

Cooperative Extension

Gerald M. Ghidui, Specialist in Vegetable Entomology

Ladybird Beetles



Lady beetle feeding on an aphid



Lady beetle egg mass (left) and larva

Ladybird beetles, or ladybugs, are one of the most easily recognized beneficial insects in the garden. Adults are nearly hemispherical in shape, brightly colored red, brown, or tan and usually have black spots on the wings, from 1/16" to 1/4" in length. Larva are long and flattened, tapered, with distinct body regions and are generally conspicuously colored with patches of orange, black and blue. Adults and larvae are voracious feeders of aphids, scale insects, whiteflies, and other small-bodied insects. Ladybird beetles also feed on the eggs of armyworms, asparagus beetles, bean beetles, cabbageworms, corn earworms, potato beetles, whiteflies, and other insect pests. Lady beetle adults and larvae are commercially available.

Praying Mantids

Sometimes called "mule killers", the common name "praying" mantids comes from the manner in which they hold up their forelegs, as though in prayer. Another version of this common name is "preying" mantids, because they are the only insects in this family (Mantidae) that are exclusively carnivorous, feeding on any other insect it can catch. Eggs are laid in an egg case (1" or larger), and nymphs resemble adults but are smaller and without wings. Entirely predatory, mantids eat grasshoppers, crickets, katydids, beetles, and any other insect pests they can catch. Several species and colors ranging from green to brown are found in New Jersey. Praying mantid egg cases are available commercially.



Female with egg case

Minute Pirate Bugs



Minute pirate bug adult



Minute pirate bug nymph attacking aphid (OSU)

Minute pirate bugs, *Orius insidiosus* (Say), are common, small predators that can be found throughout the summer in gardens, woods, fields, etc. Both the nymphs and adults feed on insect eggs, aphids, spider mites, thrips, and even small caterpillars, sucking juices from their body through a needle-sharp beak. Adults are very small (1/16" long), oval shaped, and black in color with a white triangle on each side of the wings. The nymphs are orangish in color with dark body contents that can be visible through the skin. If insect prey is not available, these insects may feed on pollen and plant juices, but this does not significantly injure plants. On occasion, especially in later summer and early fall, this predator will bite humans, usually causing a mild stinging sensation. Depending on sensitivity, bites on some people may swell up similar to a mosquito bite, and with others there is no reaction at all. However, because these insects can consume up to 30 or more spider mites or eggs per day, they are an important insect pest predator in vegetable crops. *O. insidiosus* adults are commercially available.

Lacewings

Lacewing adults may feed on small insects, pollen, nectar and even aphid honeydew, but the larvae are voracious predators of many soft-bodied insects, such as aphids (which gives them the nickname "aphid lions"), mealybugs, thrips, whiteflies, spider mites, and the eggs of many insect pests. Green lacewings, *Chrysoperla plorabunda* (Fitch) and *C. oculata* Say, are very common in New



Green lacewing adult, larva, and egg (on stalk)



Brown lacewing adult
(*B. Patterson*)

Jersey. They are light green, 3/4" to 1" in length with long antennae and bright brownish-gold to bright gold eyes. Adults have large, transparent green wings and are active fliers, easily seen at night because of their characteristic fluttering flight. Eggs are deposited singly at the end of a long silken stalk, and mature larvae are about 1/2" in length, brownish in color with an alligator-

like shape having large pincers to suck the body fluids from prey. In the fall, adults find sheltered areas such as leaf litter to overwinter. Brown lacewing, *Hemerobius stigma* Stevens being the most common species, adults are slightly smaller than green lacewings and are similar in appearance except that they have brown or tan wings which may have dark spots on them. Eggs are laid on plants on leaf undersides, but not on stalks as with the green lacewing. Both adults and larvae



Brown lacewing larva, with debris
(*S. Seely*)



Green lacewing larva and cocoon
(*inset*)

are voracious predators, and some larvae hold debris, such as shells of their victims, on their backs as camouflage from their enemies. These larvae are often called "trash bugs" because of this habit. Green lacewing eggs and larvae are commercially available.

Parasitic Wasps



C. congregata wasp and parasitized hornworm



Aphid mummies with wasp emergence hole

There are well over 1000 known species of parasitoid wasps, belonging to several different families. The adults can be small (<1/2" long) and short and stout, or large with a long and slender body. The female deposits an egg on or inside a host insect, and the larva feeds on the host from within, eventually killing the host. Larvae reach maturity by the time the host dies, and pupate in or on the host in small silken cocoons. Adult wasps emerge and seek out new hosts to repeat the cycle. In New Jersey, it is common to find the silken cocoons covering tomato hornworms (by *Cotesia congregata*) and imported cabbageworms (by *C. glomerata*),



