



Identifying Invertebrates in the Garden

Are they beneficial or a pest?

TK-8

Vetted by Riverside County Office of Education-STEM

Suggested Uses

Print all slides 3-55 two-sided or your choice of slides two-sided.

Recommended for each grade level span:

- **TK-1:** Slides representing invertebrates in the **Friend or Foe lesson**.
- **2-3:** Include slides representing **Insect Life Cycle Observation:** Green Lacewing, Lady Beetle; Hornworm, Cabbageworm.
- **4-5:** Include slides that feature insects your students observed in the ***Warm Weather Observation activity***.
- **6-8:** Provide an overview of these invertebrates by showing all slides on the screen. Have students create a table of beneficials and pests. Print out all slides for bingo.
- **All grade spans:**
 - Use Bingo cards that best fit your focus-Beneficial, Pest, or a mix of both.
 - Print slides of invertebrates you want students to focus on and post in the garden.



Aphids: Pest

- **Found:** Aphids are found on many plants including fruits, vegetables, trees and shrubs. They feed on juices from the plant's stems and leaves.
- **Effects on Plants:** Large numbers of aphids can cause leaves to curl and plant growth to become stunted. Aphids secrete honeydew as they feed, which attracts ants and causes a black sooty mold to grow on the leaves.
- **Management:** Natural predators include lady beetles, parasitic wasps, crab spiders, and lacewings. Organic gardening insecticides like *insecticidal soap* and neem oil will kill aphids.



Armyworm: Pest

- **Found:** Armyworms feed of the foliage and fruit of many plants and grasses including corn, tomatoes, cabbage, lettuce, barley, peppers and beans.
- **Effects on Plants:** Armyworms eat through the leaves of many plants causing them to look skeletonized. They can also eat through corn kernels, and damage grass in lawns.
- **Management:** Natural predators include birds, lady beetles, parasitic wasps, minute pirate bugs, lacewings and beneficial nematodes. Organic gardening insecticides like insecticidal soap and neem oil will kill armyworms. Biological insecticides approved for organic gardening like *bacillus thuringiensis var kurstaki (Bt-k)* and *spinosad* also work well.



Braconid Wasp: Beneficial

- **Found:** Braconidae are found on nectar producing plants like yarrow and small-flowered daisies.
- **Effects on Plants:** These beneficial [parasitic](#) wasps feed on a wide range of garden insect pests such as aphids, hornworms, sawflies, and beetle larvae. Adult wasps lay their eggs inside a host insect. When the eggs hatch, the larvae feed on the insides of their host, effectively killing it. Braconidae are particularly fond of feeding on tomato and tobacco hornworms.
- **Management:** To attract adult parasitic wasps, plant nectar producing flowers near or in your garden beds.



Black Anise

Swallowtail Butterfly Larva: Neutral

- **Found:** Black anise swallowtail caterpillars feed mainly on young, tender citrus leaves. When disturbed, all larval stages stick out orange-colored [scent glands](#) and give off a strong odor.
- **Effects on Plants:** Adult butterflies are not generally considered pests as they help pollinate plants. Larva can defoliate young citrus trees.
- **Management:** There are not usually large numbers of larvae in one location to overtake a young tree. However, you can plant anise (fennel) as a trap crop in strips with citrus and mow regularly after the egg-laying peak in each generation.



Cabbage Worm: Pest

- **Found:** Cabbage worms are found on the leaves of cabbage, cauliflower, broccoli, kale, and brussels sprouts.
- **Effects on Plants:** Cabbage worms are green and blend in with the host plant. This makes them difficult to spot without signs of damage. If left untreated, these worms will eat their way into the heart of the plant. Larvae will feed on the leaves of plants, leaving behind irregular holes.
- **Management:** Natural predators include parasitic wasps, spiders, green lacewing, and insect-eating birds. Biological insecticides for organic gardening like *bacillus thuringiensis var kurstaki (Bt-k)* and *spinosad* will eliminate these insects.



