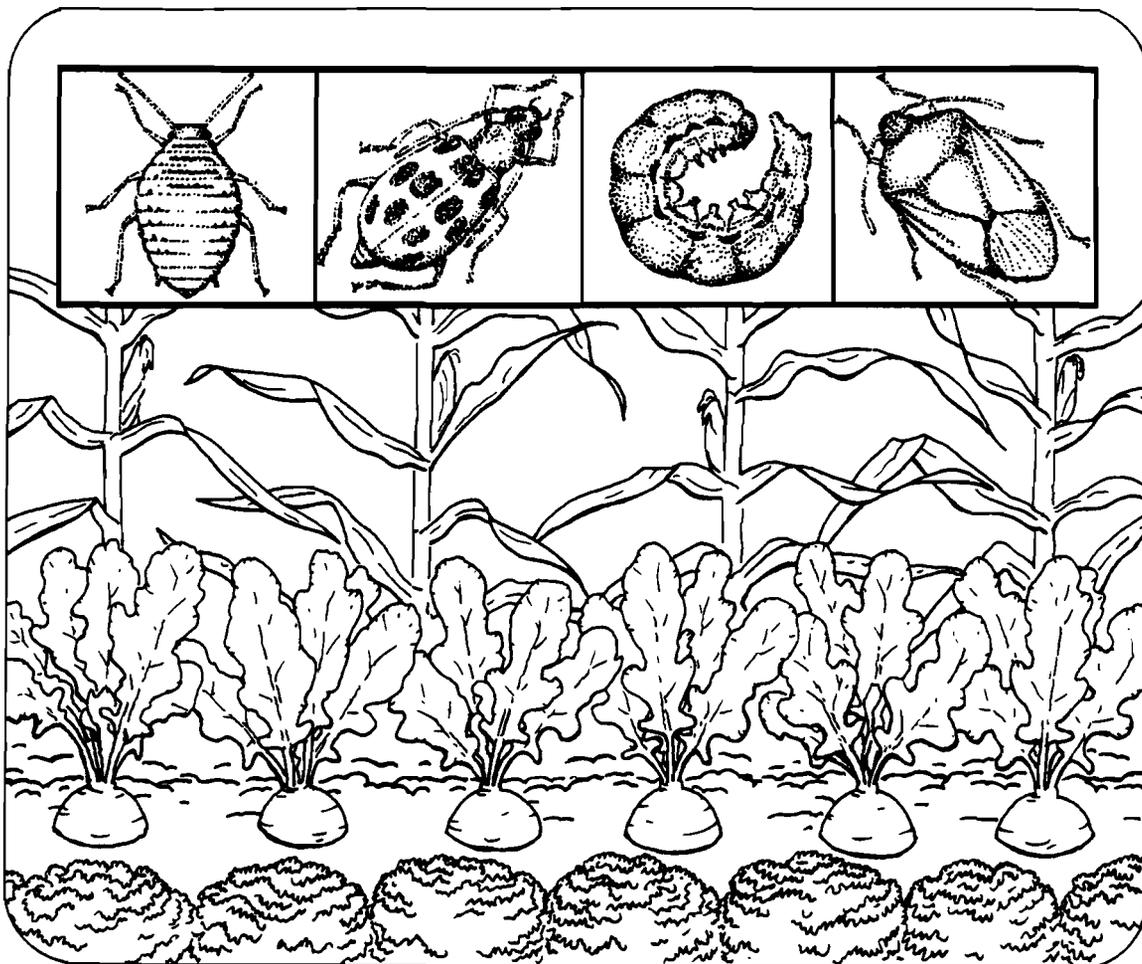


# Insect Management And Control In The Home Garden



Florida Cooperative Extension Service/ Institute of Food and Agricultural Sciences/ John T. Woeste, Dean

## INTRODUCTION

This publication provides information to aid homeowners in management and control of insect pests in a vegetable garden. Growing vegetables at home reduces food bills and provides recreation for many homeowners each year. This is especially true in Florida where warm temperatures and long growing seasons make gardening possible year-round.

Unfortunately, the same climate which is so ideal for gardening also provides conditions in which insects thrive. Many different insects attack vegetable crops and it is impossible to know from one season to the next which of these pests will cause problems. Some cause problems every year while others rarely appear. There are also many insects which are beneficial, and in some instances essential, to producing vegetables.

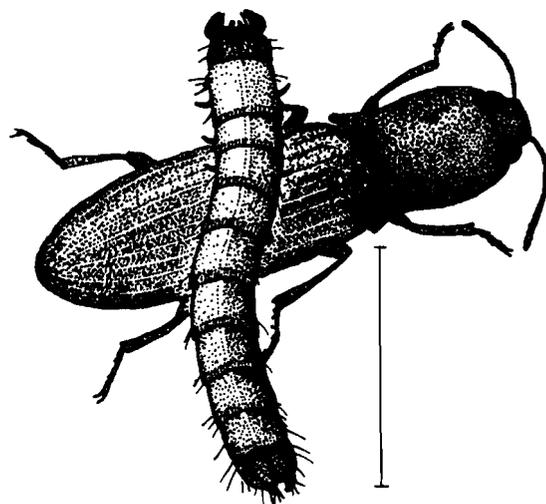
To grow a highly productive garden it is important to have an insect management program. This should include frequent surveys of the garden to detect problems at an early stage. For the survey to be effective, however, the homeowner must know where to look for insects and be able to identify those that are found. Without proper identification, management or control is impossible.

Insects attack plant roots, stems, leaves, flowers, and fruits. They also attack at any stage of growth from seedling to mature plant. The insects described in this manual are divided into groups according to the plant part that they attack. For example, the first section deals with those pests which attack underground plant parts. Descriptions and drawings of each insect are given along with information about the group as a whole. Control measures from sanitation, hand-picking and other cultural practices to the use of pesticide sprays, granules, and baits are provided.

