

Natural Enemies 101

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Any creature that feeds on or otherwise reduces the numbers of another creature is its “natural enemy.” All crop pests have natural enemies, which are often referred to as beneficials, and the reduction of pest populations by these natural enemies is called biological control. Natural enemies provide an important free service to farmers – both organic and conventional – however they are often overlooked. Many farming practices (tilling, cover crops, choice and use of pesticides) can impact natural enemy populations. It is sometimes difficult to distinguish natural enemies from pests, as they can look very similar. However, taking the time to become familiar with the common natural enemies on your crops may help you assess and possibly adjust the impact of your farming practices to promote populations of natural enemies.

Natural enemies of insect pests are probably the easiest to recognize. Insect natural enemies can be predators, parasites or pathogens. Predatory insects kill and consume other (usually smaller) insects. They are generally larger than their prey, kill many prey during their lifetime and are most commonly generalist feeders. Common predators and their prey found on Ontario farms include:

Predator	Description	Prey
Lady beetles and larvae	Eggs – small, ova, bright yellow and laid in clusters. Larvae – Black with yellow-orange patches, alligator shaped and covered in spines Adults – Broad, oval, convex, often with bright spots	aphids, mites, thrips, adelgids, mealybugs and other small insects and eggs
Ground beetles	Adults – Long, flat bodies, 0.3-8.5 cm long, often dark in colour. Prominent mandibles, long legs, threadline antennae	caterpillars and other immature insects, eggs, slugs, some weeds
Syrphid flies	Larvae – slug-lie, mottled brown to green semi-transparent body, no legs, 5-12 mm long Adults – resemble bees or wasps but with only one pair of wings	aphids and small caterpillars
Lacewing larvae	Eggs – laid singly on stalks (brown lacewing eggs not on stalks are harder to spot) Larvae – Long pointed, mottled body with long legs and sickle-shaped mandibles on head; may be covered with debris (ie dead and previously consumed prey)	aphids, insect eggs, thrips and other small insects and larvae
Assassin bugs	Nymphs – light to black with wing pads, resemble adults but with wing pads Adults – dark, enlarged front legs, large beaks,	aphids, insect eggs, leafhoppers, flies, other small insects and

	elongated head	caterpillars
Aphid midge	Only larvae is predatory – small, orange maggots	aphids, mites, other small insects
Flower/Pirate bugs	Nymphs – yellow-orange, teardrop shaped, wingless Adult – Small, dark, shiny and oval, fast moving	mites, thrips, aphids, scales, leafhoppers, caterpillars, psyllids, other insects/eggs
Predatory stink bugs	Eggs – barrel-shaped egg masses with circle of spines at one end Nymphs – red to orange with black borders Adults – brown, pointed shield on back	mites, thrips, aphids and other small insects and larvae, insect eggs and caterpillars
Predatory mites	Similar to pest mites but faster-moving, fewer hairs, often tear-drop shape	

Table 1. Common predatory insects and their prey.

Parasitic insects or parasitoids lay their eggs in or on the bodies of other insects. When these eggs hatch, the young parasitoids feed on the host insect, typically killing it. They are generally smaller than their host, have a narrow host range and each immature kills only one host during its development. Most parasitic insects are tiny wasps or flies. The most common include:

Parasitoid	Description	Prey
Chalcidoid wasps	Parasitized hosts – parasitized aphids are hardened, black, slightly swollen, sometimes with exit holes, parasitized eggs appear black Adults – small, yellow, brown or black, slightly smaller than host or small and metallic	Depending on the species: aphids, scale, whiteflies, leafminers, caterpillar eggs
Braconid wasps	Parasitized host: caterpillars surrounded by multiple small cocoons, or swollen, papery aphid mummies Adult: Dark, 2-15 mm, long antennae	caterpillars, flies, beetles, aphids, leafminers
Ichneumonid wasps	Adults: variable in colour, 5-40 mm long, long antennae, abdomen often long and narrow	caterpillars, flies, beetles, aphids, leafminers
Tachinid flies	Larvae – maggots found inside host Pupae – dead host with exit hole and brown ovoid pupa beside it Adults – medium to large, housefly-like, covered in bristles	caterpillars, beetles, bees, wasps, sawflies, stink bugs, grasshoppers

Table 2. Common parasitic insects and their prey.

Pathogens are microorganisms that infect and kill other living creatures. While we are more familiar with the pathogens that attack our crops, insect pests are also susceptible to a wide variety of bacteria, fungi, viruses and other pathogens. The most famous example of an insect pathogen is Bt, an insect pathogenic bacteria which is the basis of many biopesticides widely used in organic agriculture. However, there are numerous other pathogens naturally present in the environment that play a very important role in regulating pest populations. They are often, but not always, specific to certain groups of insect pests, or even certain life stages. Entomopathogenic nematodes are not microbes but are often grouped with pathogens because they act in a similar way. Common hosts and symptoms of pathogens include:

Pathogen	Symptoms in Host	Hosts
Bacteria	Initially hosts stop eating, cadavers are limp, dark, shrivelled bodies	caterpillars, beetles, flies, others
Viruses	Cadavers are limp, dark, oozing, appear “melted”. May be firmly attached to plant and arched backwards.	caterpillars, beetles, others
Fungi	Cadaver swollen and covered in fungus. Fungus may be less prominent under dry conditions	Wide host range – caterpillars, beetles, aphids, flies, thrips, sucking insects, mites, others
Nematodes	Cadavers limp, dark or reddish, sometimes nematodes can be seen oozing out of cadaver	commonly soil dwelling beetles and other soil insects

Table 3. Common hosts and symptoms of pathogens.

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