Cucumber Beetle: Pest

- **Found:** Can be spotted or striped. It feeds on the leaves and fruit of cucumbers, beans, squash, melons, corn, peas, potatoes, tomatoes, and various other fruits and vegetables.
- **Effects on Plants:** Will eat tiny holes in the plant's leaves and fruit. Overall, the plant may become stunted and lose vigor. Plants may even become susceptible to certain diseases that are spread by contact with cucumber beetles.
- **Management:** Natural predators like lady beetles, green lacewing and spined soldier bug will eat the pest eggs. Organic gardening insecticides like *pyrethrin spray* and *neem oil* will eliminate the adults.



Decollate Snail: Beneficial

- **Found:** Decollate snails are active mostly at night and during overcast or rainy weather. During the day they hide in litter on the ground and in the top 1 inch of soil.
- **Effects on Plants:** Decollate snails eat various snail and slug species especially the brown garden snail. So, they control the snails that feed on foliage and ground-level fruit.
- **Management:** Decollate snails are reared commercially and can be purchased. Because decollate introductions are legal only in certain counties check with the local office of the county agricultural commissioner or wildlife officials before introducing them to your garden.



Flea Beetle: Pest

- **Found:** Flea beetles consume the leaves of a large variety of plants including tomatoes, potatoes, peppers, lettuce and corn.
- **Effects on Plants:** Flea beetles chew tiny holes in plant leaves. If infestations are high, they can quickly defoliate entire plants causing them to die.
- **Management:** Sticky traps placed near plants will help control flea beetle populations, catching them as they jump around. Organic gardening insecticides like *neem oil*, *pyrethrin* and *insecticidal soap* will kill flea beetles. Non-organic insecticides like carbaryl and permethrin will work as well.



Grasshopper: Pest

- **Found:** Grasshoppers feed on the leaves and stems of a variety of plants including beans, corn, carrots and lettuce.
- **Effects on Plants:** Grasshoppers eat holes in the leaves and plant tissue. If the infestation is large, grasshoppers will eat almost everything on a plant that is edible.
- **Management:** Organic gardening insecticides like *neem oil*, *insecticidal soap* or *pyrethrin sprays* will kill grasshoppers. Powders like *diatomaceous earth* will also kill grasshoppers by damaging their outer shell as they contact the powder.



Green Lacewing: Beneficial

- **Found:** Green lacewing are found on nectar and pollen from flowers and plants.
- **Effects on Plants:** Adult lacewing larvae are natural predators of common garden insect pests like aphids, whiteflies and caterpillars, making them beneficial to any garden. Even though they're only in their larval stage for two or three weeks, lacewing larvae can consume up to 600 garden pests in that timeframe.
- **Management:** Adult lacewings feed on nectar and pollen, so attract green lacewings by planting flowering plants like sunflowers, dill, Queen Anne's Lace, fennel and coriander.



Hornworm: Pest

- **Found** Hornworms can be found on tomatoes, eggplants, peppers and other nightshade vegetables. They will feed on the leaves, stems and fruit of the plant. You can easily recognize these bright green caterpillars by the large horn or spike on its tail end.
- **Effects on Plants:** Hornworms damage vegetables by chewing holes in the fruit and leaves. If left untreated, they can defoliate your plant in just a few days.
- **Management:** Natural predators include *parasitic wasps*, *lady beetles* and *lacewings*. Biological insecticides like *bacillus thuringiensis var kurstaki (Bt-k)* and *spinosad* will eliminate hornworms and are approved for organic gardening. Organic gardening insecticides like *insecticidal soap* will also kill hornworms.



Japanese Beetle: Pest

- **Found:** Japanese beetles feed on the leaves, buds and flowers of a variety of plants including peppers, tomatoes, berries, roses and beans.
- **Effects on Plants:** Leaves will look skeletonized as Japanese beetles feed on the plant tissue and leave the veins intact. Blossoms will look stunted or jagged when eaten by Japanese beetles.
- **Management:** Bag traps will attract and trap Japanese beetles by using a powerful bait to lure them in. Be sure to hang traps away from plants and houses as they may attract lots of Japanese beetles to areas nearby. Organic gardening insecticides like *neem oil*, *insecticidal soap* and pyrethrin will kill Japanese beetles on contact. *Parasitic wasps* are natural predators of Japanese beetles.