### Insects That Attack Underground Plant Parts

Almost all soil insects build to high populations on grass, and most home gardens are grown in plots covered previously with grass. In order to help combat the pests discussed in this section, it is important to plan well in advance where the garden is to be planted. The plot must be thoroughly tilled or spaded well in advance of planting and should be kept clean and free of grass for 30 or more days before planting.

**Wireworms** range from  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches in length and have slender, shiny, segmented bodies. They are yellowish-brown in color and shiny in appearance.

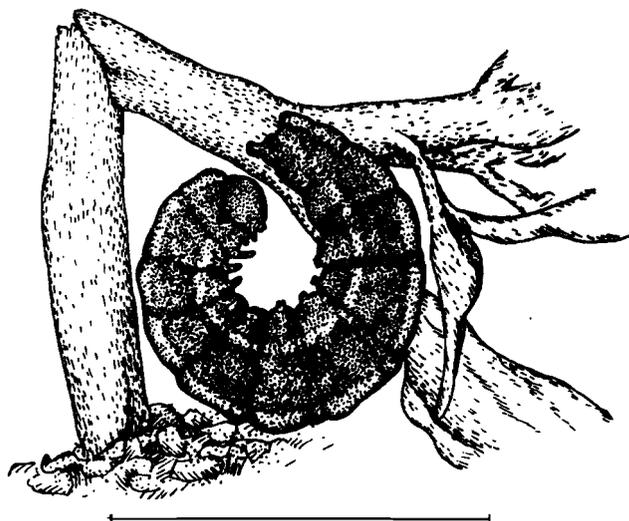


*Note:* The line indicates average adult size or worm length.

These worms are known to attack a wide variety of vegetables. Living deep in the soil, they move up quickly to attack seeds or young plants. Wireworms drill holes in the seed and feed on the seed insides or they bore holes into the taproot of the plant.

Control measures for wireworms include rotation of garden plots, and tilling the soil several months prior to planting. In areas where the worms are known to exist, it may be necessary to apply a granular insecticide (such as diazinon) to the prepared soil, "rototill" or spade it in to a depth of 6 inches and water the plot thoroughly.

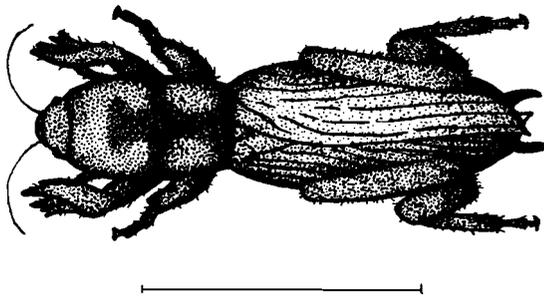
**Cutworms** are stout, gray to almost black worms that may reach almost 2 inches in length. They have a "slick" appearance and curl up if disturbed. Cutworms are active only at night. During the day they



remain below the soil surface. At night they emerge to feed on leaves and stems of young seedlings and transplants. The stems are frequently cut so that the plant falls over.

Control measures include removing grass and plowing the soil well in advance of planting. Small "sleeves" made from paper cups with the bottoms removed provide a mechanical barrier to the worm when slipped over the plant and the bottom pressed into the soil. Baits (Sevin, Dylox, Proxol, etc.) may also be used, but should be applied late in the afternoon so they will be fresh when the worms come out to feed at night. Insecticide sprays will provide satisfactory control of cutworms if the spray is directed at the base of the plant where it emerges from the soil. Care should be taken to wet the soil with spray in an area extending 3 to 5 inches from the stem.

**Mole crickets** are light brown insects — about 2 inches long. The front legs are large and resemble small shovels. Mole crickets tunnel under the soil and feed on plant roots. They also disrupt and dislodge plants by their digging. Like cutworms, mole crickets are active only at night and hide in their tunnels during the day. The presence of this pest can be determined by observing their meandering tunnels that are located just below the soil surface. The tunnels are approximately one-half inch in diameter and the soil surface appears loosened and raised as if a miniature mole of the mammal type had tunneled.

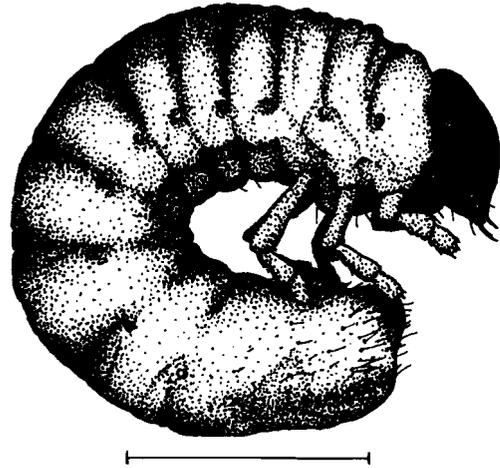


Mole crickets are best controlled by applying baits (such as malathion, or Dylox) late in the afternoon on warm days and after the garden has been watered thoroughly. If liquid insecticides or granules are used, they should be applied and treated area irrigated immediately with 1/2 inch of water.

