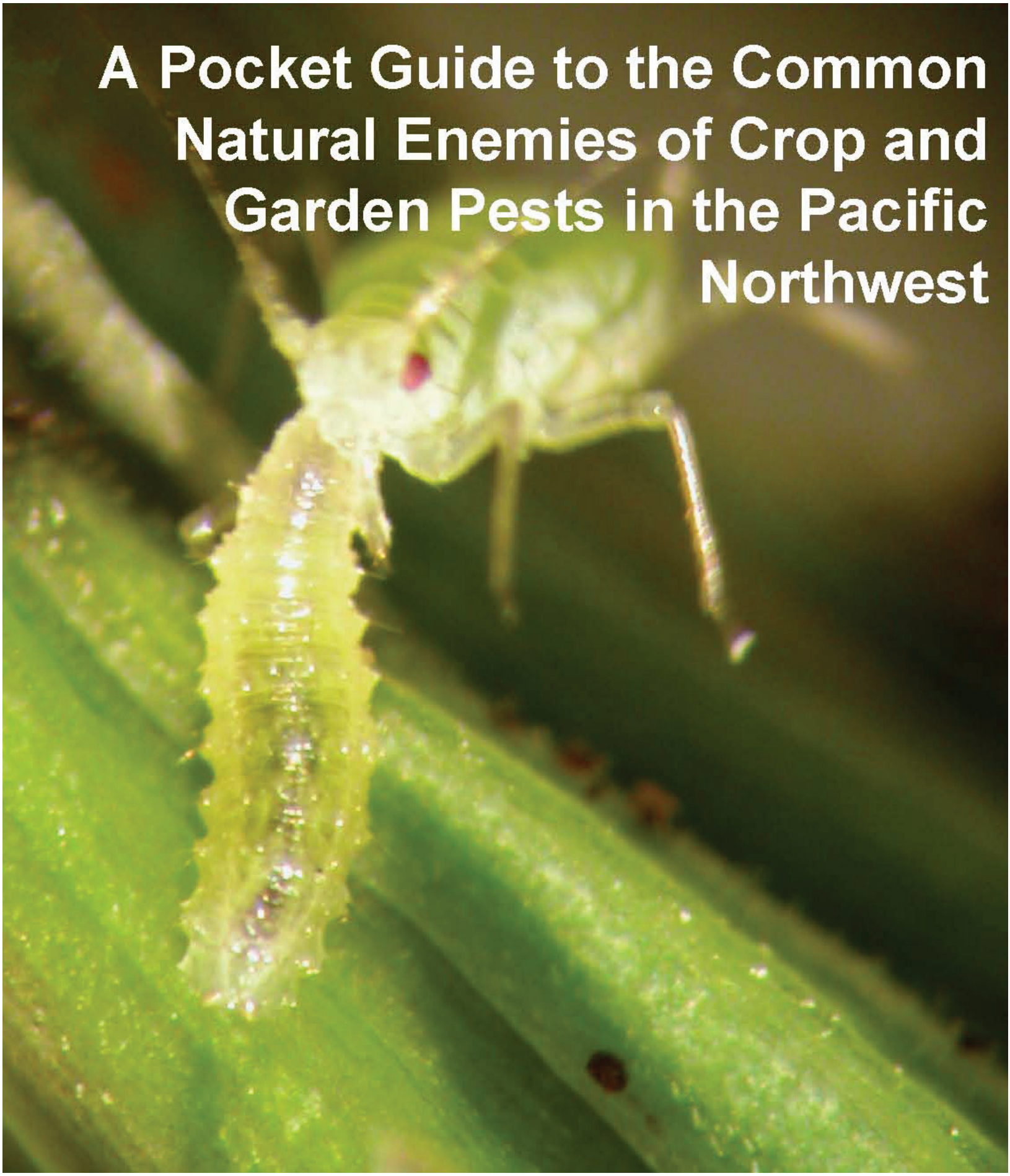

A Pocket Guide to the Common Natural Enemies of Crop and Garden Pests in the Pacific Northwest

Using this Guide

The cards in this guide are designed to help the user quickly learn the main groups of natural enemies, their predacious activity, and tips for observing them. Photographs are of the most common species in this region.

This guide should be used as a field supplement to other publications that provide more detail on how to scout for and manage specific pests and natural enemies:

Each sheet can be printed on regular paper or cardstock & turned into pocket-sized cards by folding along the central horizontal line and then cutting on the dotted orange lines to trim into three 2-sided cards (laminate if needed).

Most photographs from the Ken Gray collection.