C. glomerata cocoons on imported cabbageworm

both belonging to the wasp family Braconidae and commonly found in the home garden. Hosts of Braconid wasps include beetles, caterpillars, flies, ants, and sawflies. In particular, however, these wasps are important parasitoids of aphids. Parasitized aphids become mummified, turn light brown, and the wasp emerges from a neatly cut hole in the back of the aphid. Wasps in another family, Ichneumonidae, attack armyworms, cabbage loopers, cutworms, and the European corn borer. An Eulophid wasp, *Pediobius foveolatus*, is a gregarious larval parasite of the Mexican bean beetle, and can completely eliminate the bean beetle in small gardens. *Aphidius colemani*, *A. matricariae*, *A. ervi* (all Braconid wasps), *Trichogramma pretiosum*, *T. minutum* (both Ichneumonid wasps), and *P. foveolatus* are commercially available.



Ichneumonid adult (IPM MSU)

Predacious Flies

Syrphid flies, also called flower flies or hover flies because of their ability to hover in flight, are a large group of beneficial insects. Three of the more common species to this area are *Syrphus rectus* Osten Sacken, *Allograpta obliqua* (Say), and *Eupeodes americanus* (Weidemann). Adults are often seen



Syrphid fly (or flower fly) (UMD)



Syrphid fly larva attacking aphids

hovering around flower blossoms, thus earning the name flower flies, where they feed on nectar and pollen. They are usually bee mimics, having black and yellow banding that closely resembles bees or wasps. Being true flies, however, all syrphid flies have only one pair of wings (bees and wasps have two pairs of wings). Each adult lays hundreds of eggs, individually, near or within colonies of their host - aphids, thrips, or other small soft-bodied insects. The larvae are often seen on the plant foliage, usually near a colony of their prey. Larvae are legless, elongate maggots that are tapered toward the head end. They are usually either brownish or greenish, having opaque skin through which the internal organs can be seen, and vary in size from 1/32" to 1/2". Larvae pierce the aphids with mouth hooks and suck the body fluids from their prey, each larva consuming hundreds of aphids during its

development. After three instars, larvae pupate on the plant or on the soil surface. Depending on species, there may be 5-7 generations per year.



A. aphidimyza adult (BioControl Systems, Inc)



A. aphidimyza larva (J. Ogrodonick, Cornell)

A few fly species are important predators of aphids and scale insects. Larvae of a small midge, *Aphidoletes aphidimyza*, feed on many species of aphids, including green peach aphids and potato aphids. Adults are small, delicate black midges that live for only a short period of time (~10 days), hiding in the plant foliage during the day. Female flies deposit up to 100-200 eggs near aphid colonies. Larvae are small, 1/8" long, bright orange maggots that feed on aphids by injecting a toxin into their prey to immobilize them, then sucking the body fluids out of a hole bitten into the thorax. A single *A. aphidimyza* larva can devour up to 50-60 aphids per day. *Feltiella acarisuga* is a small midge that attacks spider mites. The larvae are voracious feeders, and will feed on spider mites and spider mite eggs. A single *F. acarisuga* larva can devour up to 45 spider mite eggs per day. These beneficials prosper under warm conditions and high relative humidity, and are effective in greenhouse and outdoor plantings. Both of these midges are commercially available.

Predacious Stink Bugs



Two-spotted stink bug & potato beetle larva



Spined soldier bug attacking caterpillar (ISU)

Although many species of stink bugs are harmful, some species are predatory. Two common stink bugs in New Jersey are the two-spotted stink bug, *Perillus bioculatus* (Fabricius), and the spined soldier bug, *Podisus maculiventris* (Say). Stink bugs, both plant feeders and predacious, get their name because they exude a foul-smelling odor from a pore on each side of the thorax. Stink bug adults and nymphs feed on many insects, including beetles and beetle larvae, soft-bodied insects and caterpillars. Predator stink bugs usually have spines on the thorax (or "shoulders") with short, stout mouthparts to suck the body fluids from their prey, whereas plant feeding stink bugs usually have rounded "shoulders",

with long, thin mouthparts to extract plant juices. Adults are strong fliers, and are usually colorful or have conspicuous markings. Nymphs of stink bugs are similar to the adults in shape, but have distinct color patterns and no wings.

Ground Beetles

Ground beetles make up one of the largest groups of beetles in New Jersey. Adult beetles range in size from 1/8" to over 1" long, are usually shiny black (some are bright metallic), elongate and generally tapered at one end. They have well-developed mandibles to eat other insects, and are very quick moving predators. Larvae are elongate, wormlike, live in burrows in the soil or in leaf litter or debris, have large pincher-like mandibles, and feed on other soil-dwelling



Ground beetle adult (UK)



Ground beetle larva (ISU)

insects. Ground beetles hide under rocks, logs, boards, etc. during the day, and feed at night, actively seeking out caterpillars, aphids, weevils, grubs and maggots, and even slugs and snails. Some of the more common ground beetles in New Jersey include the six-spotted tiger beetle, *Cicindela sexguttata*, the caterpillar hunter, *Carlosoma scrutator* Fabricius, the bigheaded ground beetle, *Scarites subterraneus* Fabricius, and the common black ground beetle, *Pterostichus* spp.