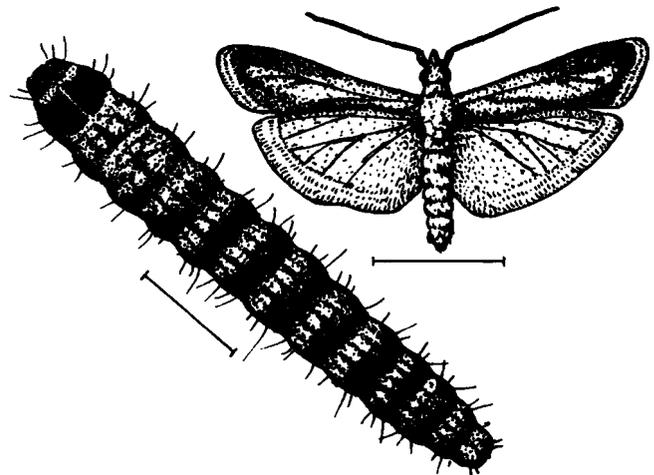
**Grubs** are "C" shaped and dirty white in color with the tip of their abdomen purplish-black. Their head is hard, blunt, and reddish-brown in color. Grubs range in size from 1/4 to 2 1/2 inches long. Like mole crickets, grubs feed on plant roots and tubers and also cause damage by tunnelling in the root zone.

Grub populations can be reduced by preparing the garden soil well in advance of planting. Granulated

insecticide (such as diazinon) applied for wireworms will also control grubs.



**Lesser cornstalk borers** are small caterpillars, ranging from 1/4 to 3/4 inch in length. Their bodies are alternately banded with aqua and wine colored bands. These caterpillars attack the roots of corn, peas, and beans. The larva causes damage by boring into and eating the root system. They construct fragile silk-like tubes that are attached to the roots just below the soil surface.



Addition of organic matter to the soil and regular irrigation can reduce the activity of this caterpillar. Do not allow the garden to undergo periods of drought. Plant early and if a crop is grown in hot weather an application of a material like diazinon granules at planting time may be needed.

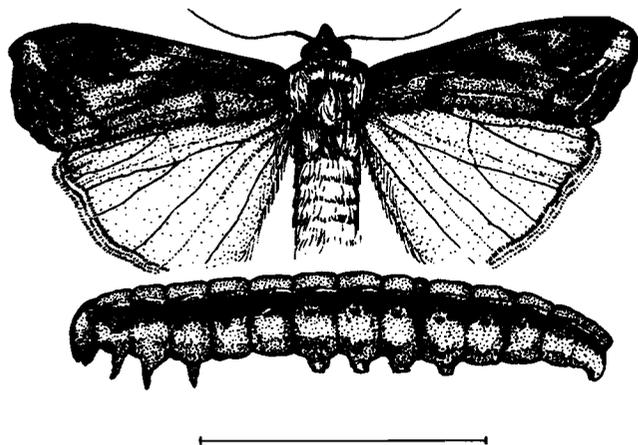
### Chewing Insects That Feed on Foliage and Stems

Caterpillars are the primary foliage feeders. They consume large amounts of plant tissue after reaching a length of 1/2 inch or longer. Moths and butterflies

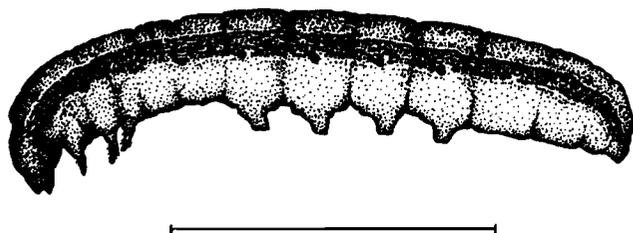
which are the adult forms of caterpillars do not feed on or damage the plant. Caterpillars are the larval (immature) forms of the moths and butterflies. Caterpillars have three pairs of true legs (jointed) located just behind the head. They also have a pair of anal prolegs (fleshy non-jointed) located at the extreme rear end of the body and may have from one to four pairs of prolegs located in the abdominal portion of their body.

**Armyworms:** There are several types of armyworms that are similar in appearance that attack plants in the home garden.

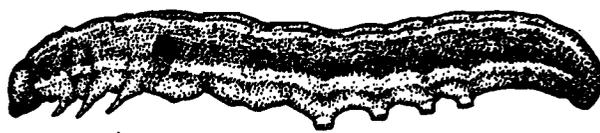
**Fall armyworms** are about 1½ inches long when fully grown. They usually have dark heads with a light inverted Y shaped mark on the front part. They are usually tan to green in color and are found feeding in young corn whorls or in the ears.



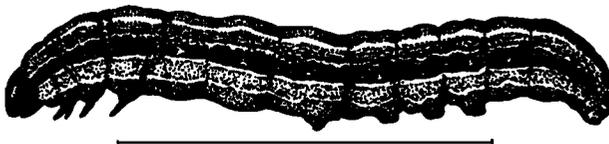
**Beet armyworms** are predominately green and have dark stripes on their sides and a single prominent black spot on each side of their bodies just above the second pair of true legs. They seldom exceed 1¼ inches in length.



**Southern armyworms** are also called climbing cutworms. The larvae are dark gray to nearly black in color and are marked with yellow stripes on their sides. The southern armyworm may reach almost 2 inches in length when full grown.



**Yellow striped armyworms** have a pair of triangular black markings on most of the segments of the upper back and often possess a bright orange stripe bordering the outside of these markings. They may reach a length of 2 inches when full grown.

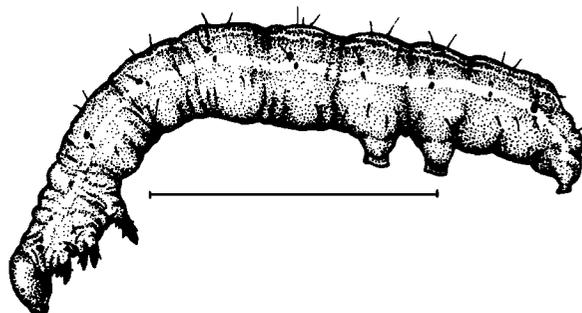


Armyworms are generally migratory species that may fly great distances when the weather begins to warm up. It is wise to plant crops like corn, beans, peas, potatoes, and tomatoes as early in the spring as possible to avoid large infestations. Once armyworms have invaded a crop then applications of recommended insecticides must be made. *Bacillus thuringiensis* formulations are generally effective only on very young and/or small armyworms. Once worms have exceeded 1/2 inch in length they become more difficult to control with *Bacillus thuringiensis* and other recommended insecticides must be used.

