Beneficial Insects for the Garden and Landscape

Unfortunately when it comes to the subject of insects most people would rather squish first and ask questions later. The truth is that only about 1% of all insects are considered harmful pests, which means the rest is either innocuous or beneficial. Sadly about 13% of insect captures in bug zappers are "beneficials" while 43% are harmless and less than 1% bite humans. This means that one way we can start immediately to conserve beneficials is to turn off the zappers for good!

Let's look at the three groups of beneficial insects:

1. The first group is considered beneficial with respect to their abilities to pollinate other plants. Many of our food crops would fail to set fruit and flourish were it not for these insects.

2. The second group acts on harmful insect populations. Beneficial insects in this group can be predators, parasites or parasitoids. A predator simply hunts other insects. A parasite lives at the expense of another but does not actually kill. A parasite can disable the host or decrease the host's ability to feed or reproduce. A parasitoid on the other hand actually kills its host. Often included in this group are the spiders, the centipedes and the predatory mites even though they are not truly insects. Members of the this group of beneficials may be generalists, feeding on everything that comes their way including good guys or innocuous insects, or they may be specialists feeding only on one group or a few selected prey.

3. The third group includes those that break down rotting materials. Without this group we would be knee deep in garbage!

The best way to increase beneficials in your landscape is through conservation. This means learning to recognize beneficial insects in all stages including eggs and juveniles. It also means making a positive identification before killing something you feel is a pest. Finally, conservation also means choosing pesticides that will have the least impact on beneficial populations

For most people, the most important aspect is which insects can be used to control other insects. This is known as biological control.

The Good Guys

Beetles

Beetles have two hard outer wings and two inner, membranous wings. They come in many shapes, sizes, and colors and feed on many different groups of insects. Beetles may be generalists or specialists and feed with chewing mouthparts. The following is a list of beetles commonly found.

Ground beetles *(Carabids)* are predators of grubs and scarab eggs. They are fast runners, and are many different shapes, colors, and sizes. They may be iridescent. They are excellent predators of grubs and scarab eggs as well as other insects. One is know for climbing trees to feast on gypsy moth caterpillars. People often think they are roaches but you can tell they are not by looking at their short antennae. They are nocturnal and may live 4 years. They are occasionally attracted to light and if you find them in the house, they may be after other insects, or there may be construction near by. They have ridged wing covers and are 0.25-2" long. They are more common

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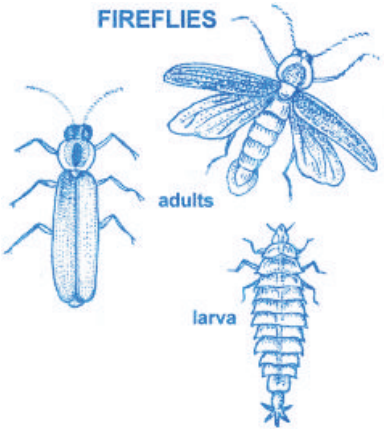
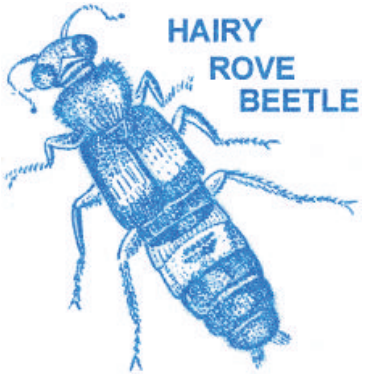
in mulched landscapes. The larvae are grub-like but shiny, very active, and hide in soil, grass, debris, or dead bark.

Tiger beetles are shiny flattened beetles with ridged wings 0.5-1" long. They have big eyes. The larvae live in soil, hunt like trap door spiders, and have a camel like hump on their back and dorsal hooks. You will see them often in light dry soils, especially in damp areas.

Soldier beetle adults look like firefly beetles except that colors are opposite. They are orange with dark elongate areas and their heads can be seen from above unlike firefly beetles. Adults eat pollen, nectar, aphids, and soft-bodied insects. The larvae look like velvet coated grubs, and are found in soil or under damp bark. The larvae enjoy a diet of maggots, grasshopper eggs, and caterpillars.

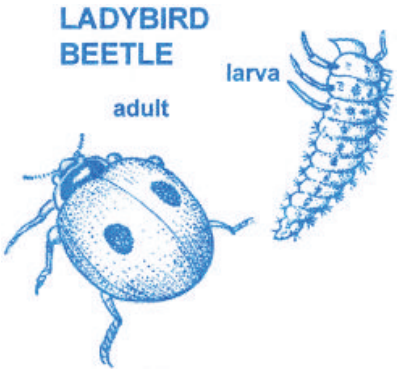


Fireflies/lightning bugs are actually beetles. The larvae are predaceous and the adults don't feed at all. The larvae are flattened, and look a bit like the tower of Pisa. They live in soil, and also glow (they may be called glowworms along with other glowing larvae), where they eat insects and snails.