Questions & comments can be directed to:

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Biological Control

After the relative amounts of pests and natural enemies are determined with preliminary monitoring, a number of tactics can be used to enhance biological control and be integrated into an IPM program:

1. Protecting natural enemies from disturbances such as pesticides, other management practices, their own natural enemies (eg. ants), or adverse environmental conditions.

2. Providing supplementary nectar or pollen sources, alternate hosts, or shelter.

3. Manipulating the behaviors of natural enemies with food sprays, kairomones, or plant structure and arrangement.

4. Augmenting natural enemy populations with mass releases of lab-reared individuals.

5. Introducing natural enemies that are totally absent from an area.

General Observation Tips

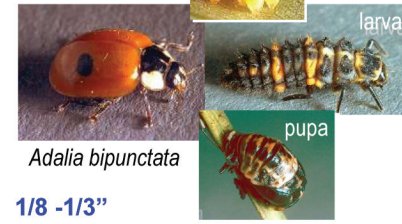
1. When doing visual counts, also inspect the underside of leaves
2. Approach fast-moving insects slowly, or use nets, beating trays and traps for these to get a closer look

Distinguishing Natural Enemies from Plant Pests in General

1. Spend a few extra seconds or minutes observing the specimen to see if it feeds on animals or plants
2. To see if a particular natural enemy attacks a target pest species, place them together in an enclosed environment that allows both animals room to move

Lady Beetles

(Coleoptera: Coccinellidae)



Adalia bipunctata

1/8 -1/3”

Identification

Adults orange to red with black spots, or mostly black, larvae longer, eggs in clusters

Coccinella novemnotata

Olla abdominalis

Hippodamia convergens

Observation Tips

All stages found on plants

Predacious Activity

Adults & larvae prey on aphids, scale insects, mites, and other small insects

Similar Beetles

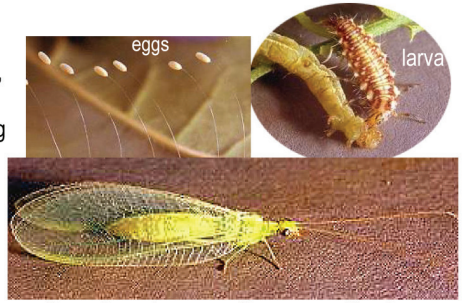
Chrysomelid beetles

Green & Brown Lacewings

(Neuroptera: Chrysopidae & Hemerobiidae)

Identification

Light green or brown, large wings, long antennae, larvae flat with long mouthparts, eggs on stalks



Green lacewings, eg. *Chrysopa californica*

Observation Tips

Adults often seen flying or on plants, eggs & larvae on plants

Brown lacewings, eg. *Hemerobius spp.*

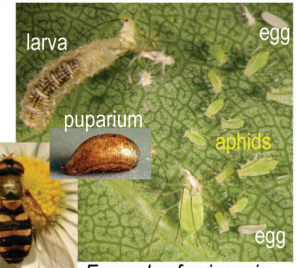
Predacious Activity

Larvae & adults mostly prey on aphids, mealybugs, and other small insects

1/2 - 3/4"

Predacious Hoverflies

(Diptera: Syrphidae)



Identification

1/4 - 3/4"

Adults are mimics of wasps & bees, but fly more quickly or hover, often with yellow markings, larvae maggotlike, eggs small, whitish and oblong

Eupeodes fumipennis

Observation Tips

Eggs, larvae, and tar-like excrement are found at aphid colonies, adults mostly found on or hovering at flowers

Scaeva pyrastri

Sphaerophoria sulphuripes

Predacious Activity

Larvae prey mostly on aphids & scale insects, adults obligate flower feeders, some species not predacious

Other Insects Confused with Hoverflies

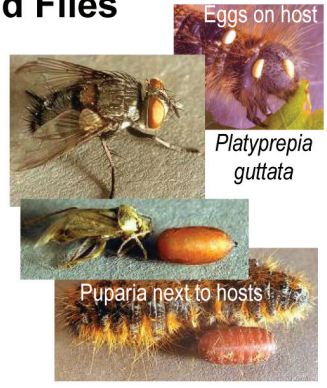
bee flies

bees

wasps

Parasitoid Tachinid Flies

(Diptera: Tachinidae)



Platyprepia guttata

Identification

1/3 – 2/3”

Adults similar to houseflies, but with very long bristles on tail end, puparia red to brown & oblong, larvae inside host, eggs white & oblong on host

Parasitic Activity

Important endoparasitoids of many worm, beetle, sawfly and bug pests, can increase populations rapidly