**Loopers** are often common caterpillar pests of the home garden. They are green in color, shaped somewhat like a baseball bat, with the head being the smaller end. The worms loop or bow up their backs when they crawl. They grow to about 1½ inches long and have two pairs of abdominal prolegs.

Loopers generally feed on the undersides of older leaves. To find them, the plant must be shaken or the leaves turned to expose the pest.

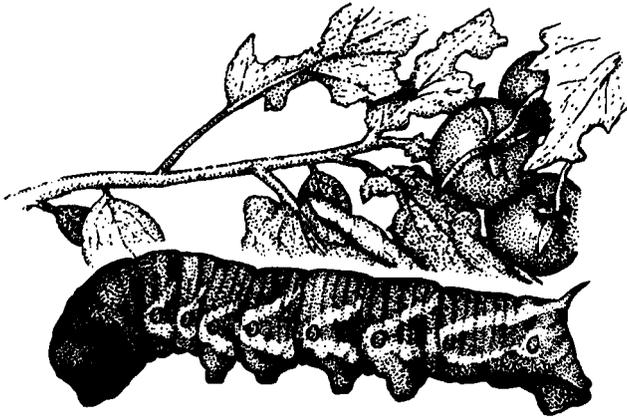
Control measures for loopers include hand picking if they are not too numerous or use of sprays. If a spray is used, care must be taken to cover the entire plant as well as the upper and lower leaf surfaces. *Bacillus thuringiensis* formulations usually perform



satisfactorily, however, loopers are difficult to control with most insecticides available to the home gardener.

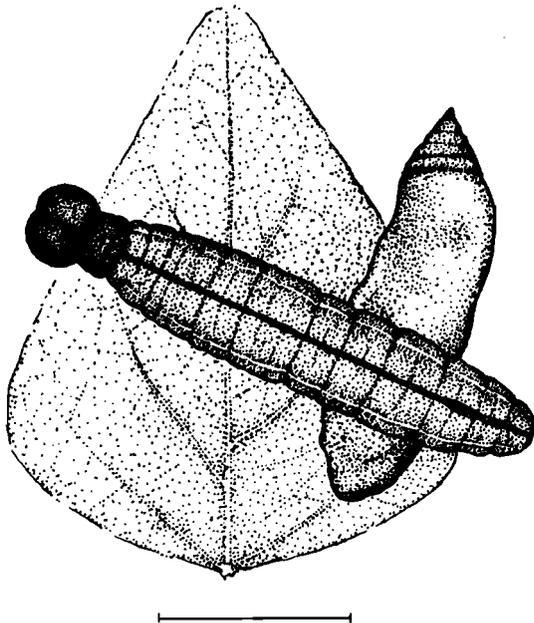
**Tomato hornworms** are occasional garden pests which may feed on eggplants as well as tomatoes.

The hornworms may reach 3½ to 4 inches in length when fully grown. They are green in color with white oblique lines on their sides. The worms also have a horn-like projection on the upper end of their bodies.



Hornworms can be easily removed by hand and destroyed. They are usually eaten by paper wasps. However, if they become large they will strip a plant of foliage in a short period of time. Hornworms can be detected by the presence of relatively large fecal pellets or droppings. *Bacillus thuringiensis* as well as most broad spectrum insecticides give good control.

**Bean leafrollers** feed on members of the bean family. They are easily recognized since they cut the



leaf margins in a semi-circle then roll the "flap" back over themselves.

The larvae are brightly colored yellow and green and grow to about 1½ inches long. The head is large and the worm has a constricted neck.

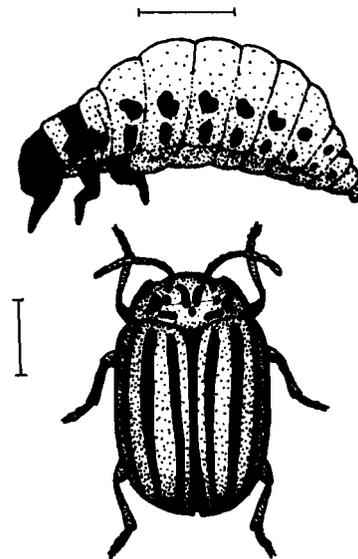
Leafrollers may be hand picked from the leaves or controlled easily by use of recommended insecticide sprays.

**Beetles** generally feed on foliage in their adult stage and on roots in the immature or larval stage. A majority of damage is caused by the root feeding forms. Only when populations become large will the adults eat enough foliage to cause major damage.

**Colorado potato beetles** are primarily pests of potatoes but also feed on eggplants, tomatoes, and peppers. They may be found anywhere in Florida north of the Tampa Bay area.

The adults are about 3/8 of an inch long with alternating black and yellow stripes running lengthwise on their backs. The larvae are smooth-skinned, hump-backed and light pink in color with two rows of black spots on each side. Larvae are about 1/2 inch long when full sized.

Both the adults and larvae feed on the leaves and terminal growth of the plant. Larvae usually feed in groups while adults are scattered. The beetles and larvae may be controlled through continuous hand picking. The yellowish-orange colored egg masses should also be destroyed. Severe infestations of the beetles must be treated with recommended insecticides.



