

What's Bugging Your Garden?



What's Ahead

In this lesson, you'll learn:

- why most insects are beneficial;
- about insect life cycles;
- types of insects and the damage they do;
- how to identify insect damage; and
- how to reduce insect injury.

What Are Insects?

When you think of insects, you usually only think of the bad guys. But there are all kinds. Insects are one of the largest groups in the animal kingdom.

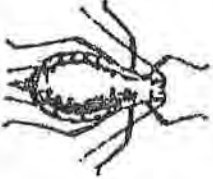


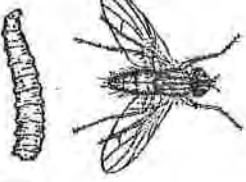
Insects vary greatly in size, color and shape. Although most insects are harmless or beneficial to humans, the few that cause damage can have a tremendous impact due to their numbers.

With a little basic knowledge, you can usually recognize insects by plants they live on, their habits and life cycle and how they do damage. Plant damage varies depending on the type of mouthparts an insect has.

Harmful insects can usually be managed in a home garden without pesticides. Good cultural practices, choosing the right plant varieties and mechanical and biological controls all help control insect populations.

Insects Can Be a Gardener's Best Friend

Smart gardeners study insects carefully. In this way, they can tell which are helpful or harmful. Sometimes, people go to great trouble and expense to kill insects, then learn later that the

Common Garden Pests	
	<p>APHIDS OR PLANT LICE Crops attacked: Beans, broccoli, cabbage, cucumbers, potatoes, muskmelon, squash, sweet corn, tomatoes, watermelon. Symptoms of damage: Curled leaves; "honeydew" (clear, sticky substance on leaves and fruit, which turns black and attracts ants); many tiny, soft-bodied insects.</p>
	<p>CUTWORMS Crops attacked: Broccoli, Brussels sprouts, cabbage, cauliflower, eggplant, kohlrabi, peppers, sweet corn, tomatoes. Symptoms of damage: Cut-off or wilted plants. Cutworms chew through plant stems at or just beneath the soil surface. Also feed on ripening tomatoes, leaving small, round holes.</p>
	<p>SLUGS Crops attacked: Most vegetables. Symptoms of damage: Slug paths are marked by shiny mucous. Some feed on foliage and scar fruit.</p>
	<p>ROOT MAGGOT Crops attacked: Broccoli, cauliflower, cabbage, turnips. Symptoms of damage: Wilted and yellowed leaves. Stunted growth. Channels inside roots.</p>
larva	adult

▶ **KEY POINT 1:**

The insects that feed on garden plants are often divided into two groups: sucking insects and chewing insects.

insects were helpful because they ate harmful pests.

Insects are beneficial to the gardener in several ways:

1. **Insects help produce fruits, seeds, vegetables and flowers by pollinating the blossoms.**
Peas, beans, tomatoes, melons, squash and many other vegetables need insects to set fruits.
2. **Parasitic insects kill harmful insects by living on or in their bodies and eggs.** Insects also act as predators, capturing and devouring other insects.
3. **Insects attack weeds in the same ways that they injure crop plants.**
4. **Some insects improve the physical condition of the soil by burrowing throughout the surface layer.**
5. **Insects are valuable scavengers.** They eat and bury the bodies of dead animals and plants. They play an important role in decomposition of organic matter.

Life Cycles of Insects

Insects have complicated life cycles. For some insects, the egg hatches into a larva that grows through a number of immature stages. The pupa is the insect in a resting stage before it becomes an adult insect.

With other insects, the egg hatches into a nymph that looks similar to the adult. They move through a number of stages as nymphs and, without a resting stage, mature into an adult.

In some cases, one stage (larva, nymph, pupa, adult) may be a pest, while other stages are harmless. If you know what stages of an insect's life are harmful, it will help you control it.

Kinds of Insects

The insects that feed on garden plants are often divided into two groups: sucking insects and chewing insects. Here is a list of common insect pests and the damage they can do:

Sucking Insects	Major Type of Damage
Aphids	Attack leaves and stems.
Stink bugs	Attack stems and fruit.
Leafhoppers	Attack leaves.
Squash bugs	Attack stems or vines.
Whiteflies	Sucks sap from underside of leaves.
Chewing Insects	Major Type of Damage
Potato beetle	Eat potato, tomato and eggplant leaves.
Flea beetle	Eat very small holes in leaves.
Cucumber beetle	Eat small holes in leaves.
Amyworm	Eat large holes in leaves; may eat fruit.
Cutworm	Chews off plants at or below ground.
Cabbage loopers	Eat holes in cabbage and broccoli.
Corn earworms	Bore into tomatoes, corn ears, peppers.
Japanese beetles	Larvae chew roots; adult eats leaves, flowers and fruit.
Onion maggots	Larvae tunnel into bulbs.
Bean beetles	Skeletonize leaves.
Root maggots	Channel into roots of cole crops.

