

Natural Enemy Field Guide

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This guide is a product of the Great Lakes Vegetable Working Group <http://glvvg.ohio-state.edu>



Natural Enemies are beneficial organisms that provide biological control, or natural pest control. Many natural enemies are insects. This guide illustrates common natural enemies found in agricultural crops and home gardens. In addition to photos, we indicate key characters to identify each natural enemy. The **purple bar** on the photos indicates the length of each insect. Two bars on one image indicate a size range.

Lady Beetles (Coccinellidae), also called ladybugs, feed on aphids, mites, caterpillars, and other soft bodied pests. There are many species and several found in agricultural habitats are shown below. Like all insects, lady beetles have three body regions; a **HEAD**, **THORAX** and **ABDOMEN** (see photo at right). To identify species, examine characters on both the pronotum (plate that covers the thorax) and the wing covers, which protect the abdomen.



Multicolored Asian Lady Beetle
(*Harmonia axyridis*)



May or may not have black spots on wing covers. Look for the black "W" shape on pronotum.

Checker Spot Lady Beetle
(*Propylea quatuordecimpunctata*)



Yellow wing covers with square-shaped black spots. Also called the "Fourteen Spotted" lady beetle.

Seven Spotted Lady Beetle
(*Coccinella septempunctata*)



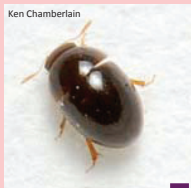
Red wing covers with 7 black spots. Two white spots on pronotum.

Polished Lady Beetle
(*Cycloneda munda*)



Pronotum with white border. Red wing covers lacking spots.

Scymnus Lady Beetle
(*Scymnus spp.*)



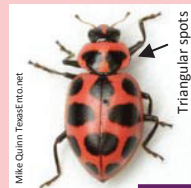
Tiny dark brown lady beetles. Tips of wing covers are light yellow-brown.

Parenthesis Lady Beetle
(*Hippodamia parenthesis*)



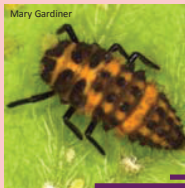
Red wing covers with parenthesis-shaped spot.

Pink Lady Beetle
(*Coleomegilla maculata*)



Bright red to pink wing covers each with six spots. Pronotum has two triangular spots.

Lady Beetle Larva
(Immature stage of lady beetle)



Sometimes called aphid alligators. They are black with light markings and appear spiny.

Ground Beetles (Carabidae) are predatory as both adults and larvae. The larvae are found underground. Most adults forage at the soil surface, although some will climb plants to search for prey. Ground beetles feed on eggs and larvae of root maggots, aphids, caterpillars, beetle larvae, snails, slugs, and weed seeds. They are typically dark and shiny with threadlike antennae. Color varies but most are dark brown, black, or metallic. The wing covers often have striations or pits.



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Striations on wing covers

Predatory True Bugs (Hemiptera) feed on aphids, caterpillars, beetle larvae, and other soft bodied pests. Juvenile stages of true bugs are called nymphs. Both nymphs and adults consume prey using piercing-sucking mouthparts, which form a straw-like beak.



Minute Pirate Bugs
(Anthracoridae)



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Assassin Bugs (Reduviidae)



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Mary Gardiner

These small insects, also called Flower Bugs, can be found foraging on plants. They also feed on pollen and nectar so providing flowering plants can sustain their populations. They are oval-shaped with a pointed head and have black and white wing patches.

Assassin bugs are voracious predators that inject a toxin into their prey to paralyze it and make consuming it easier. They attack a diversity of insects including caterpillars, beetles, and leafhoppers. Many species have a slender head and large visible beak. The Wheel Bug is one of the largest assassin bugs. It is grey in color and gets its name from a half-circle of spines found its thorax.

Assassin bug nymphs may be brightly colored and often have spines on their front legs or thorax. In some species, they closely resemble adults but with wing pads instead of fully formed wings.

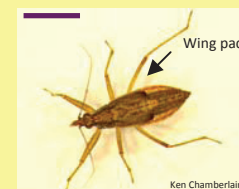
Damsel Bugs (Nabidae)



Enlarged front legs

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Adults are gray to brown and slender, with enlarged front legs and a curved beak. They forage on plants for aphids, caterpillars, and other soft bodied pests.



Wing pads

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Damsel bug nymphs look similar to adults, but with wing pads instead of fully formed wings.

Predatory Stink Bugs (Pentatomidae)

There are many species of stink bugs and the majority feed on plants. The spined soldier bug and two-spotted stink bug are two predatory species found in the Great Lakes states. The spined soldier bug feeds on caterpillars, beetle larvae, and other soft bodied pests. The two-spotted stink bug is a predator of Colorado potato beetle larvae.

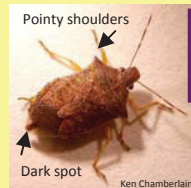
Two-Spotted Stink Bug
(*Perillus bioculatus*)



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Shield-shaped, dark body with bright yellow to red markings.

Spined Soldier Bug
(*Podisus maculiventris*)



Pointy shoulders

Dark spot

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A dark spot is visible on the tips of the wings. "Pointy shoulders" or points found on edges of pronotum.



Laura Buck



Ric Bessen

Nymphs of both species are round with bright markings.