Observation Tips

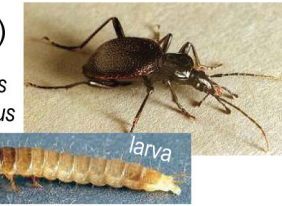
Adults seen on flowers, look for eggs *on* host, puparia *near* host

Flies Commonly Confused with Tachinids

house flies | blow flies | flesh flies

Ground or ‘Carabid’ Beetles

(Coleoptera: Carabidae)



Scaphinotus marginatus

Identification

Adults are dark or metallic with ridged wing covers, larvae grublike with large mandibles

1/3 - 2”

Pterostichus scitulus

Observation Tips

Adults mostly active at night. Look for fast running adults under objects on soil surface or in soil samples, larvae in soil samples

Predacious Activity

Prey mostly on soil organisms, some others feed on seeds

Other Beetles Confused with Carabids

Tenebrionid beetles

Rove Beetles

(Coleoptera: Staphylinidae)


Philonthus sordidus


Leptacinus batychrus

1/8 – 1/3"

Identification

Adults small with short wing covers not covering abdomen

Predacious Activity

Prey mostly on small soil organisms

Observation Tips

Adults mostly active at night. Look for fast running adults under objects on soil surface or in soil samples

Insects Confused with Rove Beetles


Earwigs (adults > 1/3")


carrion beetles

Damsel or 'Nabid' Bugs

(Hemiptera: Nabidae)


nymph

1/3 – 1/2"

Identification

Adults & nymphs long and thin with front legs slighty enlarged for grabbing prey


Nabis spp. feeding on *Lygus bugs*

Observation Tips

Most commonly found running on low, dense vegetation

Predacious Activity

Adults and nymphs prey on other insects in same habitat

Other Bugs Confused with Nabid Bugs

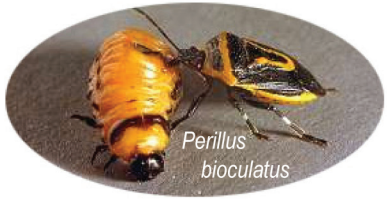

some of the thinner Mirid bugs

assassin bugs

stilt bugs

Predacious Stink Bugs

(Hemiptera: Pentatomidae)



Brochymena sp. nymph

Identification

1/3 – 2/3”

Adults & nymphs have a broad pentagon or shield shape. Usuually brown or grey rather than green

Observation Tips

Found on vegetation, may have to observe activity to determine if a the species is predacious or herbivorous

Predacious Activity

Adults and nymphs prey on other insects in same habitat

Similar-looking Herbivorous Stink Bugs

Minute Pirate Bug

(Hemiptera: Anthocoridae)

Identification

< 1/8”

Adults with a black & white cross pattern, larvae orange to dark red

Predacious Activity

Adults and nymphs prey on other small insects in same habitat

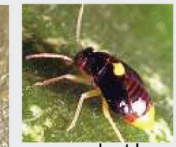
Observation Tips

Found on vegetation and flowers, more easily monitored with nets or beating trays due to small size

Other Similar-looking Small Bugs

big-eyed bug nymphs

chinch bugs



some plant bug nymphs

Big-eyed Bugs

(Hemiptera: Lygaedae)

Geocoris pallens

Identification

< 3/16"

Adults and nymphs with big eyes, fast-moving and slightly larger than minute pirate bugs

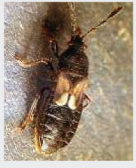
Observation Tips

Found on vegetation or the ground, more easily monitored with nets or beating trays due to speedy flight & size

Predacious Activity

Adults and nymphs prey on other small insects in same habitat

Other Similar-looking Small Bugs



chinch bugs

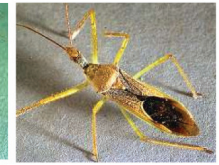
some plant bug nymphs

minute pirate bugs

Assassin Bugs

1/3 – 1"

(Hemiptera: Reduviidae)



Identification

Adults & nymphs resemble damsel bugs, but larger, with a wider abdomen, thinner neck and often with spines

Predacious Activity

Adults and nymphs prey on many types of insects in same habitat

Observation Tips

Found on vegetation and flowers

Other Bugs Confused with Assassin Bugs

damsel bugs

ambush bugs

stilt bugs

Ambush Bugs

(Hemiptera: Phymatidae)

Phymata metcalfi

Identification

1/3 – 2/3”