Rove beetles are predators of other insects found in decaying organic matter, especially root maggots. They have very short wings. Rove beetles may be parasitic on fleas, ants and termites. They also may come indoors in the soil of houseplants that were summered outdoors. They like to hide in hedges.

Flower beetle adults are less than 10mm! These beetles are oval with thick black or green stripes on an orange background. The larvae are pink to orange and are found in humus. The larvae look like ground beetle larvae. They are predatory on flea beetles.



Ladybugs actually should be called lady beetles. The larvae look nothing like the adults. The larvae look like alligators, and are blue or black with orange spots. It takes one month from egg to adult. The pupal stage looks like an army helmet. A great way to encourage lady beetles is to make sure you have some flowers (even dandelions) around so that they also have pollen to eat.

Here are some ladybug tips:

- ❖ If you are going to introduce commercially purchased lady beetles into your yard, make sure you already have enough insect pests for them to dine on when they arrive.
- ❖ They will also be thirsty so make sure you mist them with a gentle spray of water when you get them home.
- ❖ Keep them out of the sun and wet the soil and foliage where they will be released. When night comes, open the bag, lay it at the base of one of the infested plants and let the ladybugs crawl out on their own.

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- Many garden centers carry them in late spring.

- The convergent lady beetle (*Hippodamia convergens*) is the most common for indoor use. They eat aphids and whiteflies. When releasing lady beetles indoors, enclose adults with plants in a net tent to prevent them from leaving if possible. Black lady beetles called crypts (*Cryptolaemus montrouzieri*) are also known as mealybug destroyers although they eat scales as well (try 2-5 beetles/square meter of infested growing area).

Centipedes

Centipedes get a bad rap most of the time. The house centipede, with its long antennae and legs and habit of scurrying has sent many a homeowner for the flyswatter. They are actually very efficient predators but they can bite humans. The bite is similar to a bee sting and they inflict the bite with poison fangs. The house centipede favors houses with crawl spaces or very damp basements where it can find plenty of other insect prey.

Providing adequate ventilation in crawl spaces can reduce both numbers of centipedes and their prey. Another kind of centipede occurs outside, often under stones or other debris. More of its favorite gathering places include foundation walls and under eaves. It is also an effective predator and should be left alone.

Spiders

All spiders are predators. If you have a large number of spiders in your house, they have to be eating something! Since they are generalist feeders, they may be eating each other! Outside, in natural, undisturbed areas, you may have an average spider population of 1 every 3 square inches.
Spiders are very nearsighted, not aggressive, and usually "bite" only when seriously provoked. Often their jaws may not be strong enough to pierce the skin at all. Dangerous ones are found in dark, hidden corners, not in the open air. Conserve spiders in your landscape by providing vegetation of varying heights.

Mites

We think of mites as always being bad guys but actually there are many predatory mites that happily feed on the slower plant feeding mites. *Phytoseiulus persimilis* is a tropical predatory mite that can be purchased commercially for application to indoor plants. A mated female eats 5-20 plant feeding mites/day! For best results, avoid bright sun and provide bridges from plant to plant such as overlapping canopy leaves. They are very sensitive to pesticide residues though, even months after treatment.

Use 20 per cubic yard of plant (2 per plant for small plants), and hairy or sticky foliage may need more. When mites arrive, place them in a cool spot out of bright sunlight. Inspect your purchase. They should be active at room temperature. Distribute them as soon as possible (although early morning is best!) Lightly mist plants, rotate vials gently to disperse mites, sprinkle directly on infested leaves. Misting again after distribution helps keep mites on the foliage, but do not drench them. Predatory mites will migrate to the undersides of leaves, and you will begin to see control after 4-6 weeks

Neuropterans or nerve winged insects

Neuropterans include Green Lacewings which are one of the best known beneficial insects. Immature lacewings are called aphid lions. These larvae are mottled, and pointed on either end with large, sickle like mouthparts. They eat pollen and honey dew along with insects. Egg to adult takes one month, and there may be 10 generations/year. Adults are attracted to flowering plants. If you are going to buy them, they should be ordered well before winter sets in since a

