



INSECT CONTROL

Making Your Garden Vegetables Less Susceptible to Insect Damage

In home vegetable gardens, insecticides should be used only as a last resort to prevent serious insect damage. There are many ways to reduce or eliminate the need for insecticides in your garden. The best approach to successfully control garden pests is to use a combination of techniques.

Healthy Soil

Healthy soil will result in plants better able to resist insects and diseases. Before planting, turn over the garden soil and add organic matter, such as manure or compost, to supply essential nutrients. Organic nutrients are released slowly, in contrast to synthetic fertilizers, which provide "quick-fix" nutrients.

Companion Planting

Some plants contain or give off compounds that repel insects. Companion planting is the practice of strategically placing insect-repelling plants next to crops that will benefit from their repellent effects. For example, planting garlic among vegetables helps to deter Japanese beetles, aphids, vegetable weevils, and spider mites; basil planted near tomatoes repels tomato hornworms; and marigolds interplanted with squash or cucumbers will repel cucumber beetles and nematodes.

Beneficial Insects

Not all insects are "bad bugs." Your garden and surroundings contain many insects that are actually beneficial because they feed on harmful insects. Therefore, a gardener should be able to identify garden insects and determine whether they are harmful or beneficial. Many organic gardening books provide pictures of the most common beneficial and pest insects. They give information on how to encourage populations of beneficial insects like ladybugs, bees, lacewings, dragonflies, predaceous beetles, wasps, thrips, mites, and spiders. Remember that applying synthetic insecticides can destroy the natural balance by eliminating beneficial insects.

Crop Rotation

Planting different kinds of vegetables in a different section of your garden each year will help reduce pest infestation. Some insect pests overwinter in the garden soil and emerge in the spring and begin searching for food. If the plant they prefer to eat is located several yards away, the insect must move to the source. Many will die along the way or will fall prey to

birds and other insects. Also, many vegetables may predominately absorb a particular nutrient from the soil. By rotating your vegetable crops each year, the soil in a particular section will have the opportunity to rest and regenerate.

Diversified Planting

A common practice among home gardeners is to plant a single crop in a straight row. This encourages pests because it makes it easy for them to travel from one host plant to another. By intermingling different types of plants and by not planting in straight rows, an insect is forced to search for a new host plant, thus exposing it to predators. This approach also works well with companion planting.

Trap Plants

If given a choice, some insects will opt to feed on one plant type over another. For example, pickleworms prefer squash to cucumbers, and some tomato worms prefer dill over tomatoes. With a little knowledge of host preferences, you can take advantage of this by placing certain plants where they can lure harmful insects away from the plants you wish to protect. Once the "trap plants" have become infested, the target insect can be picked off and dropped in soapy water or the entire plant can be disposed of.

Barriers and Traps

Barriers and traps can be employed to capture or impede the movement of pests. A collar made of thick paper or cardboard placed around the stem of a plant and pressed into the soil an inch or so deep will prevent cutworms and other burrowing insects from getting into the soil around your plants. A board or thick piece of paper painted bright yellow and coated with a sticky substance, such as Tanglefoot, will attract and intercept aphids, whiteflies, and other small, flying insects.

Mulch

Mulching is the spreading of organic matter in the garden and around plants. It is an effective method to control weeds and also serves as a refuge for predatory insects like ground beetles. Mulch also helps the soil to retain moisture and stay cool which promotes plant vigor and tolerance to insect attack. Mulch should be added to the garden when plants are 4 to 6 inches high. Grass clippings, leaves, hay, sawdust, wood chips, and compost make excellent mulches. One drawback of using mulch may be increased numbers of slugs in the garden that feed on young and succulent plants.

Compost

Fertile soil is the foundation of a healthy garden. Adding compost is an excellent way to enhance soil fertility. Compost is made by mixing organic matter and allowing it to decay through a natural process. This produces a dark, rich substance called humus which can be added directly to the soil. The first step is to build a holding bin or composter. Chicken wire, scrap wood, or cinder blocks can be used to construct a bin. The dimensions should be at least 3 feet high, wide, and

deep but can vary depending on your needs. The bin should be placed in a convenient location. Leaves, grass clippings, and household vegetable food waste are some of the most common materials that can be added to a compost heap. Do not add animal residues because they may attract rats and/or racoons. The pile must be turned to aerate the material; if turned every month, humus will be ready in about 6 months. If the pile is turned every 3 to 5 days, the humus will be ready in 2 months or less.