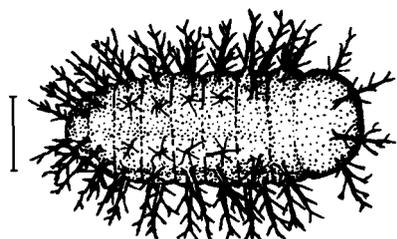
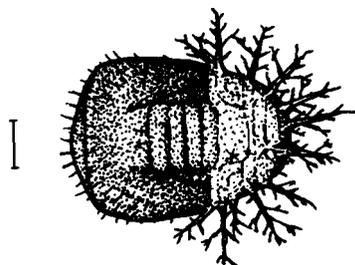
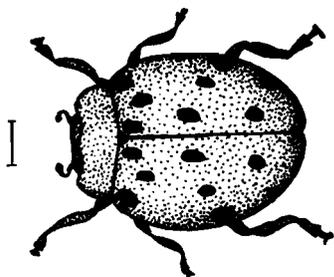
**Mexican bean beetles** are primarily restricted to the northern-most part of Florida where they feed on the leaves of bean plants.

The adults are about 1/4 to 1/3 inch long, bronze in color with 16 black spots on their backs. They are

members of the lady beetle family and closely resembles the "lady bugs."

The larvae are yellow with rows of black-tipped branched spines growing from their backs. The larvae reach about 1/3 inch in length.

Both adults and larvae feed on the underside of the leaves eating away the tissue between the veins and leaving a lacy skeletonized leaf.

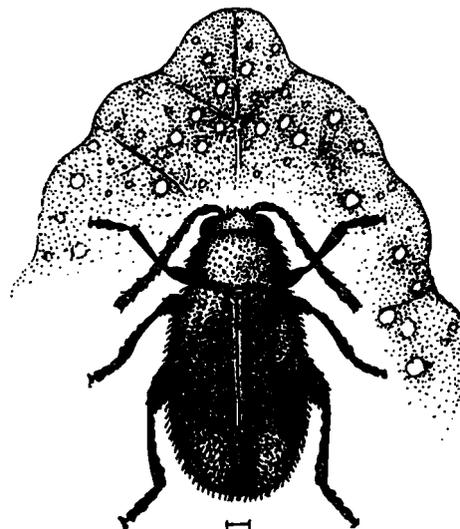


If beetle populations become heavy they must be controlled by applying recommended insecticides.

Adults and larvae also may be easily hand-picked from plants and if this measure is to be used it must be thorough and continuous.

**Flea beetles** are tiny (1/16 inch long) bronze, black or brown beetles which attack young tomatoes, peppers, eggplants and other garden plants. They can jump rapidly for great distances when approached and they resemble large "fleas" in appearance and habit.

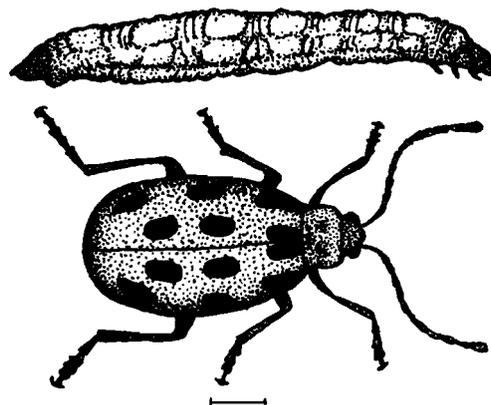
Flea beetles eat numerous small portions of tissue from a leaf thus leaving tiny "shot hole" patterns in it. The larvae feed on underground plant parts and are seldom observed. Often it is necessary to apply recommended insecticides particularly when the pest is attacking young plants. Older plants are able to tolerate more damage and don't seem to be preferred by flea beetles.



**Cucumber beetles** are prevalent on most crops and occasionally the adult beetles consume enough foliage as adults to become a problem. Most damage results from the fragile cream colored larvae feeding on plant roots.

There are two types of cucumber beetles. The **spotted** cucumber beetle is found primarily in the northern half of the state. It is greenish or yellow in color with 12 dark colored spots on the back and are 1/4 inch in length.

The **banded** cucumber beetle is found mainly in southern Florida. It is green with yellow spots on the back. These spots are very close together giving the appearance of yellow bands running across the back. Adults are 1/4 inch in length.



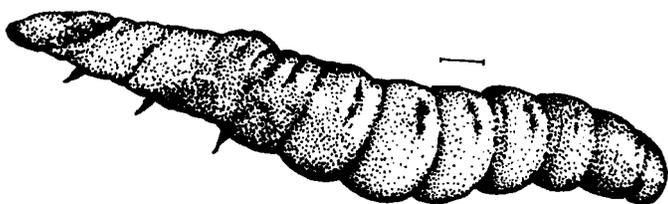
Control of the beetles include thorough destruction of weeds and grass from the garden plot well in advance of planting (preferably 30 days). Recommended insecticides may be applied to the soil at seeding time to further reduce damage.