Adults and nymphs are often camouflaged like leaves & flowers to ambush prey

Observation Tips

Found on flowers and vegetation

Predacious Activity

Adults and nymphs prey on other insects in same habitat

Similar-looking Bugs

assassin bugs

leaf-footed bugs

alydid bugs

Tiger Beetles

(Coleoptera: Cicindellidae)

Cicindela oregona

Identification

1/2 -2/3”

Adults shiny with large eyes & mandibles, very fast runners and flyers

Cicindela longilabrus columbiana

Observation Tips

Adults usually seen flying over & running on light & sandy soils

Predacious Activity

Adults & larvae prey many types of insects in the same habitat

Similar Beetles

soft-winged flower beetles

ground beetles

Soldier Beetles

(Coleoptera: Cantharidae)

Cantharis sp.

Identification

1/2– 1”

Adults are long and thin with long antenae, often with red or orange markings

Podabrus cavicollus

Podabrus sp.

Observation Tips

Found on leaves and flowers

Predacious Activity

Adults prey on other insects in same habitat

Podabrus pruinosus

Similar Types of Beetles

soft-winged flower beetles

‘fireflies’

Thread-waisted Wasps

(Hymenoptera: Sphecidae)

Observation Tips

Active near open sandy areas and flowers

Trypoxylon sp.

Identification

Stout-bodied to slender, often with a very narrow waist and wide head

1/4– 2”

Sceliphron caementarium

Predatory Activity

Many species specialize on various insect prey species. Females capture prey and bring back to larvae in nests

Other Insects Confused with Thread-waisted Wasps

hoverflies

Vespid wasps

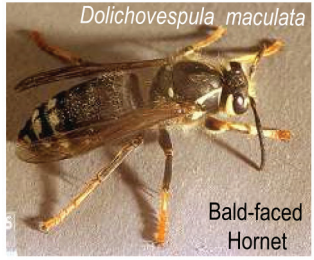
Vespid Wasps (yellowjackets, hornets)

(Hymenoptera: Vespidae)

Identification

Medium to large, black with yellow or while markings; wings smokey and folded longitudinally

0.5– 1.5”



Predatory Activity

Adults bring masticated insects, meat and nectar of many typos back to the larvae in large nests

Other Insects Confused with Vespid Wasps

Thread-waisted wasps

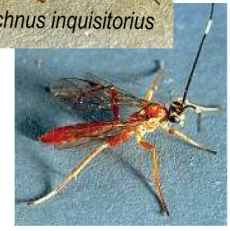
Larger Parasitoid Wasps

(Hymenotera: eg. Ichneumonidae, Braconidae)

Identification

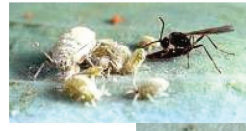
Braconids are < ½”, Ichneumonids are usually larger with a longer abdomen

Ichneumonid wasps

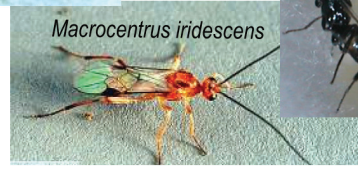


Parasitic Activity

Kill hosts by parasitism or by piercing and feeding; hosts include insect larvae,pupae and aphids



Braconid wasps



Observation Tips

Adults found at flowers or looking for hosts, monitor by looking for parsitized hosts (p. 23)

Smaller Parasitoid Wasps

(Hymenoptera: eg. Chalcididae, Eulophidae, Encyrtidae, Trichogrammatidae, Aphelinidae, Pteromalidae)

Identification

Mostly <1/ 8”

Parasitic Activity

Kill hosts by parasitism; hosts include insect eggs,larvae & pupae

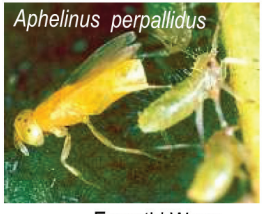
Observation Tips

Monitor by looking for parsitized hosts (p. 23)

Chalcid Wasp

Chrysocharis sp.

Eulophid Wasp



Aphelinus perpallidus

Encrytid Wasp

Microgaster sp.

Pteromalid Wasp

Parasitized & Diseased Insect Pests

Identification & Observation Tips

Parasitoid larvae and pupae are difficult to identify. One of the best methods for identification is to collect hosts that appear different from the other ones, and hold in a container until the parasitoid develops into an adult.

Individuals with a viral or bacterial disease will often appear darkened or watery. Individuals with a fungal infection will often appear fuzzy.

Any comments or questions regarding the content of this pocketbook are welcomed and can be directed to:

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Support for this project provided by:

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