General Recommendations for Managing Soil Pests in the Garden

Many soil insect pest populations reach high numbers in grass or turf. Home gardens are often established in areas previously covered with grass. To reduce soil insect problems, thoroughly till or spade the area well in advance of planting (30 days or more) and again just before planting. This will bring soil pests up near the surface where their chances of mortality are increased.

A broadcast soil insecticide applied properly 2 weeks before planting will help to control some soil insects like cutworms, wireworms, and white grubs. See the note on applying broadcast soil insecticides at the end of Table 1 for instructions on this topic.

Slugs

Slugs like to feed on young seedlings and succulent parts of plants. They leave a trail of mucus on the surfaces on which they crawl. Moist, humid environments favor slug development, and slugs usually overwinter in sheltered locations outdoors. Eggs are deposited in moist areas and maturity requires a year or more. Pesticide baits (e.g., metaldehyde) are minimally to moderately effective against slugs and are best applied late in the afternoon. Baiting in the fall after the first fall rains will target slugs before they can lay eggs.

The following are suggestions for minimizing slug damage to gardens:

- Spade or till garden area in the fall and again in the spring before planting.
- Using a flashlight, check the garden for active slugs around 10:00 pm. Those detected can be picked up with an old teaspoon. Place captured slugs in a container of salt; salt will kill slugs. If this activity is continued for 3 or 4 nights in a row, damage can be greatly reduced.
- Place stale beer in small cups or pans sunken in the soil so the lip of the container is slightly below ground level. Slugs are attracted to the beer; once inside, they drown. The beer should be replaced about every 3 days for best results; however, the beer must be stale to be effective. Slug populations can be greatly reduced if this method is started early in the spring and enough of the containers are set out.
- Use diatomaceous earth, lime, or sawdust as a barrier. Replace it after each rain.

Cutworms

Cutworms are active only at night and remain buried below the soil surface near food plants during the day. They emerge to feed at night and often cut seedlings or small stems, causing the plants to fall over. Because grass and many weeds

are preferred hosts, remove grass and weeds in the garden, and plow the soil well in advance of planting. Damage can also be prevented by placing a paper or plastic "sleeve" over the plant and pressing the bottom into the soil. Paper cups with the bottoms removed or 4-inch high sections of half-gallon paper milk cartons are ideal. Place the sections or sleeves around newly set transplants or newly emerged seedlings so that 1 inch is below ground level and 3 inches are above the ground. Tuna cans with the bottoms removed may also be used for this purpose.

Wireworms

Wireworms are the slender, yellowish-brown, hard-bodied larvae of click beetles. They can survive deep in the soil for up to 5 years and can move up to attack the seed or young plants. Several wireworm species prefer plants in the grass family. They are usually not a problem unless the garden is planted on land that previously contained grasses or crops in the grass family. Turning over the soil in the fall and again in the spring well in advance of planting will help to reduce wireworm populations.

White Grubs

These are Japanese and May beetle larvae that are dirty white in color with the tip of their abdomen more of a blue-black; they roll into a C-shape when disturbed. The mature grubs may reach 2 inches in length. They live in the soil and sometimes feed on plant roots and tubers. About the only time they are troublesome is when parts of the lawn or sod are turned under in the spring for garden use. When gardens must be planted in these areas, prepare the soil well in advance of planting. Handpick grubs as the sod is turned over, raked, and prepared for planting; this is the best method of control.

Mole Crickets

Mole crickets have brown, velvety bodies with broad front legs for digging in the soil. They have large eyes and are about 1 inch long when mature. As mole crickets tunnel through the soil, they can disrupt the root system of vegetables. They may also feed on plant roots and underground stem tissue. There are no effective soil insecticides registered for use against mole crickets in vegetables. Avoid planting the garden in areas that were previously covered with grass. If any mole cricket tunnels are observed around plants, tamp the soil back down to restore support to the root system.

Managing Pests That Feed Above Ground

This section provides some non-chemical methods for management. Insecticide recommendations are given in the following section.

