

*Providing Leadership in Environmental Entomology*

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## Beneficial Insects and Related Arthropods

Many different kinds of insects are found in and around our homes, gardens, and yards. Most of these insects are completely harmless and may even provide valuable services for us. Usually, when we hear beneficial insects, we think of things like honey bees that produce honey and beeswax. More importantly honey bees pollinate a wide range of fruit, vegetable, and field crops plus many flowers and other ornamental plants we enjoy in our yards.

People rarely see the many other insects that help keep pest insects that feed on our gardens and ornamental plants under control. Nearly everyone recognizes lady beetles and preying mantids. We need to recognize the many others that attack pest insects.

Beneficial insects fall into two general categories: parasites and predators. We will discuss their differences and show examples.

Parasites are usually the immature or larval stages of wasps and flies. The adult wasp or fly will lay an egg in or on the egg or immature stage of the pest insect. The pest insect then becomes the host for the developing parasite. Some adult parasites that lay their eggs in the host egg are so small that they are difficult to see without a magnifying glass. Others may be as much as 1.5 inches long. A parasite larva usually feeds inside and slowly destroys a single host. Parasites usually take longer to become established than predators, but can severely limit a pest population.

Aphids that a parasite has attacked take on a bloated appearance and stick to the leaf surface as they die. We often call these aphid mummies. When the adult wasp is ready to leave the mummy, it cuts a circular opening in the back of the aphids body (Fig. 1).

Caterpillars often carry several parasite eggs. We often find a large caterpillar with many white parasite cocoons attached to their body (Fig 2).

Predators are usually larger than parasites. Both the adult and immature stages may be predators while only the immature stages of parasites attack pest insects.



Figure 1. A parasitized aphid mummy showing the parasite exit hole.



Figure 2. A tomato hornworm covered with parasite cocoons.

Predators include a wide range of insects, mites, and spiders. Predators actively seek and capture their prey. They either eat the whole prey or suck out the prey's body contents. A single predator, whether an adult or immature, will kill and eat many prey during its life. In contrast, parasites kill only one host during their life. Predators may be generalists that will kill and eat any insect they can capture or they may be specialists that feed only on a few specific pest insects. Usually, the specialists are more valuable in controlling pests since that is all they feed on. Generalists may also kill and feed on other beneficial insects. We will discuss some common predators.

**Lady Beetles:** Most people recognize at least some lady beetles. However, lady beetles have a wide range of colors and markings. They range in size from 0.04 to 0.3-inch. Their color may be red to orange with black spots, black with red, white, or yellow spots, or black or red or orange with no spots. Some lady beetles, such as the Multicolored Asian Lady Beetle may range from red to orange and have many dark spots to no spots. We show several lady beetles in Fig 3. Both adult and immature lady beetles feed on a wide range of pests including aphids, scale insects, insect eggs, mites, and other small insects. A single lady beetle can eat 62 aphids per day. Adult lady beetles spend the winter in protected areas such as piles of leaves, old buildings. Unfortunately, some may invade homes where they can be a real nuisance (See E.I.S. HS-3 Multicolored Asian Lady Beetle). In the spring, the adults move to various types of plants that have suitable prey on them. They lay football-shaped yellow or yellow-orange eggs (Fig 4) in clusters on leaves, stems, twigs, and other plant parts that contain prey

insects. The immature lady beetles (Fig 5) that hatch out are usually blue-black with orange markings and resemble tiny alligators. They are voracious predators and feed for a few weeks before changing to the pupal or resting stage (Fig 6). During this stage they change from an immature to an adult beetle.



Figure 3. Various lady beetles showing color and size range.



Figure 4. Lady beetle eggs attached to a leaf.



Figure 5. A lady beetle larva feeding on aphids.



Figure 6. A lady beetle pupa. During this stage it changes from a larva to an adult.

**Lacewings:** Adult lacewings, sometimes called aphid lions. They are easily identified by their delicate, netted wings, which they hold roof-like over their body while at rest. There are two kinds of lacewings, green and brown (Fig 7). Green lacewings lay their eggs on short stalks. They may lay them singly or in clusters. The immature stage is the most important as a predator. The immature lacewings resemble lady beetle larvae but can be told apart by the sickle-like mandibles jaws that stick out in front of their head (Fig 8). A single lacewing larva can eat 25 to 30 aphids each day. When the larva is ready to change to an adult, it spins a round cocoon attached to a leaf (Fig 9). It takes three or more weeks for a complete life cycle from egg to adult.



Figure 7. Brown lacewing (top) and green lacewing (bottom) adults.



Figure 8. A lacewing larva feeding on aphids.



Figure 9. A lacewing cocoon attached to a leaf.