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Lady Beetle: Beneficial

Picture shows adult and Nymph

- **Found:** Lady beetles are attracted to the pollen of plants such as dill, fennel, cilantro and tansy.
- **Effects on Plants:** Lady beetle adults and larvae consume garden insect pests like aphids, spider mites and mealybugs, making them beneficial to any garden.
- **Management:** Plant pollen producing plants like geraniums, caraway, angelica and yarrow in or near the garden to attract this insect.



Leafhopper: Pest

- **Found:** Leafhoppers can be green, brown, gray or stippled in coloring. They feed on the leaves of many common fruits, vegetable and flowers including grapes, roses, lettuce, tomatoes and beans. They jump to nearby plants if disturbed.
- **Effects on Plants:** They feed on the foliage by piercing the leaves and sucking out the juices. This can cause the spread of various plant attacking viruses and bacteria, injuring already stressed plants. The saliva of leafhoppers is toxic to plants and can cause leaf spotting, yellowing and curling. The overall plant can become stunted and distorted.
- **Management:** Natural predators like *lady beetles*, *green lacewing* and *parasitic wasps* eat leafhoppers. Organic gardening insecticides like *insecticidal soap* and *pyrethrin* will kill leafhoppers. Yellow sticky traps will also help control leafhoppers, trapping them as they jump around.



UCCE Master Gardener Program of Riverside County



UC Statewide IPM Program
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Leafminer: Pest

- **Found:** The larval stage of leafminers are found on the leaves of plants like peppers, tomatoes, pumpkins, blackberries, spinach, trees and shrubs. The adult leafminer is a tiny, 2 millimeters, moth.
- **Effects on Plants:** Leaves will appear blotchy, mottled or have zig-zag lines throughout the leaf surface.
- **Management:** *Parasitic wasps* are natural predators of leafminers. An organic gardening insecticide like *neem oil* will eliminate leafminer populations.



Mason Bee: Beneficial

- **Found:** Mason bees prefer the pollen of early flowering plants like forsythia, and fruit trees. They're smaller than honeybees and have a blueish black hue, sometimes making it easy to mistake them for flies.
- **Effect on Plants:** Mason bees are effective pollinators of many flowering plant species, making them beneficial to home gardeners and farmers alike.
- **Management:** Mason bees are not aggressive; males don't have stingers and females only sting if they are being squeezed. Keep mason bee nesting boxes near gardens so they can have a place to lay their eggs. Plant a variety of early flowering fruits, vegetables and flowers. If you have space, fruit trees are a favorite for this bee.



Mealybug: Pest

- **Found:** Mealybugs are small, wingless insects found on the leaves, stems and fruits of a large variety of vegetables, fruits, flowers and houseplants. When there are many of them, it will appear like a white cotton-like mass.
- **Effects on Plants:** They suck the sap out of plant tissue causing the leaves to yellow and curl, and the overall plant to lose vigor. Mealybugs secrete a honeydew-like substance as they feed, which attracts ants and causes a black sooty mold to grow on the leaves.
- **Management:** Natural predators include *lady beetles*, *lacewings*, and *parasitic wasps*. Organic gardening insecticides like *insecticidal soap*, *pyrethrin spray* and *neem oil* will kill mealybugs. Mealybugs are attracted to plants with high nitrogen levels, so keep water reservoirs at consistent levels and avoid using excess fertilizer.



Orb Spider: Beneficial (Arachnid)

- **Found:** Orb weaver spiders make their webs anywhere with structural support like outdoor lights, trees, bushes and tall grasses. They are not aggressive and will flee at the first sign of a threat.
- **Effects on Plants:** These beneficial spiders eat insects, reducing the populations of many garden insect pests. They're most active during the night, eating insects trapped in their webs in the dark.
- **Management:** Provide structural support for webs near gardens like poles and tall grasses. It's very uncommon for a person or animal to be bitten by an orb weaver, and it usually only happens in extreme cases where someone is trying to pick them up. Their bites, however, are not harmful.