**Miners** are so called because they tunnel and mine in the leaf tissue. In the immature stage (caterpillar or maggot) they feed between the upper and lower

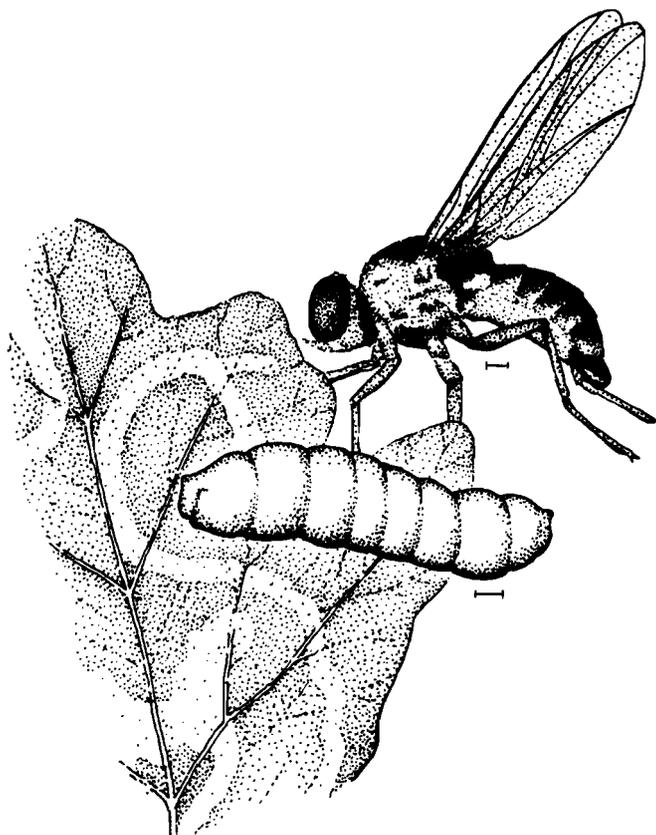
leaf surfaces eating the green chlorophyll bearing tissue and giving the leaf a colorless "windowpane" appearance. There are two miners which cause problems for home gardeners.

**Tomato pinworms** are members of the moth order and are serious pests of tomatoes, eggplants, peppers, and potatoes. The larvae are small, yellowish-gray or green purple-spotted caterpillars about 1/4 inch in length. The caterpillars roll and tie leaf tips together as well as tunneling inside the leaf. The pest is most severe on greenhouse-grown plants.

Control measures should include seeking pest-free transplants. Once infestations are established regular applications of recommended insecticides are necessary.



**Serpentine leafminers** are members of the fly order and get their name from their serpentine or snake-like tunneling patterns.



The female deposits eggs in the leaf tissue of almost all types of vegetables. The female flies are similar in size and appearance to the common eye gnat.

Small (1/10-1/18 inch) yellow maggots grow in size as they tunnel through the leaf, leaving tunnels of increasing size. The maggots leave a trail of black fecal material in the tunnels. When ready for pupation, they cut a hole in the leaf and drop to the soil.

Both pinworms and miners are difficult to control as they are protected by the upper and lower leaf surfaces. Although insecticides are a necessary part of control, overuse of these materials for other insects seems to create extra ordinary large populations of leafminers.

In situations where leafminers are expected to be a problem the use of insecticides like *Bacillus thuringiensis* for worm control helps to save the beneficial wasp parasites and predators of leafminers. Where large amounts of broad spectrum insecticides have been used it seems to reduce beneficial insects, spiders etc. so that the leafminer populations go uncontrolled. Leafminers also are very difficult to control with any insecticide and currently there is not an acceptable material available to the homeowner that provides satisfactorily control.

### **Piercing and Sucking Insects that Feed on Foliage and Stems**

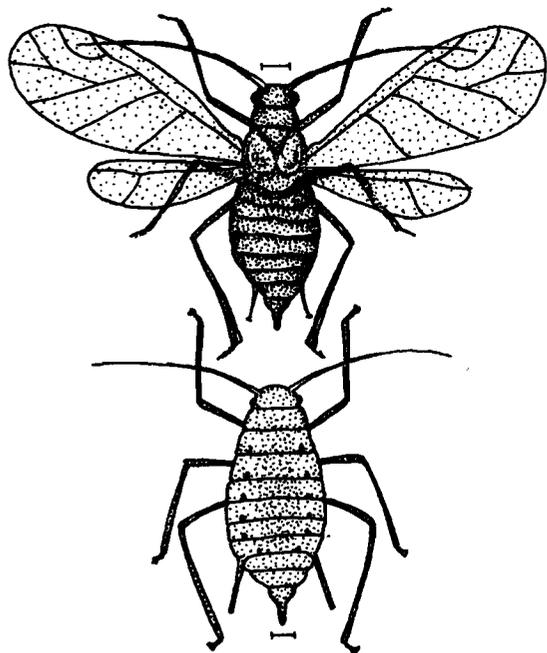
These insects have highly modified hollow mouthparts that function like a hypodermic needle. These needlelike mouthparts are inserted into the plant and used to remove the plant sap. Some of the insects in this group transmit plant viruses and diseases from plant to plant as they feed. These insects often inject certain enzymes and toxins into a plant as they feed. These chemicals can cause a plant to grow or respond abnormally.

**Aphids or plant lice** are some of the most common insects of this group. They feed on almost all garden crops. Aphids are 1/32 to 1/8 inch in length and may be brown, green, yellow, pink, or black in color. They generally feed on the under surface of leaves or on young stems and buds. They often spread viruses to tomatoes, squash, and cucumbers. Their feeding often causes leaves to curl and the plant to become distorted in growth.

Ants feed on the sticky, sugary-sweet honeydew excreted by the aphids. The honeydew also serves as media for the fungus growth known as "sooty mold." This fungus will cover the leaves and turn them black.

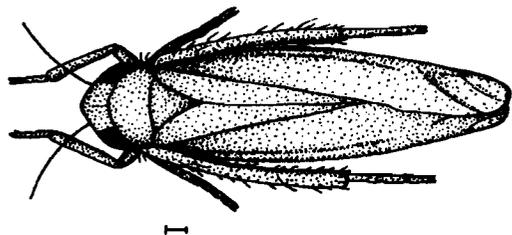
Aphids generally build up in numbers during cool weather since the parasites and predators that feed on them seem to become more numerous in warm weather. Aphid populations can often be reduced by

directing water under pressure from a garden hose at the infested plant. Also mixing a mild soap solution (1 tablespoon of detergent or soap per gallon of water) and applying to the infested plants will help.