Aphids

- Anchor aluminum foil to the soil for 1 foot around transplants to repel aphids. Slope the soil away from the plant so rain water and mud do not obscure the reflective surface. It may be removed after flowering.
- Make a water trap by painting a small, shallow pan bright yellow and filling it with soapy water. Place several in the garden and refill after each rain. Or, paint 6- x 8-inch cards or pieces of plywood a bright yellow (Rust-Oleum 659 or Safety Yellow). Then coat them with a thin layer of a sticky substance such as Tanglefoot or Tack Trap. Attach them to the garden stakes with the cards at crop level. Replace the Tanglefoot or Tack Trap as needed.
- Repel aphids by spraying plants with a mixture of 2 tablespoons of hot red pepper, 2 garlic cloves, 1 tablespoon of liquid soap, and 1 quart of water.
- Handpick, remove, and destroy aphid colonies on plant leaves.
- Knock aphids from plants with a strong spray of water from the garden hose.
- Spray plants with insecticidal soap or liquid laundry detergent mixed with water (2 to 3 tablespoons of soap per gallon of water). Test tender plants first to ensure they are not burned by the soap solution.
- Aphids can transmit plant virus disease; remove and destroy diseased plants to delay spread of the virus to healthy plants.

Asparagus Beetles

- Plant marigolds near asparagus to repel beetles.
- Destroy and bury any plant refuse in the fall to remove overwintering sites.
- Handpick and destroy all eggs, larvae, and adults in the morning before they become active.
- Spray asparagus ferns with pyrethrin or rotenone in late summer so fewer beetles will overwinter. Cut foliage off at the ground as soon as it begins to die back.

Cabbage Loopers and Cabbageworms

- Cover plants with cheesecloth or a floating row cover to prevent egg-laying.
- Handpick and destroy the worms. Green worms are much easier to spot on red-leaf cabbage varieties.
- Spray plants with *Bacillus thuringiensis* when worms are still small.
- Remove alternate host weeds such as wild mustard and shepherd's purse from the garden.
- Interplant a hot pepper plant between every two cabbage plants.

Colorado Potato Beetles

- Potato beetles prefer to feed on potatoes, eggplants, and tomatoes. Rotate these preferred hosts with other crops in alternate years.
- Interplant non-host crops (e.g., beans) with preferred host crops.
- Handpick and destroy orange egg masses, reddish-brown larvae, and yellow and black striped adults.

- Place straw mulch around plants to hinder movement of the beetles.

Corn Earworms (Tomato Fruitworms)

- With no controls applied, earworms usually damage only the tips of the ears of corn. Cut off the damaged tips and the remainder can be eaten.
- If possible, avoid planting other vegetables near corn, a favorite food of corn earworms.
- Plant and harvest corn as early as possible to avoid infestations.
- Drop 0.25 teaspoon of mineral oil on the silks of each ear of corn after silks have wilted but before they begin to dry.
- Select tight-husked corn varieties for planting; this inhibits worm movement into the ear.
- Beginning at the flower stage, check upper tomato leaves once per week for the small, round, white fruitworm eggs. Spray plants with *Bacillus thuringiensis* weekly as long as eggs are detected.

Cucumber Beetles

- Plant "nonbitter" cucumber varieties; the bitter compound in cucumbers attracts the beetles.
- Cover young plants with cheesecloth or floating row covers until the vines start to run.
- Interplant cucumbers with radishes; radish seems to repel cucumber beetles. Pansies, marigolds, and nasturtiums also repel the beetles.
- Eliminate weeds in and around the garden; some weeds are hosts for bacterial wilt disease, which is spread by the cucumber beetles.

Flea Beetles

- Flea beetles are most numerous in the spring; therefore, plant susceptible crops like eggplants and radishes later in the season.
- Unless flea beetle populations are heavy, their feeding will not kill the plants nor reduce their yields; control is usually not necessary.
- Weeds bordering the garden may serve as alternate hosts. Removing weeds will reduce flea beetle populations.

Grasshoppers

- Trap grasshoppers by using a 1-quart container half filled with a 10-percent molasses and water mixture.
- Grasshopper populations are most damaging in late summer; a floating row cover can be used to protect late-season plantings.
- Fall plowing of the garden, including fence rows and garden borders, exposes the grasshopper eggs to the weather and to insect predators.