Pill Bug: Neutral (Isopod)

- **Found:** Pill bugs and sowbugs are not insects or true bugs. They are soil-dwelling crustaceans (called isopods). They feed primarily on decaying plant material and are usually found hidden under organic litter or other debris on the ground and beneath low-growing plant parts.
- **Effect on Plants:** While their primary food is decaying matter which they help to break down, they will also chew fruit, succulent plant parts, seedlings, and vegetables that touch damp soil.
- **Management:** If pillbugs or sowbugs are a problem, reduce the amount of decaying organic matter on soil near plants and minimize wetness of the soil surface.



Pirate Bug: Beneficial

- **Found:** Pirate bugs are one of the first insects to begin feeding early in the growing season. They are also found on the green, fleshy parts of plants in the garden.
- **Effects on Plants:** Adults and nymphs feed through needlelike mouthparts, sucking the body fluids of their prey. Preferred prey include spider mites and thrips. Pirate bugs also feed on aphids, psyllids, small caterpillars, whiteflies, and insect and mite eggs. They feed harmlessly on pollen and plant juices and are not plant pests.
- **Management:** Grow flowering plants that provide nectar and pollen for the adults.



Potato Beetle: Pest

- **Found:** Potato beetles feed on the leaves of vegetables- potatoes, tomatoes, peppers and eggplants. They're easily recognizable by their round bodies with yellow and black striped wing covers.
- **Effects on Plants:** They will eat entire leaves from plants causing plants to have reduced yields. Extreme cases may even lead to plant death.
- **Management:** If you notice potato beetles on the leaves of your plants, get rid of them by picking them off and placing them in a bucket of soapy water. Look for egg clusters hiding on the undersides of plant leaves and remove those too before they hatch. Organic gardening insecticides like *insecticidal soap*, *neem oil* and *pyrethrin sprays* will kill adult beetles. Beneficial insects like *lady beetles* and *green lacewing* will feed on the eggs and larvae.



Praying Mantis: Beneficial

- **Found:** Praying mantis can be found on almost any garden plant, using the plant foliage for camouflage as they stalk their prey.
- **Effects on Plants:** Praying mantis are [carnivorous](#) insects that eat many garden insects including destructive aphids, leafhoppers and grasshoppers. They use their spiked front legs and fast reflexes to catch insects as they crawl or fly by.
- **Management:** Attract praying mantis to your garden by offering hiding places such as tall grasses and shrubbery. Female mantis lay their eggs on twigs, branches and other hard surfaces. *It is important to note that the praying mantis will also eat other beneficial insects.*



Soldier Beetle: Beneficial

- **Found:** Larvae are ground-dwelling. Adults are active during the day and usually observed on flowers or leaves infested with aphids or other honeydew-excreting insects. When disturbed, adults may withdraw their legs and drop to the ground as if dead.
- **Effects on Plants:** Adults prey on aphids and other soft-bodied (plant-sucking insects).
- **Management:** Some species feed on seeds and fleshy roots but are not considered a pest.



Squash Bug: Pest

- **Found:** Squash bugs feed on the leaves, vines and fruits of vegetables in the cucurbit family like melons, pumpkins, cucumbers and squash.
- **Effects on Plants:** Squash bugs simultaneously suck sap from plants while injecting a toxic substance back into the plant causing it to wilt. Leaves may become discolored and dry out, and in severe cases the entire plant may die.
- **Management:** *Insecticidal soap, neem oil and pyrethrin sprays* will kill squash bugs and they are approved for use in organic gardening. *Parasitic flies* will lay eggs directly on squash bugs, eventually hatching and killing the host insect.