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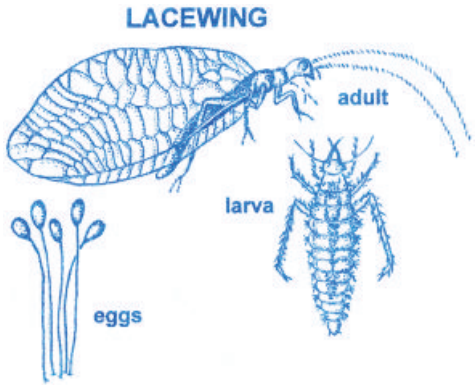

trip in the cold can irreparably damage them. Lethargy upon delivery of either ladybugs or lacewings may indicate cold damage during shipping. Lacewings are predators of aphids, thrips, mealybugs, scales, and spider mites. Place two larvae on each affected plant. Providing an artificial diet for adults increases egg laying dramatically. Lacewings eat tons of pests in the landscape so preserve them by not using broad-spectrum pesticides unless absolutely necessary. Lacewing eggs look like tiny white dots at the ends of stalk like threads. There are also brown lacewings, which are smaller, and their eggs are NOT laid on stalks. They are often found in wooded areas. They tolerate cooler temperatures and are responsible for keeping pests low early in the season. Their larvae are similar to green lacewings.

True bugs

True bugs have a piercing sucking beak, which they use to suck up the body fluids of their prey. There are many predatory bugs. Bugs can be distinguished from other kinds of insects by the fact that their wings are half hard and half membranous

Big-eyed bugs prefer hot, sunny, dry habitats like sandy or grassy banks, or thin lawns. They are predators on eggs, spider mites, plant bugs, leafhoppers, aphids, and caterpillars. They often migrate into lawns damaged by chinch bugs.

Insidious flower bugs/minute pirate bugs are even smaller than big-eyed bugs. They are 1/8" long, black with white wing patches, and very mobile. The nymphs are teardrop shaped, and yellow, orange or brown. They eat thrips, aphids, spider mites (30/day!) and insect eggs, and occasionally sip sap without harm to the plant.

Predatory stinkbugs are much larger and it is often hard to tell them apart from their plant pest cousins. The spined soldier bug and spotted stinkbug are two especially important predators. Adults range from 3/8" to ½" long. They have shield like backs and five segmented antennae. They eat caterpillars, beetle larvae and slow moving insects. The bad guys are often green while good guys are pale brown or tan with spurs on their shoulders and a dark line on the tip of each wing. Nymphs are rounded and marked with yellow, orange and red. Two spotted stinkbugs are red, black or yellow, nymphs are red and black and these predators are especially useful against Colorado potato beetles.

Assassin bugs are some of the strangest looking beneficials with their wide stomachs, and long narrow heads. They almost look as though they have a neck! They may have spines on their thorax (wheel bugs) and the eggs look like old-fashioned glass milk jugs with white caps. Nymphs look similar to adults. Both stages feed on a wide variety of insects by spearing the host with a hypodermic mouthpart, ejecting enzymes that digest body contents then sucking the predigested innards.

Ambush bugs have cryptic coloring that allows them to hide their small, stout bodies and wide rear ends. All ambush bugs are predatory. They eat bees, wasps, butterflies, and flies. They hide inside flowers. The larvae look like adults.

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Damsel bugs are elongate brown bugs about 1/3-1/2 an inch long. The wings are easily recognized by the series of cells on the edges, which give them almost an art deco appearance. They eat small insects like beetle larvae, aphids, leafhoppers, and caterpillars. They are found most often in low growing grasses and ground covers.

Crickets

Tree crickets are unusual looking slender green insects with long antennae. They are solitary and eat foliage, fruit, fungi, pollen, and small insects. Many people kill this omnivore, mistaking it for a harmful cousin.

Ants and wasps

Ants and wasps, believe it or not, are excellent predators! Ants are the predominant predators of roughs, fairways and home lawns. They prey on the eggs of the cutworm, the sod webworm, and scarab beetles such as the Japanese beetle. Ichneumonid wasps are long and slender insects with long, coiling ovipositors. They have a single black pane in their wings. They constitute the largest of all insect families with 60,000 species. They are classic examples of parasitoids, and use moth, fly or beetle hosts. Unfortunately, they terrify people with their long ovipositors. The wasps use these to drill into tree bark to lay eggs in prey rather than as a stinger. If you find them indoors, simply capture and release outdoors.. Tiphiid wasps are also scarab beetle parasites. They are tiny, only about a quarter of an inch long and shiny black. You'll see the greatest levels of parasitism by these wasps in grassy areas near weedy borders, or in naturalized areas.

One of the most important wasp beneficials can hardly be seen with the naked eye! Aphid mummy wasps are less than 1/8” long. Look closely at aphid colonies to see whether there are brown or white bloated aphid bodies or mummies, which are the end products of the wasp's labors. If you see them, leave them alone to do their job!

