lacewings syrphid flies parasitic wasps
 Buckwheat (Eriogonum species)	Perennial that ranges from small ground covers to 3' tall shrubs. Blooms are clusters of tiny pink, white or yellow flowers. Foliage ranges from green to silver/gray.	syrphid flies tachinid flies parasitic wasps lacewings ladybugs
 Goldenrod (Solidago californica)	Perennial with graceful stalks of tiny yellow flowers. Fall blooming	soldier beetles parasitic wasps
 California Lilac (Ceanothus species)	Many different evergreen species including both shrubs and groundcovers. Blooms are showy clusters of blue, purple or white flowers.	syrphid flies ladybugs lacewings bees
 California Aster (Aster chilensis)	Shrubby, deciduous perennial produces lavender daisy-like flowers. Blooms from summer through fall.	bees butterflies lacewings ladybugs syrphid flies

EXPAND YOUR SEARCH!

Books

- *Good Bugs for Your Garden*, Allison Mia Starcher, Algonquin Books, 1995.
- *Natural Enemies Handbook*, Mary Louise Flint and Steve Dreistadt, University of California ANR Publications, 1998.
- *Natural Insect Control, The Ecological Gardener's Guide to Foiling Pests*, Brooklyn Botanic Garden, 1994.

Websites

- Bee Gardens
<http://nature.berkeley.edu/urbanbeegardens>
- Bug Guide: Identification, Images and Information for Insects, Spiders and Their Kin
<http://bugguide.net>
- California Native Plant Society
www.cnps.org
- Invasive Plants and Alternatives
www.cal-ipc.org and www.plantright.org
- Las Pilitas Nursery Native Plant Database
www.laspilitas.com/plants/plants.htm
- Mostly Natives Nursery
www.mostlynatives.com
- Natural Enemies Gallery by UC Davis
www.ipm.ucdavis.edu/PMG/NE/index.html
- Our Water – Our World
www.OurWaterOurWorld.org

Acknowledgments

Developed by Deborah Tidd Consulting and Gina Purin at Marin County Stormwater Pollution Prevention Program. Designed by Schmidt Creative. **For more information, contact Gina at 415/499-3203.**

Mug shots approved for posting by:

The 10 'Most Wanted' Bugs in Your Garden



Guilty of: Controlling garden pests without the need for toxic chemicals

Reward: A healthy, sustainable garden that saves money and resources and protects the health of families, pets and the environment

ASSESSING THE LINE-UP

Here are rap sheets and mug shots on ten beneficial bugs that consume large numbers of pests or pollinate plants. Do not attempt to apprehend them... just let them serve time in your garden!



Lacewing larva and aphid

GREEN LACEWING

Aliases: Aphid wolf, aphid lion.

Wanted For: Aggressively devouring aphids, thrips, mealybugs, scale, spider mites, leafhoppers and insect eggs.

Family History: Adult green lacewings feed on nectar, pollen, and honeydew – at dawn and dusk. Juveniles are voracious predators known to eat up to 60 aphids an hour.

Sightings: Last seen around nectar-producing plants like sunflowers, tansy and buckwheat.



Soldier beetle larva

SOLDIER BEETLE

Aliases: Leatherwings.

Wanted For: Attacking and feeding on aphids and other soft-body insects.

Family History: Adults feed on pollen and insect pests on plants. The larva (or "young") hunt for pests in leaf litter and soil.

Sightings: Known to feed on the pollen of flowers like goldenrod and milkweed while waiting for its prey. Reports of sightings appear in early spring, shortly after aphids begin hatching.



Dragonfly nymph

DRAGONFLY

Aliases: Mosquito hawk, damer.

Wanted for: Preying on unsuspecting flying insects like mosquitoes, flies and midges.

Family History: The dragonfly's excellent eyesight, strong jaws and agile flight make it a deadly predator able to catch prey in mid-air. Dragonfly larvae (nymphs) live in water and are also efficient hunters eating mosquito larvae and other insects, snails and even small fish.

Known Accomplices: Often seen in the company of its relative, the damselfly, another insect predator. Don't be fooled: when at rest, dragonflies hold their wings outstretched while damselflies fold their wings closed over their bodies.

Sightings: Last seen near garden ponds, streams and other bodies of water.