Japanese Beetles

- Avoid planting the garden near lawns or in previously grassy areas.
- Protect plants with floating row covers.

Leafhoppers

- Protect plants with cheesecloth or other fine, mesh row covering.
- Paint 6- x 8-inch boards a bright yellow (Rust-Oleum 659 or Safety Yellow). Then coat them with a thin layer of a sticky

substance such as Tanglefoot or Tack Trap. Hang the boards at crop level. When the boards are filled with insects, wash and recoat them.

- Spray plants with insecticidal soap.
- Leafhoppers can transmit virus diseases; remove diseased plants to delay spread to healthy plants.

Mexican Bean Beetles

- Handpick and destroy the egg masses and beetles in early morning before they become active.
- Interplant nonhost crops like potatoes among bean plants to disrupt egg-laying.
- Soybeans are preferred by bean beetles over snap or lima beans; thus soybeans planted nearby can be used as a trap crop.

Spider Mites

- Spray plants with insecticidal soap.
- Mites don't like moist conditions. Keeping the foliage wet can deter mites, but it can also encourage plant diseases.
- Covering plants with an old blanket creates a cool, moist environment that deters mites. First, spray plants with water or insecticidal soap. Then, cover infested plants for 3 days and follow with a second soap spray.

Squash Bugs

- Remove and destroy any clusters of oval, orange-brown squash bug eggs.
- Remove and destroy vines and unused fruit after harvest to eliminate overwintering sites.
- Place shingles or boards near squash or pumpkin plants in spring or early summer to attract squash bugs. Then, collect and destroy the adult bugs that gather under the boards each morning.
- Nasturtiums and marigolds planted near squash plants may deter squash bugs.

Squash Vine Borers

- Cover plants with a fine mesh cloth or row cover until female flowers appear. They have a bulge between flower and stem that is absent in the male flowers.
- Squash varieties with long vines may continue to grow despite borer damage.

- Plant squash in late summer or fall to avoid heavy vine borer infestations.
- Cut open borer entry holes in the stem with a knife. Then, remove the worm and pack moist earth around the stem. This is a more labor-intensive method.

Tomato Hornworms

- Handpick worms from plants; check plants in the evening with a flashlight.
- *Bacillus thuringiensis* will be effective if sprayed when the worms are small.
- Dill planted next to tomatoes will serve as a preferred trap crop; handpick worms off the dill.
- Do not destroy hornworms that have small, white cocoons attached to their bodies. These are parasite cocoons from which small beneficial parasitic wasps will emerge.
- Turning the soil in the fall will expose hornworm pupae to weather and predators.

Bean or Cowpea Weevils

- Plant resistant, thick-hulled southern pea varieties such as AUbe or Freeze-Green.
- Plant beans as early as possible; then, turn plants under after harvest.
- Pick shell beans when they are somewhat green. Then, blanch them before freezing. This will kill weevil eggs and larvae which are seldom seen in the frozen beans.
- Before storing, heat beans in a 175°F oven for an hour. When cool, bag beans and freeze for a week. This will kill any weevil larvae or eggs; beans can then be stored at room temperature.

Whiteflies

- Whiteflies are rarely a problem in outdoor gardens. Make sure any purchased transplants are not infested with whiteflies (or other insects).
- Paint 6- x 8-inch boards a bright yellow (Rust-Oleum 659 or Safety Yellow). Then, coat them with a thin layer of a sticky substance such as Tack Trap or Tanglefoot. Hang the boards at crop level.
- Spray plants with insecticidal soap.

How To Use The Tables

In Table 1, you will find (1) the names of the vegetables grown in most home gardens in Alabama, (2) the names of the insects that are likely to attack each vegetable, (3) the common (or generic) name of the recommended insecticides, and (4) the number of days you must wait after applying each insecticide before harvesting the vegetable. This is important for the safety of anyone eating the food.

In Table 2, you will find a list of common names for each recommended insecticide. The common name is present on the product package where active ingredients are listed. This table also provides common formulations of the active ingredient and the application rate or application rate range for the given formulation of that active ingredient. Rate ranges are given where active ingredients are recommended at different rates for different pests. Read the label of each product you use to make sure you are using the correct application rate for the pest you want to control.