Many times, gardeners confuse non-insects for insects. Non-insects can be pests, too. Examples are spider mites, millipedes, snails, slugs, nematodes and sowbugs.

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KEY POINT 2:

One of the most important strategies to control insects is to learn about them — which ones are pests, where they live, their lifecycle, what they feed on and how they behave.

Recognizing Insect Problems

Smart gardeners learn to look for insect problems. They watch for anything that does not look

normal about the plants. Here's what you should look for:

Injury by Chewing Insects. Chewing insects chew off the parts of a plant or mine into the plants. They eat roots, stems, fruit, leaves and seeds.

Examples: cabbageworm, tomato hornworm, armyworm, grasshopper, Colorado potato beetle.

Symptoms: ragged leaves, holes in fruit and seed, serpentine mines or blotches, wilted or dead plants, presence of "worms."

Injury by Piercing-Sucking Insects. Sucking insects feed on growing plants by piercing the skin of a plant and sucking out the sap from the cells. The insect remains on the outside of the plant.

Examples: aphids, scale insects, squash bugs, leafhoppers.

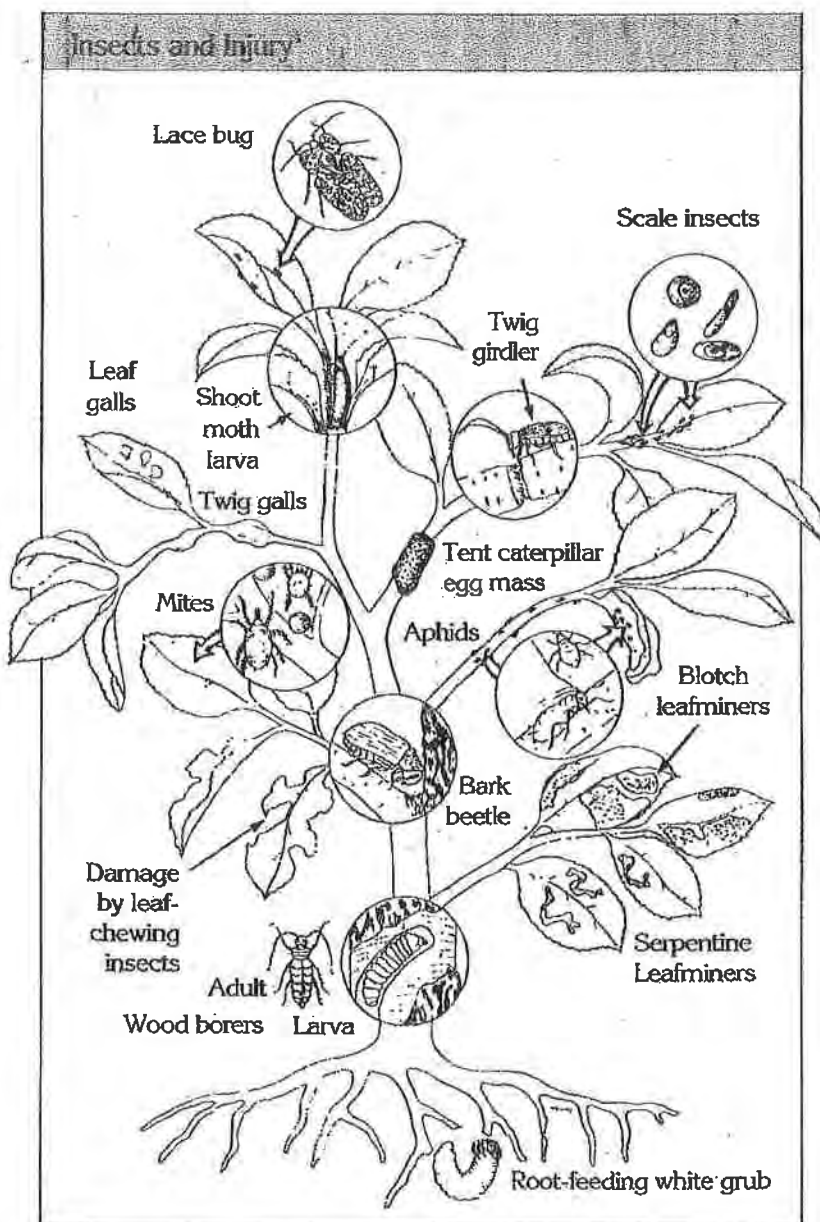
Symptoms: usually off-color, misshapen foliage and fruit.

Injury by Internal Feeders. Many of our worst pests feed within the plant tissues. They are harder to control with insecticides. They enter the plant either by having the egg thrust into the tissues by the parent insect or by eating their way in after they hatch from the eggs.