Damsel Bugs



Nabis spp. adult

Damsel bugs, often called "nabids", from the family name Nabidae, are very fast-moving insects that chase down and feed on beetle larvae, aphids, thrips, lygus bugs, leafhoppers, caterpillars, and other insects and insect eggs. They are called damsel bugs because they hold

their front legs up, as if they were lifting a skirt hem up during a spin around a dance floor. They are elongate, 1/3"-1/2" long, tan or gray in color, and have a flat, almost five-sided shape (similar in shape to closely related stink bugs).

Damsel bugs lay their eggs in plant tissue, and the nymphs hatch and feed with the adults. Nymphs are similar in appearance to adults, but without wings. All stages of damsel bugs hold their prey with strong, spiny front legs, then suck the body fluid from their prey using long, needle-like mouthparts.

Big-Eyed Bug

Big-eyed bugs, *Geocoris* spp., are small (1/6" long) predators that feed on many different insect and mite pests. They have oblong-oval bodies, broad heads and very distinctive wide set, bulging eyes. Adults are generally a grayish or brownish color, and nymphs are similar to adults but are wingless. Adults and



Big-eyed bug adult (USDA)



Big-eyed bug egg (UC IPM)

nymphs feed on various caterpillars, aphids, beetles, spider mites, lygus bugs, and the eggs of insect pests. Each big-eyed bug adult may consume up to 80 spider mites a day.

Assassin Bugs

Assassin bug is a common name for a group of insects in the family Reduviidae that hunt and feed on other insects. They are long-legged, fairly large in size (0.5" - 1.5" in length), and have folded wings that overlap on its back, giving them a characteristic shape. They have long narrow heads, long slender antennae, usually are dark-colored with shades of brown, gray, green, red or black. Assassin bugs capture prey with their front legs, stab them with a sharp beak to inject a small amount of toxin, then suck the body fluids from their victim. Although they usually attack small flying insects, assassin bugs will feed on aphids, leafhoppers, asparagus beetle and Mexican bean beetle eggs and larvae, and even caterpillars. One of the largest and most easily recognized assassin bugs is the wheel bug, named because of the "crest" on its upper



Assassin bugs attacking a caterpillar (OSU)



Adult wheel bug (R. Bessin)

back that closely resembles a cog-wheel. Assassin bugs can inflict a painful bite if handled carelessly, resulting in inflammation and pain that may last several days.

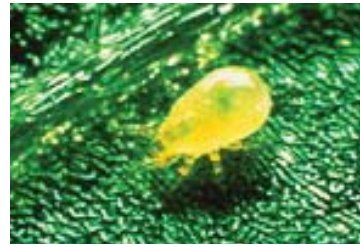
For a comprehensive list of our publications visit www.njaes.rutgers.edu.

August 2008

Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

Predatory Mites

Mites are not insects, but belong to the order Acari, which is more closely related to spiders than to insects. Mites generally



A. cucumeris (OSU, R. Lindquist)



P. persimilis (OSU, R. Lindquist)

have two body parts (insects have three), and adult mites have four pairs of legs, although mite larvae (newly hatched mites) have only three pairs of legs until after the first molt. Several species are considered beneficial because they feed on spider mites, thrips, and other small insect pests, and are important for pest management in both the greenhouse and the garden. Predatory mites are small, usually either oval or teardrop in shape, and appear yellowish-brown or reddish-tan in color. They are long-legged compared with other mites because they actively search for prey. Several species are commercially available as biological control agents: *Phytoseiulus persimilis* is suited to humid, warm greenhouses and on low, dense vegetation (such as strawberries); *Neoseiulus californicus* is suited to higher temperatures and attacks spider mites, cyclamen mites and broad mites; *Amblyseius cucumeris* and *A. degenerans* attacks thrips as well as spider mites, cyclamen mites and broad mites, and are suited to temperate regions; *Hypoaspis miles* live in the soil or growing media and feed on fungus gnat larvae, springtails, and on thrips, and remain active year-long as they do not enter diapause. These predatory mites are also commercially available.

Spiders



Spider and web on cabbage leaf

Although spiders are not true insects, they are closely related and are quite common in gardens and fields. All spiders have venomous jaws, and the spiders commonly found in the garden feed on insects and other small organisms. Some species actively hunt their prey, and others spin webs to catch flying and jumping insects. Spiders, depending on their size, feed on almost any insect they can catch or trap in their webs, including aphids, beetles, leafhoppers, flies, grasshoppers, plant bugs, and even stout-bodied moths such as armyworm and earworm moths.