Wasp and Fly Parasitoids (Hymenoptera and Diptera) are important biocontrol agents of many pests. They have a unique life cycle and require a host insect to develop. Females lay their eggs either on, in, or near the host. The larva hatches and feeds within the host, ultimately killing it and emerging as an adult.



Parasitoid Wasps (Hymenoptera) vary in body size from tiny egg parasitoids less than 1/16 inch to large species greater than 1 inch in body length. Parasitoids attack a large diversity of insect pests. Some species in the family Ichneumonidae (above left) have an ovipositor greater than 2 inches in length, which females use to lay their eggs in larvae boring within trees. Several species in the family Braconidae (above right) attack aphids and caterpillar pests.

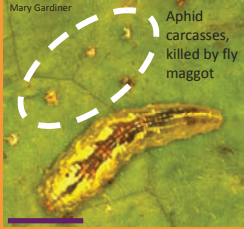
Parasitoid Flies (Diptera: Tachinidae) attack many insect pests including caterpillars, beetles and true bugs. The feather legged fly, *Trichopoda pennipes* (below left) is a parasitoid of the squash bug. The tachinids *Celatoria diabroticae* and *C. setosa* (below right) are parasitoids of cucumber beetles.



Predatory Flies

Hover Flies (Syrphidae)

Hover flies are pollinators as adults and predatory as larvae. Adults resemble bees or wasps, but have only two wings.



Aphid carcasses, killed by fly maggot

Female hover flies lay their eggs in aphid colonies.



The slug-like eggless maggots are an effective aphid predator.

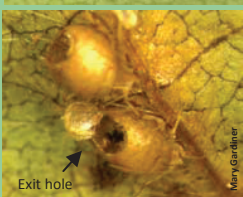
Aphid Predatory Midge (Cecidomyiidae)

The aphid predatory midge *Aphidoletes aphidimyza* is also an important aphid predator. The adults are tiny "mosquito-like" flies that are difficult to spot. The predatory maggots are bright orange to pink in color.

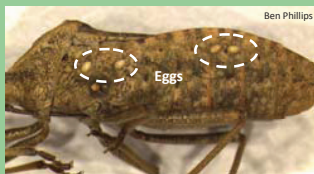


Evidence of wasp parasitism such as aphid mummies or parasitized caterpillars are often easier to spot than parasitoid adults.

Aphid Mummy: These aphids (images at left) were consumed by a wasp larva. The wasp pupated inside the dead aphid transforming its exoskeleton into a golden pupal case called an "aphid mummy". The wasp adult emerges by chewing a round "exit hole".



Parasitized Caterpillar: Depending on the parasitoid species and host, sometimes multiple parasitoid larvae can develop within a single host. This tobacco hornworm is covered with parasitoid wasp pupae.



Parasitoid Fly Life Cycle: Eggs of parasitoid flies are sometimes visible on their hosts (above left). Larvae burrow into the host and feed. The flies emerge from the host to pupate (above right and image at right).



Lacewings

Green Lacewing (Chrysopidae)



Brown Lacewing (Hemerobiidae)

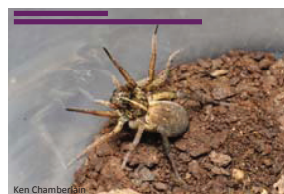


Lacewing adults have long slender bodies, long antennae, and two pairs of large net-veined wings. As adults, some species are predatory, some feed on pollen and nectar, and some do not feed.



Lacewing larvae are grey to brown and alligator-like. These voracious predators pierce their prey using large sickle-shaped jaws and feed on body fluids.

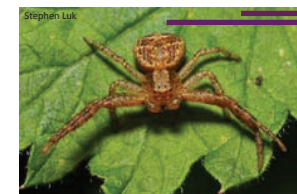
Spiders (Araneae) are insect relatives. These abundant and important predators have eight walking legs, six to eight eyes, and two body regions. The first body segment, called the prosoma, contains the eyes, mouthparts, and legs. The second region is the abdomen, which has spinnerets at its base that produce silk.



Wolf Spiders (Lycosidae) are typically black, brown, or gray and often have one or more light stripes on their prosoma and / or abdomen. They hunt for prey along the ground and do not make webs. The female attaches her egg sac to her abdomen and carries it with her.



Jumping Spiders (Salticidae) are stout with flattened bodies, large eyes, and short legs. They are attractive spiders, often brightly colored or patterned with iridescent scales. Jumping spiders are named for their hunting technique of stalking and jumping on their prey. They do not build webs.



Crab Spiders (Thomisidae) are named for their ability to walk sideways, holding their legs "crab-like" out at their side. Crab spiders are sit-and-wait predators that do not build webs. They use their large legs to grasp unsuspecting prey. They are found foraging on the ground, on plant leaves and stems and in flowers.



Orb Weavers (Araneidae) are a large family, the size and color patterns found within this group are immense. Sometimes the easiest way to identify an orb weaving spider is by their large, orb shaped web. The orb weaver family includes some of the largest spiders.

Interested in learning more about natural enemies?

Check out our video "*Identifying and Enhancing Natural Enemies in Vegetable Crops*" available on the Great Lakes Vegetable Working Group website:

<http://glvwg.ag.ohio-state.edu>