**Syrphid Flies:** Adult syrphid flies are often called hover flies (Fig. 10). They resemble bees, are strong fliers, and often hover a few inches in front of a person's eyes for a moment and then dart away. The adult flies are not predaceous and feed on nectar, pollen, and honeydew. The larvae are predators of aphids and scale insects.

The larvae are greenish brown to purple in color and slug-like in appearance (Fig 11). The larvae may be as much as 0.4 inch long when mature. The body tapers toward the head. Other parasites and predators often attack syrphid fly larvae and pupae.



Figure 10. A syrphid fly adult feeding on nectar.



Figure 11. A syrphid fly larva feeding on aphids.

**Assassin Bugs:** These large (0.5 to 1.5 inches) predators have narrow, elongated heads that give them the appearance of having a neck. One large, easily recognized member of this group is the wheel bug (Fig 12). It has a distinctive crest on its back that resembles a cog wheel. Immature assassin bugs resemble the adults except they are smaller and lack wings.

Assassin bugs insert their needle-like mouthparts into their prey and suck out the juices leaving a dry shell. Immatures feed on small, soft-bodied insects like aphids while the adults capture larger prey like caterpillars. We should handle assassin bugs with care. Larger ones can produce a very painful bite.



Figure 12. Wheel bugs on a pecan.



Figure 13. A predatory damsel bug.

**Damsel Bugs:** Adult damsel bugs are between 0.3 and 0.5 inches long with bodies that taper toward the narrow head (Fig 13). They are usually tan or gray and have long needle-like beaks used to pierce the body of their prey. They feed in the same way as assassin bugs. Both adults and immatures are general feeders. Damsel bugs attack aphids, mites, and small caterpillars.

**Stink Bugs:** Most stink bugs feed on plants. Several stink bugs are very good insect predators. They feed on various soft bodied insects and caterpillars (Fig. 14). Some kinds of predatory stink bugs, like the spined soldier bug, live for more than two months.



Figure 14. A predatory stink bug feeding on a caterpillar.

### General Predators

**Preying Mantid:** Almost everyone recognizes this predator (Fig 15). The color may vary from a light brown to green. Mantids have excellent eyesight and are fun to watch. They will follow any movement, whether an insect or your finger. The front legs are modified for grasping prey. Mantids will feed on anything they can capture. This includes many pest insects, other mantids, and other beneficial insects.



Figure 15. Brown and green preying mantids.

Preying mantids spend the winter in the egg stage. In the fall, the female lays many eggs on twigs and small branches. They enclose the eggs in a protective coating that resembles Styrofoam.

Sometimes these egg masses will be found on Christmas trees. If brought inside, the eggs can hatch and several hungry little mantids will be roaming around the house.

**Spiders:** While spiders are not insects, they can be good general predators of pest insects. Sometimes, we may not give spiders enough credit for helping to control pest insects. There are many different kinds of spiders. Many spin a silk web that we commonly see on various shrubs, trees, flowers, and even on the grass. Early morning is the best time to see spider webs,

especially when there has been a heavy dew. The webs have strands of sticky silk that captures any insect that happens to run into the web. The spider then bites the prey, injects venom that paralyzes it, and usually wraps it in a silk bag (Fig. 16). The spider will return later to feed on the insect. Although spiders may capture beneficial insects, they capture many pest insect adults that fly.



Figure 16. A common garden spider with a captured insect.

A few spiders are active hunters and roam about searching prey insects. Some of these, such as wolf spiders, can be large. Hunting spiders are usually much more robust than spiders that depend on silk webbing to capture their prey. Some hunting spiders live in burrows lined with silk and capped by a trap door. We commonly refer these to as trap door spiders. The spider remains in the burrow until a passing insect bumps into the silk strands along the ground. The spider then jumps out of the burrow and captures the insect.

**Predatory Mites:** Mites are not insects, but are more closely related to spiders. Some mites are very good predators of plant feeding mites. In many commercial fruit growing areas, predatory mites are the main control for spider mites. Predatory mites are usually more pear-shaped than plant feeding mites (Fig 17). They also are much more active than spider mites and other plant feeding mites. Predatory mites are more of a golden-tan to reddish-orange color as well.



Figure 17. A predatory mite. Note the plant feeding mite eggs above this mite.

### CONSERVATION OF BENEFICIAL INSECTS

Avoiding unnecessary insecticide applications can conserve beneficial insects and spiders. Always be aware of what is going on in the yard, garden, or orchard. Avoid treating pest insects if predators and parasites are present and active.

If treatment is necessary, consider using materials such as insecticidal soaps and B.t. formulations, such as Dipel whenever possible. If other materials have to be

used, avoid applications when beneficials are active on the plant.

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