

BENEFICIAL PREDATORS AND PARASITES FOUND ON WASHINGTON CROPS

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There are many beneficial predaceous and parasitic insects which help control pest insects on Washington crops. In fact, the number of species of beneficials is almost always greater than the few really damaging pests. The reason that certain pest species are often in outbreak numbers is directly attributable to man's activities and agricultural practices. One of the main causes of epidemics of insect pests of agriculture is the use of insecticides. Chemicals very often cause a greater killing of beneficial predators than of pest insects.

If a farmer wishes to make better use of the predators and parasites in his fields, he must learn to recognize his "friends" from his "foes." He must also learn what sprays, types of applications, and timing of programs are least hazardous to the beneficial insects.

This publication briefly describes some of the more common and useful predators and parasites which are found in Washington. We define as predators those insects (like the lady beetles) which actively feed on a number of prey during their development. Parasites are those species (like the tachina flies) which lay their eggs in, on, or near a suitable host insect. The larvae, when they hatch, consume only one, or part of one host individual.

All photos by Jack Eves unless otherwise noted.

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Lady beetles probably are the best known beneficial predators of insect pests. Both the adults and larvae feed on aphids, mealybugs, scale insects, or spider mites. The familiar brightly colored kinds are 1/4–1/3 inch long with full grown larvae 2/5–3/5 inch long. The beetles are oval and convex with the underside quite flat; while the larvae are elongate and covered with tubercles, spines, or woolly wax secretions. Often the larvae are spotted or banded with bright colors. Eggs are yellow to orange, spindle-shaped, and attached to plant stems or foliage in compact clusters.

One of the commonest species in Washington is the **convergent lady beetle**. It is red with black and white markings. It has a black prothorax (rounded portion just behind the head) with two converging white marks. Other aphid-feeding species are the **transverse lady beetle** with transverse black lines on the wing covers and the **sinuate lady beetle** with irregular black blotches on the wing covers.

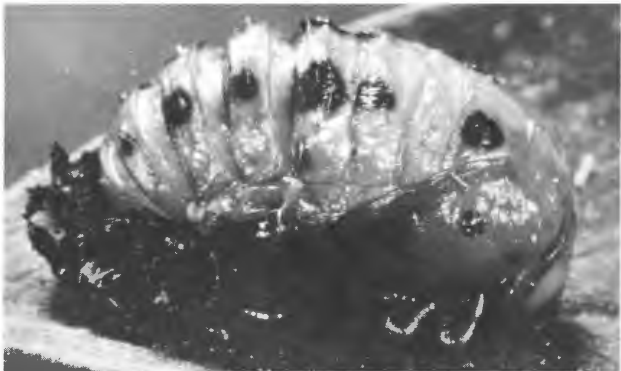
The **twice-stabbed lady beetle** is black with two red spots on its back. It is 3/16 inch long and preys upon scale insects such as the destructive San Jose scale. A tiny black species only 1/25 inch long is called the **spider mite destroyer**. It is most prevalent in Washington orchards, while similar small black species prey on spider mites in field crops.

California entomologists have found that a single convergent lady beetle female may consume 2,400 pea aphids and lay 1,700 eggs during her life span. She requires about 100 pea aphids before she is ready to lay eggs and a minimum of two aphids per day for each egg produced.



Convergent lady beetle feeding on aphid.

LADY BEETLES

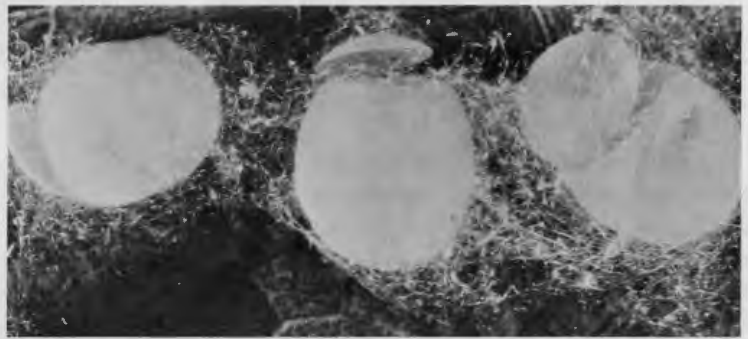


Lady beetle pupa attached to leaf.