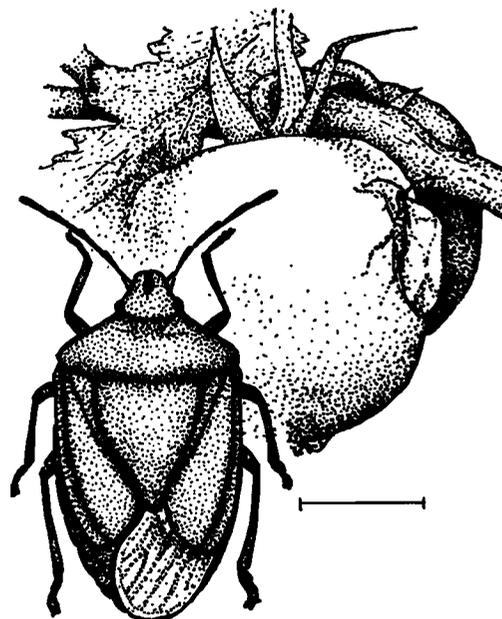
If insecticides are used care should be taken to direct the spray so that all parts of the plant, as well as lower leaf surfaces are covered. Often ants will protect aphids and move them from plant to plant in order to receive the honeydew given off by aphids. The presence of ants crawling on the plants often indicates an aphid population. Control of the ants frequently reduces the aphid outbreaks.

**Leafhoppers** attack nearly all garden plants. They are 1/20 to 1/4 inch long and may be green, brown, tan, or grayish-black in color. Leafhoppers are wedge-shaped with the head being broad and the rear end narrow. Being strong flyers, the insects will quickly move short distances when disturbed, giving them the appearance of hopping. In most cases leafhoppers do not require control. However, if they become so numerous as to cause leaf discoloration or marginal leaf burns use of a recommended insecticide may be necessary.



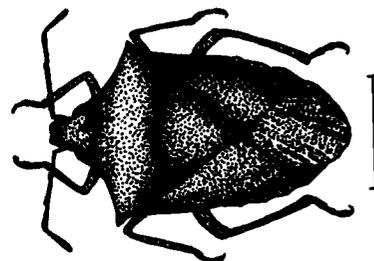
**Stinkbugs** are common pests to most all plants and are generally solitary feeders in the adult stage. Immature nymphs may be found in groups since they cannot fly. All stinkbugs give off the characteristic foul smell as a defensive weapon when disturbed.

**Green stinkbugs** are also known as the "pumpkin" bugs and are probably the most common of the stinkbugs. Full-grown stinkbugs may reach 2/3 inch in length and are pale to medium green in color. Adults are strong fliers. Nymphs (immature forms) range in size from 1/8 to 1/2 inch long and are green in color with red, white, and black spots on their backs. Eggs are laid generally in masses of from 10-50 and resemble miniature barrels.

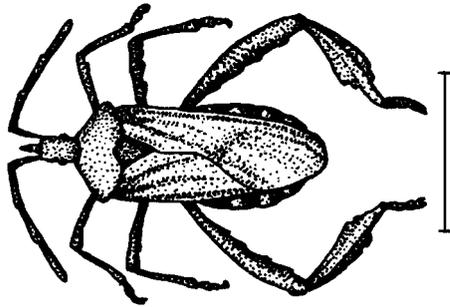


Stinkbugs do not usually cause enough damage to merit control unless they start feeding on the pods, fruit, or seed parts of a plant. However if the green stinkbug or any of the following described types become numerous and their feeding causes the foliage to wilt a recommended insecticide may be necessary.

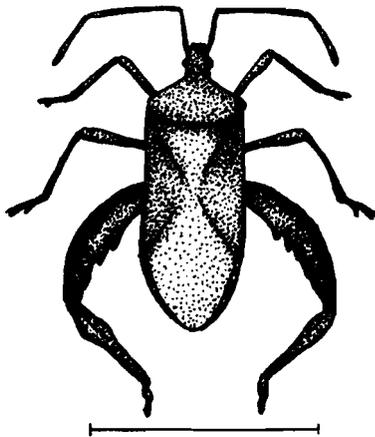
**Brown stinkbugs** are not as prevalent as the green species. They are light brown to buff in color and somewhat smaller than the green forms when full grown.



**Leaf-footed plant bugs** are often called squash bugs. Adults are  $\frac{5}{8}$  to  $\frac{3}{4}$  inch in length and are brown in color with a narrow white band running across the back.



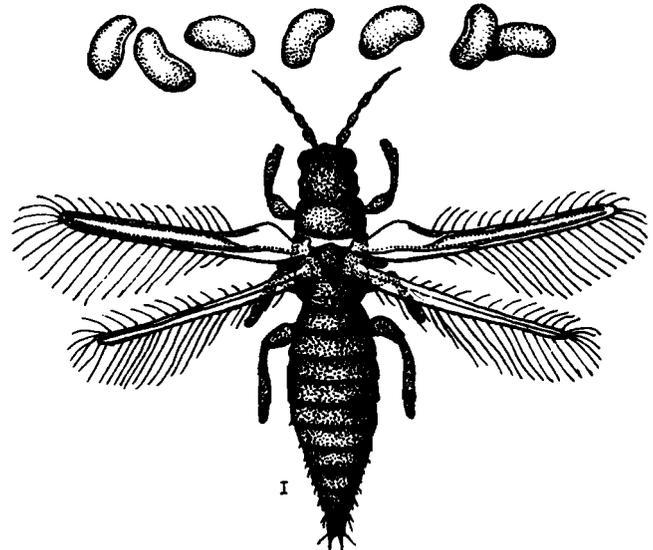
**Big-legged or big-footed plant bugs** are the largest of the stinkbugs reaching 1 to  $1\frac{1}{2}$  inches in length. The leaf foot gets its name because the lower part of the hind legs appears to be flat and leaf shaped. The big-legged species gets its name by having a large "thigh" portion on its hind leg. Both are dark gray to black in color, and give off an offensive odor if disturbed.