Bumblebee nest cells cut open to show developmental stages

BEE

Aliases: European honeybee, bumblebee. (Also includes hundreds of native bee species including leafcutter and orchard bees.)

Wanted For: Pollinating the flowers of many of our ornamental, fruit and vegetable plants.

Family History: Specially equipped for moving large quantities of nectar and pollen, honeybees are usually found in colonies in hives. Most native bees are masters at eluding notice and often live alone in ground nests. Bee populations are diminishing due to pesticide use, and loss of habitat.

Sightings: Usually seen in gangs in the vicinity of flowers high in nectar and pollen including asters, sunflowers, mints, lavender, rosemary and sages.



Syrphus larva eating broccoli aphids

SYRPHID FLY

Aliases: Hoverfly, Flower Fly.

Wanted For: Hunting down aphids, mealybugs and other pests, and for pollinating plants.

Family History: Adults are known to be important pollinators. The larvae suck the juices out of their victims. A single larva can consume hundreds of victims a month.

Sightings: Larvae are usually found under leaves in the company of aphids. Adults have been seen lurking around ceanothus, sunflowers, feverfew and other nectar-rich flowers.

Master of Disguise: With their yellow and black stripes the adults appear to be bees. They have only one set of wings and can't sting. The larva look like fat, legless caterpillars.



Ground beetle larva

GROUND BEETLE

Aliases: Predacious ground beetle, rove beetle, and carabids, among others.

Wanted For: Conspiring to eat many soil-dwelling pests like slugs, snails, cutworms and root maggots.

Family History: Fast-moving predator, armed with strong jaws. Generally dark brown or black with long legs, and shiny, hard front wing covers that sometimes have a metallic sheen. Usually hunts at night. Reported to be able to consume its body weight in food each day. Larva also feed on soil insects.

Sightings: Usually sighted hiding in soil or under rocks, dried leaves and mulch.



Parasitoid wasp cocoons on caterpillar

PARASITIC WASP

Aliases: Trichogramma, Braconid, Hyposoter and Ichneumon, among others.

Wanted For: Parasitizing the eggs of cutworms, cabbage loopers, codling moths, tomato hornworms, aphids, whitefly scales and other pests.

Family History: These tiny, notorious wasps lay their eggs on or inside of pests or insect eggs and the larva eat the pest. Can be tracked by the tell-tale signs they leave behind, like tiny, white cocoons on caterpillars, or "aphid mummies," – the tan, dried up husks of aphids stuck to a leaf.

Sightings: Suspected of forging for nectar on tiny flowers like alyssum, yarrow, tansy, and clover.



Orb weaver spider
Juveniles closely resemble adults

SPIDER

Aliases: Funnel weavers, crab spiders, and golden orb spiders, among others.

Wanted For: Trapping and bugnapping a wide variety of insect pests.

Family History: The most deadly natural enemy of pests, spiders are skilled predators. They may hunt with webs or track their victims on the ground and on plants. Can be identified as arachnids, with eight legs and two body parts.

Sightings: All over your garden, and on front porches near lights.

Warning: Spiders are thought of as fearsome creepy crawlers but very few have a bite that is harmful. Always wear gloves when cleaning garages, debris, woodpiles, storage areas or piles of clutter.



Ladybug larva and pupa

LADYBEETLE

Aliases: Ladybug, ladybird beetle, seven-spotted ladybeetle.

Wanted For: Gorging on soft-bodied insects like aphids, scale, thrips, mealybugs and spider mites. **Family History:** Both adults and larva eat large numbers of pests. It is believed that one ladybug can devour 5,000 aphids in its lifetime. Most common suspect is red with black spots – but watch for many other species in a variety of colors, with or without spots.

Warning: Be on the lookout for a ladybug look-alike: the spotted cucumber beetle! This green beetle with black spots feeds on crops and foliage.

Sightings: Known to loiter on nectar-rich flowers like yarrow, clover and tansy.



Tachinid fly eggs on a caterpillar

TACHINID FLY

Aliases: Diptera.

Wanted For: Attacking unsuspecting caterpillars and beetles.

Family History: Disguised as a hairy housefly, this parasitic insect lays its eggs on caterpillars, grubs and other insects. When the eggs hatch, the young (larva) tunnel into their victims and eat them.

Sightings: Often seen stealing the nectar and pollen of tansy, milkweed and Queen Anne's Lace.