Braconid wasps are tiny, dark colored wasps with a single black pane in their wings. The classic biological control of the tomato hornworm is due to a braconid wasp parasite. You'll see little white sacs on the outside, which are cocoons of the wasp. When you see these, leave the hornworm in place because it will not survive AND it serves as a good disseminator of more braconids.

Trichogramma wasps are also famous for their ability to act as a biological control. These are even smaller at less than 1/16” long! They are the most widely used wasps for biological control on a commercial basis, and are used mostly to control for moth eggs (which turn black after they have been parasitized).

Aulacid wasps are parasitoids of wood boring beetles, chalcid wasps are parasitoids of moths, flies and beetles, cuckoo wasps parasitize other wasps and sometimes walking sticks. Digger wasps and mud daubers are fabulous beneficials, which are often carelessly killed because humans perceive them as a stinging threat due to their predilection for nesting around or within our homes. These wasps will sting an insect or spider, leaving them paralyzed but not dead. They then lay eggs on the paralyzed host so there is plenty of food when they hatch.

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Flies

Flies are perhaps some of the most vilified insects know to man, but yet some of the best beneficials belong to this group! The **robber flies**, of which there are 4000 species, have hairy bodies with long, tapering abdomens and a depression in their heads behind their eyes. They are 0.5-1" long and the worm-like larvae eat other insect larvae in the soil. Adults eat leafhoppers, small beetles, wasps, bees, and grass hoppers.

You can encourage robber fly populations by having flowering plants available throughout the growing season. Aphid midges are another member of the fly family that provides good biological control of aphids. The adults look like tiny mosquitoes (less than 1/8"), and they fly at night. The larvae are bright orange or red wormlike larvae. The aphids are paralyzed then sucked dry by larvae, which are commonly seen mid-late summer. Aphid midges are most effective when temperatures are 68-80; there is high humidity, and strong winds. Mass release of aphid midges has successfully controlled aphids in small back yard areas. If you purchase aphid midges, make sure you have an alternate food source for the adults.

Tachinid flies look like houseflies with their hairy and gray-brown bodies. They walk or take short hopping flights to agitate caterpillars and beetle larvae. Adult tachinids feed on nectar or honeydew. They attack corn borers, earworms, cabbage loopers, imported cabbage worms, army worms, Japanese beetles, leaf eating beetle larvae and squash bugs. The eggs are deposited just behind head of host, and upon hatching the maggot bores into the host and feeds in a protected atmosphere.

Syrphid flies are also called hover flies or flower flies due to their habit of hovering around blooms. They may even resemble bees or wasps by being yellow and black striped with short antenna and large eyes. They come in variable sizes but can always be recognized as flies by the fact that they only have two wings. The adults feed on nectar and pollen, and the slug like larvae can eat 400 aphids/day each! When eggs are laid near aphid infestations, the larvae will continue to eat for 2-3 weeks. Plant things like dill, carrots, angelica, and horseradish to attract them to your yard and garden.

Snipe flies are predaceous on a variety of small insects in both the adult and larval form. The larvae will often be present in decaying organic matter.

Making biological control work

It's not as difficult as it sounds. Conservation of natural enemies is the first step. Careful observation is the next: remember that 10% of a plant's leaves can be chewed, distorted or discolored before most people recognize there's a problem! The ultimate goal in pest control when you are maintaining a healthy population of beneficials is NOT elimination but reduction to an acceptable level.

There are three major ways that beneficials can work for you: classical biological control, conservation of natural enemies, and augmentation of biological control

1. Classical biological control is the process where we import natural enemies from the pest's homeland for use in this country. This methodology is experimental and very slow and cannot be attempted by the homeowner.

2. Conservation is the best method for the homeowner, provided NO BROAD SPECTRUM PRODUCTS are used for pest control. Recall too that pests are often much more efficient at reproducing than their predators so there is a lag

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time before natural controls build up to sufficient levels to control the pest population.

3. Augmentation is the process of introducing living biological control organisms into areas where the pest is problematic but before you do this you must ask the following:

- ❖ Are other natural enemies present?
- ❖ Are they present at levels that will effectively control the pest?
- ❖ If you answer yes to both questions, a do nothing policy may be best and cheapest!

Proper plant care should always accompany biological control efforts and make sure you use management tactics that will have minimal impact on beneficials. You should know how to recognize ALL life stages of natural enemies, and if you do need to treat plants for pest problems, try to use oils, soaps and bacterial preparations for minimum impact on beneficials.