Example: European corn borer, squash vine borer, leaf miner.

Symptoms: wilting, weakened plant, stunted growth, death.

Injury by Soil Insects. Almost as secure from human attack as the internal feeders are insects that attack plants below the surface of the soil.



¹ Information and artwork from a Cornell Cooperative Extension bulletin, *A Guide to Pest Management Around the Home*.

▶ **KEY POINT 3:**

Use pesticides only as a last choice to control pests.

Examples: wireworm, cabbage maggot.

Symptoms: wilting, weakened plant, stunted growth, death.

Other Insect Injury. About 95 percent or more of direct injury to plants is caused by insects feeding in the various ways described above. Insects can also be vectors (carriers) of disease organisms. They can carry pests from plant to plant.

Aphids, which are carriers of certain viruses, are one of the more troublesome. Virus symptoms may be wilting, dwarfing and off-color foliage.

Insects can help disease organisms enter and attack the plant as well. Carrot rust fly larvae chew roots, and the roots may become infested with soft-rot bacteria. Injured plants don't grow and quickly decompose. Aphid honeydew leads to the growth of sooty mold that covers the leaves, so the plant can't make food.

Managing Insect Pests

There are many ways to reduce insect pests in home vegetable gardens. Combining a number of strategies is often best. One of the most important strategies to control insects is to learn about them — which ones are pests, where they live, their life cycle, what they feed on and how they behave.

Here are some other strategies for managing insects:

- **Maintain vigorous, healthy plants.** Check and correct the fertility and soil pH regularly. Thin plants to the recommended spacing.
- **Rotate crops.** Soil insects (grubs, wireworms) may spend several years in the larval stage.

- **Choose recommended varieties for your area.** Choose resistant varieties.

- **Clean up in and around the garden.** Many vegetable pests overwinter in weeds or plant debris in or near the garden. Remove weeds and infested plants.

- **Carefully check transplants for insects before purchasing and planting.**

- **Time planting to avoid pests.**

- **Handpick pests** off the plants and destroy them. Put them in a bucket of soapy water.

- **Put up physical barriers** around plants to control insects. Cardboard collars or milk cartons placed around young transplants can prevent cutworms. Row covers can cover plants until pests are gone. (Commercial covers are available, but you can also use cheesecloth or screening.)

- **Use mulching materials**, such as aluminum foil, to repel aphids, thrips and other insects.

- **Try using traps**, such as yellow sticky boards, to check insect populations. On a small scale, they may even reduce insect population levels.

- **Encourage biological controls**, such as predators and parasites, to help manage pests.

- **Use pesticides only as the last choice.** Be sure to use only the amount needed and treat only the crops that need treating. Spot treatments are effective and may be practical for home gardens. Before using any pesticide, check the label to see if it can be used on the crop and pest you want to treat. If the crop or pest is not listed, do not use the pesticide.

- **Keep records!** A record is a great help when you are faced with similar problems next year.

Lesson 8

What's Bugging Your Garden?

Summary

In this lesson, you learned about types of insects, how to identify insect damage and ways to prevent insect problems in your garden. Now answer the **Study Questions**. The **Study Activities** will help you apply your new knowledge. In the next lesson, we'll discuss how you can grow a weed-free garden.

Study Questions

1. Put a 'b' next to beneficial insects and a 'h' next to harmful insects in the list below.

(Some answers may be found in Lesson 7.)

- | | |
|----------------|----------------------|
| 1. stink bug | 5. minute pirate bug |
| 2. aphid | 6. squash bug |
| 3. lady beetle | 7. assassin bug |
| 4. armyworm | 8. braconid wasp |

2. Match the insect with the type of injury it does to a plant.

- | | |
|--------------------|--|
| 1. bean beetle | a. skeletonizes leaves |
| 2. root maggot | b. tunnels into roots |
| 3. cabbage looper | c. eats entire leaves |
| 4. cutworm | d. eats holes in cabbage and broccoli |
| 5. whitefly | e. chews leaves |
| 6. Japanese beetle | f. chews off plants at or below ground |
| 7. potato beetle | g. sucks sap from underside of leaves |
| 8. leafhopper | h. chews holes in potato and tomato leaves |

(See answers on the bottom of this page.)

Study Activities

Pest Profile

Pick a pest that has been bugging your garden. Learn its life cycle from egg to egg. Note when the pest causes damage and what plants it attacks.

Preparing for Pests

List five insect control strategies that fit you and your garden.

Other Resources

Check with your county Extension office for fact sheets on specific pests. Also see the resource list in Lesson 7.



Study Question Answers
1. 1-h; 2-h; 3-b; 4-h; 5-b; 6-h; 7-b; 8-b
2. 1-a; 2-c; 3-d; 4-f; 5-g; 6-b; 7-h; 8-e