Transverse lady beetle feeding on aphid.

Lady beetle larva feeding on aphid.





Cocoons of western green lacewing.

GREEN LACEWINGS

Adult green lacewings are beautiful, filmy-looking creatures with long hairlike antennae and iridescent red-gold eyes. The large membranous wings have a netlike venation which gives them their name. Eggs are attached to stems or leaves by long silken stalks produced by the females. The full grown larvae are about $\frac{3}{8}$ inch long with flattened, wedge-shaped bodies and long, sickle-shaped jaws. Lacewing larvae often appear to resemble miniature alligators.

The common Washington species on all types of crops and orchard trees is known as the **western green lacewing**. Adults feed primarily on nectar and honeydew, but larvae are voracious feeders upon aphids and other small insects, insect eggs, and spider mites. They grasp their prey with their two hollow mandibles and literally "suck them dry."

Western green lacewing.

Young larva of western green lacewing feeding on aphid.



Syrphid fly maggot feeding on aphid.



SYRPHID FLIES

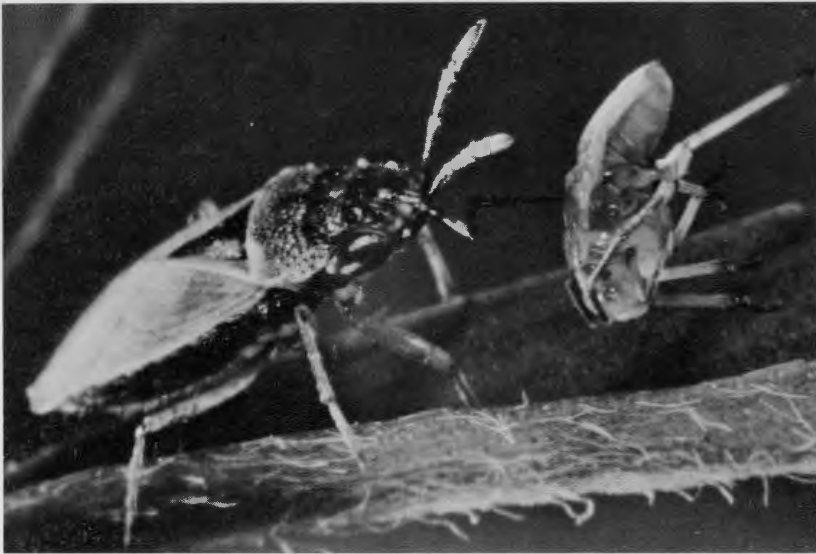
Syrphid flies are also called flower flies or hover flies because they often hover about and alight upon flowers. Adults of the predaceous species are brightly colored and resemble wasps or yellowjackets. They are $1/4$ – $3/5$ inch long and feed upon pollen, nectar, and honeydew. The larvae are wrinkled, fleshy, brown or green maggots, $1/4$ – $1/2$ inch long. They seize aphids with their mouth hooks and suck out the body juices. The eggs are long and white with a pebbled surface. They are easy to recognize amongst aphid colonies where they are usually laid. **Common syrphid** is one of the largest aphid-feeding species found throughout much of the world. It is up to $3/5$ inch long with black and yellow markings on the abdomen. Another common species in Washington is the **western syrphid** which is $2/5$ inch long with black and yellow markings on the abdomen.

Common syrphid fly resting on alfalfa flowers.



Puparium of syrphid fly attached to leaf.





Bigeyed bug feeding on lygus bug nymph.

BIGEYED BUGS

Bigeyed bugs are small bugs with large protruding eyes and piercing-sucking mouth parts. The two most common Washington species are tan to dark brown and 1/8–3/16 inch long. **Western bigeyed bug** is the smaller, usually buff-colored species, while **large bigeyed bug** is the larger, darker form. These bugs and their immature nymphs move about rapidly on plants and feed on aphids, lygus bug nymphs, leafhoppers, and spider mites. They have been especially useful against lygus bugs in recent years because they have gained an increased tolerance to a chemical used for lygus bug control.

Bigeyed bug nymph.





Western damsel bug feeding on lygus bug.

