

Beneficial Insects

Predators, Parasitoids and Pollinators

January, 2016

Beneficial insects and mites belong to three categories: predators, parasitoids, and pollinators.

Predators capture and eat other organisms such as insects or mites. Predators include ladybird beetles, ground beetles, lacewings, syrphid (hover) flies, aphid midges (*Aphidoletes*) and yellowjacket wasps.

Parasitoids are insects that parasitize other insects. The immature stages of parasitoids develop on or within its host, eventually killing it. Parasitoids may attack all stages of their host (eggs, larvae, nymphs, pupae, adults).

Pollinators include honeybees, leafcutter bees, other wild bees, butterflies, moths and other insects that visit flowers to feed on nectar and pollen. Pollinators transfer pollen in and between flowers of the same species (pollination) which is essential to seed and fruit production for plants.

Common Predators and Parasitoids

Ladybird beetles

Appearance: There are many species of ladybird beetles that vary in size, colour and pattern. Depending on species, colours are black, red, orange-red to almost yellow. Most species have coloured spots or markings on their backs.

Body length: Adult - 1.0-5.0mm; Mature larva- 1.0-7.5mm

Life Cycle: Overwinter as adults. Eggs (orange, elongated) are laid in clusters on underside of leaves and branches. Usually only one generation per year. Both the larvae and adults feed on pests.

Insect Pests Attacked: Aphids, whiteflies, scales, mites, mealybugs and other soft-bodied insects.

Monitoring: Inspect colonies of aphids for adults and/or larvae.



Twospotted ladybird beetle adult feeding on aphid



Multicolored Asian ladybird beetle adult



Ladybird beetle eggs



Ladybird beetle larvae



Ladybird beetle pupae

Lacewings

Appearance: Common species of lacewings include two green lacewing species, *Chrysoperla carnea* and *Chrysopa oculata*, and one brown lacewing species, *Hemerobius pacificus*. Lacewing eggs are white and laid singly or in groups on long stalks on the underside of leaves or branches. The brown and green lacewing larvae are very similar except for small differences in body shape and the brown lacewing's habit of moving its head from side to side while walking.

Body length: Adult - 10.0-20.0 mm; Mature larva - 6.0-10.0 mm

Life Cycle: *Chrysoperla carnea* and *Hemerobius pacificus* overwinter as adults; *Chrysopa oculata* as pupae. Up to four generations per year depending on temperature.

Monitoring: Examine aphid- or psylla-infested leaves and shoots for feeding larvae or use limb taps.

Insect Pests Attacked: Aphids, spider mites, whiteflies thrips, leafhoppers, scales, mealybugs, psyllids, small caterpillars and insect eggs. Green lacewing larvae feed on insect pests. Both larvae and adult brown lacewings feed on pests. Green lacewings are commercially available.



Green lacewing adult



Brown lacewing adult.

Photo courtesy: E.S. Cropconsult Ltd.



Lacewing eggs



Lacewing larva

Syrphid (Hover) fly larvae

Appearance: Hover fly larvae are flattened, legless maggots with no distinct head and a tapered body. They are variously coloured (yellow, green to brown). Adults frequent flowers over which they hover before landing to feed on nectar and pollen (their only food source). They are often mistaken for bees or wasps which they mimic in colouration. Hover fly eggs are white, elongate, with fine sculpturing and are visible in aphid colonies.

Body length: Adult - 8.0-15.0 mm; Mature larva - 10.0-15.0 mm

Life Cycle: Overwinter as larvae, pupae, or adults depending on the species. Eggs laid on aphid-infested plant parts. Several generations per year depending on temperature and location.

Insect Pests Attacked: Aphids, scales, thrips and other small soft-bodied insects

Monitoring: Examine aphid-infested leaves and shoots for maggot-like larvae. Adults frequent flowers.



Syrphid fly larva feeding on aphid



Syrphid fly adult



Syrphid fly adult



Syrphid fly pupa

Praying mantids

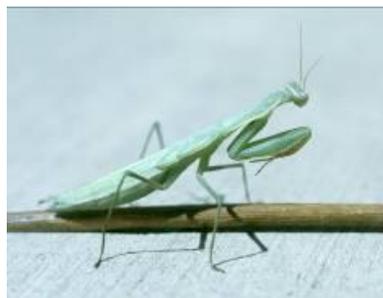
Appearance: Adults are 5-10 cm long and green, brown or yellow in colour. Mantids have an elongated thorax and grasping forelegs, which they use to hold their prey while they eat.

Life cycle: One generation per year. Overwinters as eggs in egg cases, which are glued to wood, bark, or other plant material.

Insect Pests Attacked: Many, including aphids, flies, beetles. Feeds on pests as well as beneficials. Mantids grasp their prey with spined front legs and hold them while they eat.



Praying mantis egg case



Praying mantis adult



Praying mantis adult

Minute pirate bug (*Anthocoris* spp., *Orius* spp.)