Home garden insecticides are available as liquids and dusts and occasionally as wettable powders. Concentrated liquid formulations must be mixed with water and applied as a spray. Some insecticides may be bought ready to use (RTU) and do not need to be mixed. They can be sprayed from the container. Dusts are also applied directly to the plants without any mixing by the home gardener.

First, check Table 1 to identify the common name of the insecticide that is recommended for the insects that are attacking your vegetables. Then look in Table 2 to find the common formulations available and recommended application rates or rate ranges if the active ingredient has different rates for different pests. Insecticides for home gardeners are almost always grouped together at stores that sell them. Locate a product that has the active ingredient you need and inspect the label to be sure that the vegetable you wish to treat is included on the label.

Table 1. Home Garden Vegetables Insecticide Recommendations

Insect	Insecticide Common Name	Number of Days to Wait from Application to Harvest	Comments
ASPARGUS			
Aphids			
	insecticidal soap	0	No residual activity. Do not apply at temperatures above 90° F.
Asparagus Beetles, Cutworms			
	carbaryl	1	
	pyrethrin	1	
BEANS, PEAS			
Aphids			
	bifenthrin	3	
	esfenvalerate	3 (green) 21 (dry)	
	insecticidal soap	0	No residual activity
	lambda-cyhalothrin	7	
	malathion	1 (beans) 3 (peas)	
Mexican Bean Beetles, Bean Leaf Beetles, Corn Earworms, Cowpea Curculio, Stink Bugs			
	bifenthrin	3	For cowpea curculio make three applications at 5-day intervals starting when pods are 0.5 inch long.
	carbaryl	3 (fresh) 21 (dry)	
	esfenvalerate	3 (green) 21 (dry)	
	lambda-cyhalothrin	7	
Spider Mites			
	insecticidal soap	0	No residual activity
	malathion	1 (beans) 3 (peas)	Malathion provides marginal control of spider mites.
	sulfur	0	Do not use if temperature is greater than 95° F. Do not use within 3 weeks of oil spray.
BEETS			
Flea Beetles			
	carbaryl	7 (roots) 14 (tops)	
BROCCOLI, BRUSSELS SPROUTS, CABBAGE, CAULIFLOWER			
Aphids			
	bifenthrin	7	
	esfenvalerate	3	Not for use on brussels sprouts
	insecticidal soap	0	No residual activity
	lambda-cyhalothrin	1	
	malathion	3 (broccoli) 7 (others)	
	permethrin	1	

Insect	Insecticide Common Name	Number of Days to Wait from Application to Harvest	Comments
BROCCOLI, BRUSSELS SPROUTS, CABBAGE, CAULIFLOWER (cont.)			
Caterpillars (on foliage)			
	<i>Bacillus thuringiensis</i> (Dipel/Thuricide and other formulations)	0	Treat as soon as damage is found and repeat as needed. Susceptible larvae will stop feeding soon after eating treated foliage but may not die for several days.
	bifenthrin	7	
	carbaryl	3	
	esfenvalerate	3	Not for use on brussels sprouts
	lambda-cyhalothrin	1	
	permethrin	1	
Cutworms			
	bifenthrin	7	
	esfenvalerate	3	Not for use on brussels sprouts
	lambda-cyhalothrin	1	
Flea Beetles, Stink Bugs, Harlequin Bugs			
	bifenthrin	7	
	carbaryl	3	
	esfenvalerate	3	Not for use on brussels sprouts
	lambda-cyhalothrin	1	
CANTALOUPE, CUCUMBER, PUMPKIN, SQUASH, WATERMELON			
Aphids			
	bifenthrin	3	
	esfenvalerate	3	
	insecticidal soap	0	No residual activity
	malathion	3 (pumpkin) 1 (others)	Use and registration varies with specific product. Do not apply unless leaves are dry.
	permethrin	0	
Cucumber Beetles (adults), Squash Bugs, Pickleworms, Melonworms, Rindworms			
	bifenthrin	3	Late planted crops may be heavily attacked by pickleworms and melonworms. Begin treatments at first bloom and repeat weekly as needed.
	carbaryl	3	
	esfenvalerate	3	
	permethrin	0	
Squash Vine Borers			
	bifenthrin	3	Direct spray at base of plants.
	esfenvalerate	3	
Spider Mites			
	insecticidal soap	0	No residual activity
	malathion	3 (pumpkin) 1 (others)	Use and registration varies with specific product. Do not apply unless leaves are dry. Malathion provides marginal control of this pest.
Whitefly			
	bifenthrin	3	
	insecticidal soap	0	No residual activity
	pyrethrins+PBO	0	No residual activity
COLLARDS			
Aphids			
	esfenvalerate	7	
	insecticidal soap	0	No residual activity
	malathion	7	Use and registration varies with specific product.