DAMSEL BUGS

Damsel bugs are tan to gray piercing-sucking insects with enlarged front legs fitted for grasping their prey. They have slender bodies with the front portion narrowed and are $3/8$ – $1/2$ inch long. Adults are swift and aggressive and are one of the few predators which can successfully attack lygus bug nymphs. All active stages also feed on aphids, leafhoppers, spider mites, and small caterpillars. The common species in Washington is the **western damsel bug**. The so-called **common damsel bug** is found throughout North America.

Western damsel bug nymph.





Minute pirate bug resting on edge of leaf.

PIRATE BUGS

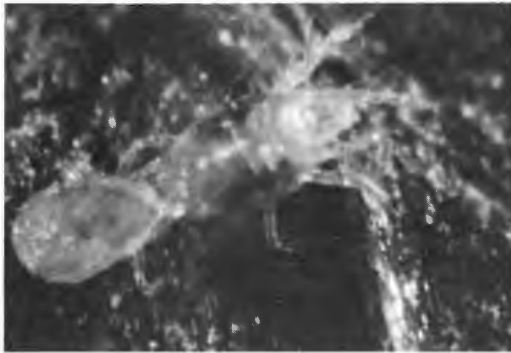
Pirate bugs are small piercing-sucking insects with white and black or white and brown color patterns which provide a checkered appearance. The nymphs are usually amber to brown, or even reddish. They impale thrips or spider mites on their prominent beaks and will also attack small aphids and caterpillars.

Minute pirate bug is the common Washington species. The adult is less than 1/8 inch long and black and white. A slightly larger species has been recently introduced from Europe to combat the pear psylla. It has a tan V marking on the back and black tips on the wing covers.

Nymph of minute pirate bug.



PREDATOR MITES



Orchard predator mite attacking McDaniel spider mite.

Predator mites are 1/125–1/50 inch in length. They are usually pale in color and oval in shape. The body is more or less flattened and has only a few short hairs. They often are somewhat smaller and with relatively longer legs than the spider mites which are one of their favorite kinds of prey. Predator mites usually move around on leaf surfaces much more rapidly than the plant-feeding spider mite, rust mite, or cyclamen mite hosts.

Orchard predator mite is the most famous species in Washington. It provides the basis for the current highly effective integrated mite control programs on tree fruits in thousands of acres of orchards. **Field predator mite** helps control the twospotted spider mite and the cyclamen mite on a wide variety of crops. At least a dozen additional species of predator mites are known to occur in Washington fields and orchards.



Crab spider lying in wait for prey on alfalfa bloom.

SPIDERS

Spiders are usually not abundant enough in gardens, fields, and orchards to provide a significant amount of control of pest insects. However, **crab spiders** are sometimes numerous enough to be beneficial in legume seed fields. One common species in Washington has a white abdomen and is 1/2-3/4 inch long. It waits motionless on a flower or leaf and quickly grasps insects which alight too close. This spider can handle adult lygus bugs.

TACHINA FLIES

Tachina flies are one of the most familiar types of parasites in the Pacific Northwest. Many people have seen their white eggs attached to the skin of a tent caterpillar or cutworm. The adults are 1/8-3/5 inch long and usually dark and bristly and beelike in appearance. Females deposit eggs or first-stage larvae in or on the host insect, or on foliage to be consumed by the host. Usually a single fly develops from a host individual, having devoured most of its internal tissues. The **cutworm tachina** is a widespread species which was originally introduced into New England from Europe. The adult is about 1/4-1/2 inch long and parasitizes the zebra caterpillar, alfalfa looper, and various cutworms in our area. The **squash bug parasite** was introduced into Washington from New Jersey and helps to control this pest. Native tachina flies parasitize various caterpillars, stink bugs, sawflies, and beetles.



Redtailed tachina is common parasite found throughout North America and Europe. Attacks wide range of caterpillars such as whitelined sphinx, tobacco hornworm, variegated cutworm, western yellowstriped armyworm, corn earworm, yellownecked caterpillar (photo courtesy Ken Gray).




Alfalfa weevil parasite (photo by Guy W. Bishop, University of Idaho).