Appearance: Adult anthocorids have a narrow, pointed head, flattened, smooth body with distinctive clear markings on their back.

Body length: Adult - 2.0-4.0 mm; Mature nymph - 1.8-3.7 mm

Life Cycle: Overwinter as adults. Becomes active early in season. 3 to 4 generations per year.

Insect Pests Attacked: Aphids, spider mites, thrips, psyllids, whiteflies and small caterpillars.

Monitoring: Limb taps in orchards will detect adults and nymphs.



Adult anthocorid



Three nymphal instars of the anthocorid, *A. melanecerus*

Aphid midge (*Aphidoletes* spp.)

Appearance: Adults of the predaceous midge *Aphidoletes aphidimyza* are tiny (3mm long), delicate, long-legged brown flies that are active at night and thus rarely seen.

Body length: Adult - 3.0mm; Mature nymph - 3.0mm

Life Cycle: Overwinter as pupae in soil. Eggs are laid in colonies of aphids. Several generations per year.

Insect Pests Attacked: Aphids

Monitoring: Examine aphid colonies for presence of tiny orange maggot-like larvae or tiny paprika-like eggs. It may be necessary to inspect under aphids to find them.



Midge larva (*Aphidoletes* spp.) feeding on a winged aphid



A. aphidimyza larva among aphid cast skins and killed aphids

Bigeyed bug (*Geocoris* spp.)

Appearance: Adults and nymphs are oval, somewhat flattened, about 4 mm long, usually brownish or yellowish, and have a wide head with large, bulging eyes.

Life Cycle: 5 nymphal instars. Females lay oblong, pale-colored eggs singly on leaves which develop reddish eyespots shortly after being laid. Common on low-growing plants and crops.

Insect Pests Attacked: Flea beetles, mites, insect eggs, small caterpillars, other bugs



Bigeyed bug adult.

Photo courtesy: Bradley Higbee,
Paramount Farming, www.insectimages.org

Predatory mites

Appearance: The western predator mite, *Typhlodromus occidentalis* (Nesbitt), and *Zetzellia mali* are the two most common species of predaceous mites in B.C. They are distinguished from their prey by their larger size, pear-shaped body, and translucent colouration. Their eggs are opaque and oval whereas pest mite eggs are round. They are very active and fast moving compared to pest mites.

Body length: Adult - 0.25-0.4mm; Mature nymph - 0.2-0.38mm

Life Cycle: Overwinter as adults. Become active in spring and produce several generations per summer depending on temperature.

Insect Pests Attacked: Spider mites, thrips, fungus gnat larvae

Monitoring: Visual inspection of leaves or leaf brushing for microscopic examination.



Predatory mite and 2-spotted spider mite



Z. Mali feeding on European red mite egg

Parasitic wasps

Comments: Parasitic wasps occur in various shapes and sizes and are commonly named according to their family name (for example, ichneumons, brachnoids, chalcids, trichogramma). Parasitized aphids (mummies) appear inflated and are often tan or black in colour with hardened, shell-like appearance. Small round exit holes will appear in those from which adult wasps have emerged. Some parasitic wasp larvae may leave their host - such as caterpillars - to make small white cocoons beside the host carcass in which to pupate.

Body length: Adult - 1.0-24.0 mm; Mature larva - 1.0-26.0 mm

Life Cycle: Life cycles and the number of generations produced per year vary according to species.

Insect Pests Attacked: Aphids, caterpillars, whiteflies

Monitoring: There is no monitoring method developed. Examine aphid colonies for presence of "mummies."

Comments: *Trichogramma*, *Encarsia formosa* and *Aphidius* parasitoids such as *Aphidius ervi*, *A. colemani*, *A. matricariae* are commercially available. *Trichogramma* is an egg parasitoid and works well on many caterpillars. *Encarsia formosa* is used for the control of whiteflies in greenhouses. *Aphidius* parasitoids are effective against aphids.



Parasitic Wasp (*Meteorus trachynotus*), a common leafroller parasitoid. Photo: Agriculture & Agri-Food Canada



Aphid mummy showing exit hole of parasitic wasp



Braconid wasp parasite cocoons on tomato hornworm



Encarsia formosa, whitefly parasitoid



Parasitized scale insects



Aphelinus mali, woolly apple aphid parasitoid

Pollinator Gallery



Honey bee



Honey bee



Bumble bee



Mason bee (*Osmia* sp.)



Mason bee (*Osmia* sp.)



Mason bee (*Osmia* sp.)



Leafcutter bee on alfalfa (*Megachile rotundata*). Photo courtesy Dr. Shelley Hoover, Alberta Agriculture & Forestry



Leafcutter bees (*M. rotundata*). Photo courtesy Dr. Shelley Hoover, Alberta Agriculture & Forestry



Leafcutter bee (*M. rotundata*) Photo courtesy Dr. Shelley Hoover, Alberta Agriculture & Forestry



Halictid (Sweat) bee



Digger Bee



Butterfly