Insect	Insecticide Common Name	Number of Days to Wait from Application to Harvest	Comments
COLLARDS (cont.)			
Caterpillars (on foliage)			
	<i>Bacillus thuringiensis</i> (Dipel/Thuricide and other formulations)	0	Treat as soon as damage is found and repeat as needed. Susceptible larvae will stop feeding soon after eating treated foliage but may not die for several days.
	carbaryl	14	
	esfenvalerate	7	
Flea Beetles, Harlequin Bugs, Stink Bugs			
	carbaryl	14	
	esfenvalerate	7	
EGGPLANT			
Aphids			
	bifenthrin	7	
	esfenvalerate	7	
	insecticidal soap	0	No residual activity
	lambda-cyhalothrin	5	
	malathion	3	Use and registration varies with specific product.
Colorado Potato Beetles			
	bifenthrin	7	
	carbaryl	3	
	esfenvalerate	7	
	lambda-cyhalothrin	5	
	permethrin	3	
Flea Beetles			
	bifenthrin	7	
	carbaryl	3	
	esfenvalerate	7	
	lambda-cyhalothrin	5	
Lacebugs			
	bifenthrin	7	
	carbaryl	3	
Spider Mites			
	insecticidal soap	0	No residual activity
	malathion	3	Use and registration varies with specific product. Malathion provides marginal control of spider mites.
Whiteflies			
	bifenthrin	7	
	insecticidal soap	0	No residual activity
	pyrethrin+PBO	0	No residual activity
IRISH POTATOES			
Aphids			
	esfenvalerate	7	
	insecticidal soap	0	No residual activity
	malathion	0	
	permethrin	14	
Colorado Potato Beetles, Flea Beetles			
	carbaryl	7	
	esfenvalerate	7	
	permethrin	14	

Insect	Insecticide Common Name	Number of Days to Wait from Application to Harvest	Comments
IRISH POTATOES (cont.)			
Potato Tuberworms			
	esfenvalerate	7	Treat when foliage or tuber damage is noticed. Store tubers promptly after digging to avoid tuber worm infestation in storage.
	permethrin	14	
LETTUCE, SPINACH			
Aphids			
	bifenthrin	7	For use on head lettuce only.
	insecticidal soap	0	No residual activity
	lambda-cyhalothrin	1	For use on lettuce only.
	malathion	7 (head) 14 (leaf) 7 (spinach)	Use and registration varies with specific product.
Caterpillars (on foliage)			
	<i>Bacillus thuringiensis</i> (Dipel/Thuricide and other formulations)	0	Treat as soon as damage is found and repeat as needed. Susceptible larvae will stop feeding soon after eating treated foliage but may not die for several days.
	bifenthrin	7	For use on head lettuce only.
	carbaryl	14	
	lambda-cyhalothrin	1	For use on lettuce only.
	permethrin	1	
Flea Beetles, Harlequin Bugs, Stink Bugs			
	bifenthrin	7	For use on head lettuce only.
	carbaryl	14	
	lambda-cyhalothrin	1	For use on lettuce only.
MUSTARD GREENS			
Aphids			
	insecticidal soap	0	No residual activity
	malathion	7	Use and registration varies with specific product.
Caterpillars (on foliage)			
	<i>Bacillus thuringiensis</i> (Dipel/Thuricide and other formulations)	0	Treat as soon as damage is found and repeat as needed. Susceptible larvae will stop feeding soon after eating treated foliage but may not die for several days.
	carbaryl	14	
Flea Beetles			
	carbaryl	14	
OKRA			
Aphids			
	insecticidal soap	0	No residual activity
	malathion	1	Use and registration varies with specific product.
ONIONS			
Onion Maggots (adults)			
	lambda-cyhalothrin	14	
Thrips			
	lambda-cyhalothrin	14	
	malathion	3	Use and registration varies with specific product.