ICHNEUMON WASPS

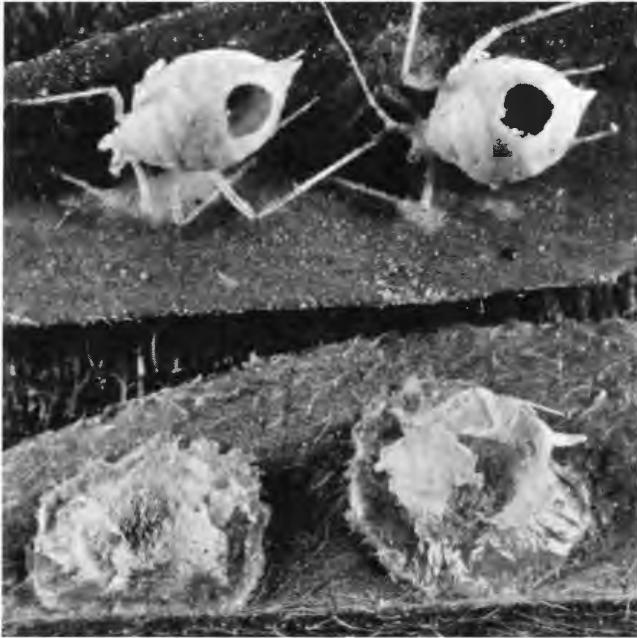
Ichneumon wasps are 1/6–1½ inches long and usually slender-bodied. Females often have a long, conspicuous egg-laying structure at the tip of the abdomen. They have a prominent color spot on the leading edge of each front wing. Adults are usually brown, red, or black with variable markings. They usually parasitize the caterpillars or pupae of moths or butterflies. The eggs are often injected into the body of the host and the larvae usually develop internally. The **alfalfa weevil parasite** was originally introduced into Utah, Idaho, Nevada, and Colorado from Italy. It is only 1/8 inch long and forms a silken cocoon with a distinctive white band around the middle. Other ichneumons parasitize the beet webworm, corn earworm, western yellowstriped armyworm, codling moth, and other caterpillar pests.

BRACONID WASPS

An introduced braconid parasite that helps control pea moth in western Washington.



Braconid wasps are similar to, but often smaller than, the ichneumons. They range from 1/20–1/2 inch in length. Most species parasitize the larvae or pupae of moths and butterflies, flies, wasps, or beetles, and also the nymphs or adults of aphids. The **orange tortrix parasite** is a native species which adapted to that introduced leafroller pest of berries and ornamentals in western Washington. **Satinmoth parasite** was introduced from Europe into New England and later to Washington. It has provided excellent control of the satin moth during most seasons. A closely related species, the **cabbageworm parasite**, was also introduced from Europe to attack the imported cabbageworm or white butterfly. **Pea aphid parasite** is only 1/8 inch long. It has provided considerable control of the pea aphid in several localities since its introduction. Many closely related species of **Aphidius** are native parasites attacking aphids in Washington.



Native braconid parasite injecting its egg into pea aphid (photo by W. T. Mondor, USDA, Yakima).

Aphid "mummies," remains of aphids parasitized by *Aphidius* (upper forms) and *Praon* (lower forms with light cocoons). Both parasites are braconids.

Many of the groups of chalcid wasps contain parasites of other insects. They are quite variable in size, ranging from 1/85-1/2 inch in length (most of the beneficial parasites are 1/8 inch or less). Often they are dark colored and metallic blue or green. They tend to have unusual shapes, sometimes with the abdomen laterally compressed and triangular, and sometimes with the hind legs enlarged and fitted for jumping.

The **woollyaphid parasite** is one of the most famous parasites used in biological control throughout the world. It has provided excellent control of the woolly apple aphid in Washington orchards for 40 years. It was suppressed by insecticides in many areas 20-25 years ago, but apparently regained effectiveness by developing resistance to the chemicals.

Clover aphid parasite is a closely related species, native to Washington, which often provides excellent control of the aphid on red clover raised for seed.

Minute egg parasite is only 1/85 inch long. It parasitizes the eggs of many kinds of moths and butterflies, as well as other kinds of insects. Other chalcids prey on the San Jose scale, greenhouse whitefly, cottony maple scale, beet leafhopper, grape mealybug, and many other pest species.

CHALCIDS



Tiny chalcid wasp that parasitizes the spinach leaf miner.