Tachinid Fly: Beneficial

- **Found:** They are attracted to gardens with flowering herbs, especially those in the dill family. Also, they are attracted to the Aster family. A tachinid fly is small and resembles a house fly. Most kinds are less than ½ inch in length. They usually have a few hairs sticking up and pointing backward and are gray or black in color.
- **Effects on Plants:** Tachinid flies in gardens don't bother humans but make things difficult for garden pests. They lay eggs in a host insect. As the fly larva develops, it eventually kills the host insect.
- **Management:** To attract the tachinid fly, plant cilantro, dill, fennel, parsley, and Queen Ann's Lace, aster, chamomile, feverfew, Ox-Eye Daisy, and Shasta Daisy.



Thrip: Pest

Picture shows adult and nymphs

- **Found:** The tiny insects are virtually impossible to spot with the naked eye, as they're only about 1/25 of an inch in length. However, they tend to feed in large groups. Thrips feed on a large variety of fruits, vegetables and flowers. They can be found feeding on plant leaves, flowers and fruit.
- **Effects on Plants:** Thrips suck out the juices of plants through the fruits, flowers and leaves. Plant leaves end up splotchy with a silvery appearance, and the overall plant can look twisted and discolored.
- **Management:** Natural predators include lady beetles and lacewings. Organic insecticides such as *insecticidal soap*, *pyrethrin spray*, *neem oil* and *spinosad* will eliminate thrips. Sticky traps can be hung near plants to trap thrips as they fly away. Thrips overwinter on plant debris, so it's important to thoroughly dispose of any leftover plant material after harvest.



Whiteflies: Pest

- **Found:** Whiteflies are found on the undersides of leaves, usually on the new growth of a plant. They feed on more than 250 plants including tomatoes, grapes, cucumbers and poinsettias. They are found in large numbers and will fly into the air when disturbed.
- **Effects on Crops:** Whiteflies suck the sap out of the leaves, causing them to yellow and the overall plant to have stunted growth and reduced yields. They also secrete honeydew as they feed, attracting ants and promoting the growth of a black sooty mold.
- **Management:** Inspect plants at least once a week to look for signs of whiteflies. Natural predators include *lady beetles* and *lacewings*. Insecticides like *insecticidal soap*, *pyrethrin spray*, and *neem oil* eliminate whiteflies and they're approved for use in organic gardening. *Sticky traps* can be hung near plants to trap whiteflies as they fly away.

Teachers: Please Provide Your Input!

Master Gardeners would appreciate your feedback on this lesson. The survey is anonymous but does require a Gmail account to access.

- Please click on the link to complete a brief survey.

[MG Invertebrate ID Lesson Survey](#)



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Resources

Beneficial/Neutral Invertebrates

- **Black Anise Swallowtail Butterfly**
- **Braconid Wasp**
- **Green Lacewing**
- **Lady Beetle**
- **Mason Bee**
- **Orb Spider**
- **Pill Bug**
- **Pirate Bug**
- **Praying Mantis**
- **Soldier Beetle**
- **Tachinid Fly**

Pest Invertebrates

- **Aphid**
- **Armyworm**
- **Cabbage Worm**
- **Cucumber Beetle**
- **Flea Beetle**
- **Grasshopper**
- **Hornworm**
- **Japanese Beetle**
- **Leaf Hopper**
- **Leaf Miner**
- **Mealybug**
- **Potato Bug**
- **Squash Bug**
- **Thrip**
- **Whiteflies**

	Beneficial or Neutral	

	Pest	

Resources

- [EarthBOX](#): Insect Identifier
- [UCANRIPM](#): Agricultural Pests

Master Gardeners

The University of California Cooperative Extension (UCCE) Master Gardener Program (MGP) is an educational program designed to teach and effectively extend information to address home gardening and non-commercial horticulture needs in California.

UCCE is the outreach arm of UC's division of Agriculture and Natural Resources (ANR). Master Gardener volunteers (MG volunteers) promote the application of basic environmentally appropriate horticultural practices through UCCE-organized educational programs that transfer research-based knowledge and information.



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Gardening Questions?

Email the UCCE Master Gardeners of Riverside County

- Email Helpline: anrmgriverside@ucanr.edu
- School Gardens: mgschoolgardens@gmail.com

Website Resources

- [Riverside Master Gardeners Website](#)



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