Insect	Insecticide Common Name	Number of Days to Wait from Application to Harvest	Comments
PEPPERS			
Aphids			
	bifenthrin	7	
	esfenvalerate	7	
	insecticidal soap	0	No residual activity
	lambda-cyhalothrin	5	
	malathion	3	Use and registration varies with specific product.
Flea Beetles, European Corn Borers			
	bifenthrin	7	
	carbaryl	3	
	cyfluthrin	7	
	esfenvalerate	7	
	lambda-cyhalothrin	5	
	permethrin	3	
Spider Mites			
	insecticidal soap	0	No residual activity
	malathion	3	Use and registration varies with specific product. Malathion provides marginal control of spider mites.
RADISHES			
Aphids			
	esfenvalerate	7	
	insecticidal soap	0	No residual activity
	malathion	7	
Flea Beetles			
	carbaryl	7	
	cyfluthrin	0	
	esfenvalerate	7	
SWEET CORN			
Corn Earworms, Fall Armyworms, European Corn Borers			
	bifenthrin	1	Begin treatment when silks appear. Repeat at 2-day intervals with sprays directed at ears.
	carbaryl	2	
	cyfluthrin	0	
	esfenvalerate	1	
	lambda-cyhalothrin	21	
	permethrin	1	
Flea Beetles, Cucumber Beetles			
	bifenthrin	1	
	carbaryl	2	
	cyfluthrin	0	
	esfenvalerate	1	
	lambda-cyhalothrin	21	
	permethrin	1	
Stink Bugs			
	bifenthrin	1	
	cyfluthrin	0	
	esfenvalerate	1	
	lambda-cyhalothrin	21	
	permethrin	1	

Insect	Insecticide Common Name	Number of Days to Wait from Application to Harvest	Comments
SWEET POTATOES			
Flea Beetles, Cucumber Beetles			
	carbaryl	7	
Caterpillars (on foliage)			
	<i>Bacillus thuringiensis</i> (Dipel/Thuricide and other formulations)	0	Treat as soon as damage is found and repeat as needed. Susceptible larvae will stop feeding soon after eating treated foliage but may not die for several days.
	carbaryl	7	
Sweet Potato Weevil			
	carbaryl	7	Also labeled as pre-plant dip; follow label directions.
TOMATOES			
Aphids			
	bifenthrin	1	
	cyfluthrin	0	
	esfenvalerate	1	
	insecticidal soap	0	No residual activity
	lambda-cyhalothrin	5	
	malathion	7	
Cutworms			
	bifenthrin	1	
	cyfluthrin	0	
	esfenvalerate	1	
	lambda-cyhalothrin	5	
Flea Beetles, Colorado Potato Beetles, Fruitworms, Hornworms, Tomato Pinworms			
	bifenthrin	1	
	carbaryl	3	
	cyfluthrin	0	
	esfenvalerate	1	
	lambda-cyhalothrin	5	
	permethrin	0	Do not use on varieties with fruit less than 1 inch in diameter.
Spider Mites			
	bifenthrin	1	
	insecticidal soap	0	No residual activity
	sulfur	0	Do not use if temperature is above 95° F. Do not use within 3 weeks of oil spray.
Stink Bugs, Leaffooted Bugs			
	bifenthrin	1	
	cyfluthrin	0	
	esfenvalerate	1	Weekly treatments may be needed for late season control.
	lambda-cyhalothrin	5	
Whiteflies			
	bifenthrin	1	
	insecticidal soap	0	No residual activity
	pyrethrins+PBO	0	No residual activity

Insect	Insecticide Common Name	Number of Days to Wait from Application to Harvest	Comments
TURNIPS			
Aphids			
	insecticidal soap	0	No residual activity
	malathion	7	Use and registration varies with specific product.
Caterpillars (on foliage)			
	<i>Bacillus thuringiensis</i> (Dipel/Thuricide and other formulations)	0	Treat as soon as damage is found and repeat as needed. Susceptible larvae will stop feeding soon after eating treated foliage but may not die for several days.
	carbaryl	7 (roots) 14 (tops)	
Flea Beetles, Harlequin Bugs			
	carbaryl	7 (roots) 14 (tops)	

NOTE: Applying Broadcast Soil Insecticides

Slugs and **snails** can be controlled in home gardens with a 2% methaldehyde bait. Consult the label for specific vegetables on which it may be used. The bait is applied to the soil surface and should not contact foliage or edible parts of the plant.