Pest problem	Predator
Scales	Scymnus Hyperaspis Microweisea Brachiacantha Chilocorus
Spidermites	Stethorus
Aphids	Anatis Coccinella Hippodamia Adalia Coleomegilla Harmonia

If you are going to order lady beetles for augmentation, you should know that different lady beetles have different taste preferences.

Refer to the list below left to match the right predator for the right pest problem.

If you don't gain instantaneous control of your problem don't despair. Although your bio-control program may not be keeping pests below threshold, you are still making an impact on pest reproductive fitness. Combining biological control with other alternatives may make enough of an impact on the pest to help the biological control work better or visa versa.

Remember that a simple change in materials you use on your plants may help to conserve your beneficials. Any products including organic products that have an impact on the nervous system are likely to bother your beneficials. Don't use pesticides with residuals for at least a month before introducing beneficials. Pyrethrin based products degrade quickly so you can use them up to a week before introducing beneficial insects.

If you are wondering what plants you have or can acquire to boost beneficials in your garden, refer to the following list.

- ❖ Angelica attracts lacewings, lady beetles, parasitic wasps.
- ❖ Anise attracts parasitic wasps, tachinid flies and lady beetles.
- ❖ Borage attracts bees.
- ❖ Caraway attracts parasitic wasps and flies.
- ❖ Catnip attracts bees and parasitic wasps.
- ❖ Nasturtium shelters ground beetles and spiders.
- ❖ Rock cress attracts bees, shelters ground beetles and spiders.
- ❖ German chamomile attracts syrphid flies and parasitic wasps.
- ❖ Chervil attracts syrphids and parasitic wasps.
- ❖ Curry plant attracts parasitic wasps, flies and other predatory insects.

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❖ Dill attracts lady beetles, wasps, spiders, hoverflies and bees.
❖ Fennel attracts hoverflies, parasitic wasps, lady beetles, tachinid flies.
❖ Lavender attracts bees.
❖ Lovage attracts beneficial wasps and shelters ground beetles.
❖ Parsley attracts parasitic wasps if permitted to flower.
❖ Rue attracts ichneumonid and predatory wasps.
❖ Spearmint attracts predatory wasps and flies, shelters spiders.
❖ Sweet annie (an artemesia attracts parasitic wasps and syrphid flies).
❖ Sweet cicely attracts beneficial wasps and flies.
❖ Bee balm attracts bees and parasitic wasps.
❖ Gayfeathers attracts parasitic wasps, hoverflies, butterflies and hummingbird moths.
❖ Golden asters attract a wide range of beneficials.
❖ Goldenrod attracts a wide range of beneficials.
❖ Hardy marguerite attracts lady beetles, parasitic wasps.
❖ Santolina (lavender cotton) provides shelter for predatory beetles.
❖ Painted daisies attract tachinid flies, parasitic wasps and other beneficials.
❖ Pincushion flowers attract hover flies and tachinid flies.
❖ Cone flowers attract beneficial wasps, flies and spiders.
❖ Sea hollies attract chalcid wasps.
❖ Yarrow attracts hover flies, lady beetles and parasitic wasps.
❖ Candy tuft attracts hover flies and protects ground beetles.
❖ Bachelor's buttons are a great nectar source for beneficials.
❖ Black eyed susans attract hoverflies and parasitic wasps.
❖ Blanket glowers are a great nectar source for beneficials.
❖ Blue eyed African daisies are an excellent nectar source for beneficials.
❖ Calendula attracts a large variety of beneficials.
❖ Calliopsis attracts hover flies, spined soldier bugs and tachinid flies.
❖ Cosmos attract hoverflies, parasitic wasps, tachinid flies, and bees.
❖ Dwarf morning glory attracts hove flies and lady beetles.
❖ Gazania attracts lady beetles and spined soldier bugs.
❖ Marigolds attract hover flies and parasitic wasps.
❖ Mexican sun flowers attract beneficial wasps and flies, spined soldier bugs and provide spider shelter.
❖ Common sun flowers attract hoverflies, lacewings, parasitic wasps, tachinid flies and bees.
❖ Swan river daisies attract tachinid flies.
❖ Sweet alyssum attracts and shelters ground beetles and spiders.
❖ Zinnia attracts lady beetles, parasitic wasps and flies, and bees.

Weeds can also attract beneficials! See the following list of weeds to conserve for a boost in your beneficial populations.

❖ Wild asters: ambush bugs
❖ Buttercups
❖ Corn spurrey (best of all for hoverflies)
❖ Dandelions (excellent source of pollen)
❖ Lamb's quarters
❖ Wild mustards
❖ Oxeye daisy
❖ Queen Anne's lace
❖ Red sorrel