Infestations of some **soil dwelling pests**, such as **cutworms**, **armyworms**, and **crickets** can be controlled with a 5% carbaryl (Sevin) bait. Combination baits of carbaryl and methaldehyde are also available. Many soil dwelling pests can also be controlled in all vegetable crops by applying bifenthrin granules (0.115%) prior to planting at the rate of 1 pound of product per acre. Work the bifenthrin granules into the top 4 to 6 inches of soil. The granules can also be applied to bifenthrin -labeled crops after plant emergence with the same preharvest interval as foliar applications.

Active ingredients available in some commercial products labeled for **fire ant** control in home gardens include spinosad (Fertilome Come and Get It!, Safer Brand Fire Ant Bait, and Green Light Fire Ant Control With Conserve), pyriproxyfen (Esteem Ant Bait), and (S)-methoprene (Extinguish Professional Fire Ant Bait). Approximate time required for the active ingredients to give noticeable results are as follows: spinosad, 2 to 4 weeks; pyriproxyfen, 6 to 8 weeks; and (S)-methoprene, 8 to 12 weeks.

No general use insecticides provide control of **leafminer** larvae inside leaves. Leafminer problems are frequently caused by overuse of insecticides. Hand-pick mined leaves.

Table 2. Insecticides, Available Formulations, and Rates for Some Common Garden Insecticides

Insecticide	Formulations	Application Rates on Labels ¹
<i>Bacillus thuringiensis</i> (Bt)	Dipel liquid and dusts Thuricide liquid Bt worm killer Other formulations	Follow label directions for all Bt products. Rates vary with Bt concentration.
bifenthrin	0.3% liquid	1.5 ounces per gallon of water. Wet plants thoroughly, but avoid runoff.
carbaryl	22.5% liquid	0.75 to 3 ounces per gallon of water and spray 1,000 square feet. ²
	0.126% RTU ³	Spray until surface is wet.
	5% dust	0.25 to 1 pound per 1,000 square feet. ²
cyfluthrin	0.75% liquid	1 tablespoon per gallon of water
	0.0003% RTU	
esfenvalerate	0.425% liquid	2 tablespoons per gallon of water
	0.0033% RTU	Cover all plant surfaces, but avoid runoff.
insecticidal soap	Insect Killing Soap 49.2%	5 tablespoons per gallon of water
	Liquid laundry detergent	2 tablespoons per gallon of water
lambda-cyhalothrin	0.5% liquid	1 tablespoon per gallon of water
	0.002% RTU	
malathion	50% and 55% liquid	1.5 teaspoons to 2 tablespoons per gallon of water ³ . Use and registration vary with specific product.
permethrin	10% liquid	0.25 to 0.75 ounces per gallon of water per 440 square feet. ²
	2.5 % liquid	1 ounce to 3 ounces per gallon of water ²
	0.25% dust	Dust lightly. ⁴
pyrethrins + PBO	0.3% + 3% Other formulations	Follow label directions.
sulfur	90% liquid	2 tablespoons per gallon of water

¹Use pesticides only according to the directions on the label. Follow all directions, precautions and restrictions that are listed. Do not use pesticides on plants that are not listed on the label. The pesticide rates in this table are recommended only if they are registered with the Environmental Protection Agency and the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Information on label changes can be obtained by contacting your local county Extension office.

²Rate varies with insect species. For example, the rate recommended for control of flea beetles on cabbage with one brand of 22.5 % carbaryl liquid is 0.75 to 1.5 ounces per gallon of water while the rate recommended for armyworm on cabbage is 3 ounces per gallon. Check label for specific rate for each pest.

³RTU = Ready To Use

⁴Read label directions to make sure dust is labeled for use on vegetable of interest.

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For more information, call your county Extension office. It is listed in your telephone directory under your county's name.

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The pesticide rates in this publication are recommended **only** if they are registered with the Environmental Protection Agency or the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Before you apply **any** pesticide, check with your county Extension agent for the latest information.

Trade names are used **only** to give specific information. The Alabama Cooperative Extension System does not endorse or guarantee any product and does not recommend one product instead of another that might be similar.

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