**Thrips** are a nuisance pest to most gardeners and are found feeding in and on the blossoms and on the young leaves. They rarely cause significant damage but are often falsely blamed since their feeding causes leaves to curl, spot, and distort. This damage is due to action of the rasping-sucking mouthparts of this insect. One part of the mouth tears open the leaf tissue and another part sucks up the juices from the wound.

Thrips are small, slender and rarely over  $\frac{1}{8}$  inch long. They are black or yellow in color and may best be collected by shaking or striking the infested plant across a piece of white paper. If control is necessary it is usually when the plants are young (the first 5

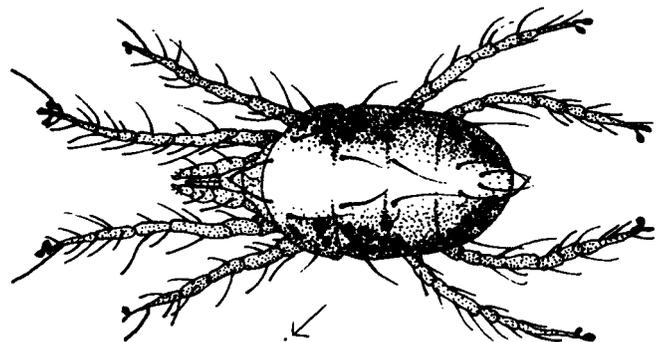
or 6 weeks of age). Directed water sprays and soap solutions discussed under aphid control may help. Most insecticides will control thrips if the plants are thoroughly covered with the spray.



**Spider mites** are not insects but are closely related to spiders. They have no wings and have 8 functional legs whereas mature insects have 6 legs. Mites have piercing sucking mouthparts like thrips and damage plants by rupturing the cells of the leaf and consuming the juices.

Mites are very small, ranging from  $\frac{1}{60}$  to  $\frac{1}{50}$  inch long. They are usually red (red mite) or greenish (2-spotted mite) in color. Most mites feed along the midrib or lateral veins of lower and upper surfaces of the leaves. Infested leaves become pale or dusty in appearance and webs may be visible on the plant.

Mites prefer hot, dry weather. Keeping the plants moist and also directing a stream of water from the garden hose onto the infested plant will aid in control. Mild soapy-water solution also will reduce mite problems. If mites become a problem it may be



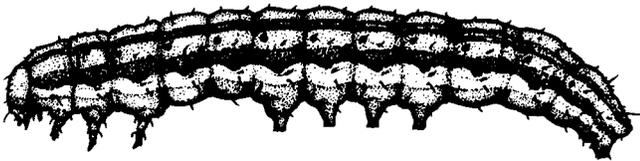
necessary to use a recommended miticide. It is generally necessary to make a second application no later than 5 days from the first in order to disrupt their very short life cycle.

### Insects That Feed on Seeds, Pods, or Fruits

This group of insects is probably the most damaging of those discussed thus far. If healthy, most plants can overcome some root or foliage damage. However, damage to the edible parts of a plant results in direct loss of the seeds or fruit. For this reason careful observation should be given to the garden when the fruit, seed, and pods are setting and maturing.

**Corn earworms** are also called cotton bollworms, tomato fruitworms and soybean podworms. They require higher amounts of protein in their diets than most worms; therefore, they feed on protein rich pods, seed, and fruit. They also feed on foliage.

The worms vary in color from green to brown, pink, yellow, and black with yellow heads and dark legs. Their skin is coarse with many black tubercles (spot-like projections). Corn earworms reach 1½ inches or more when fully mature. They bore into tomato fruit and the silk end of corn ears.



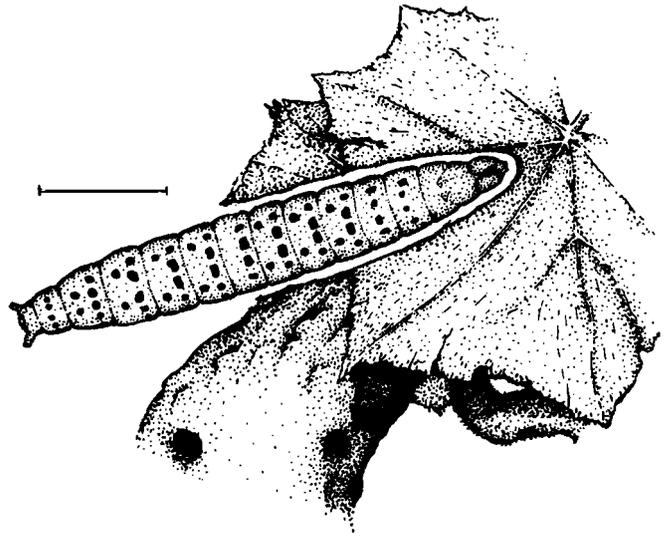
The largest number of corn earworms are encountered in the late spring and throughout the summer. Crops that are planted early often escape these warm weather caterpillars. Once infestations become established recommended insecticides are needed.

Sweetcorn is a favorite host and the silking stage is when it is most susceptible to corn earworm attack. When corn earworms become active they can require daily to every other day application of a protective insecticide until the silks begin to dry. Corn earworms also attack tomato fruit, beans, and peas (pod stages) where they bore into and partially consume the inside parts.

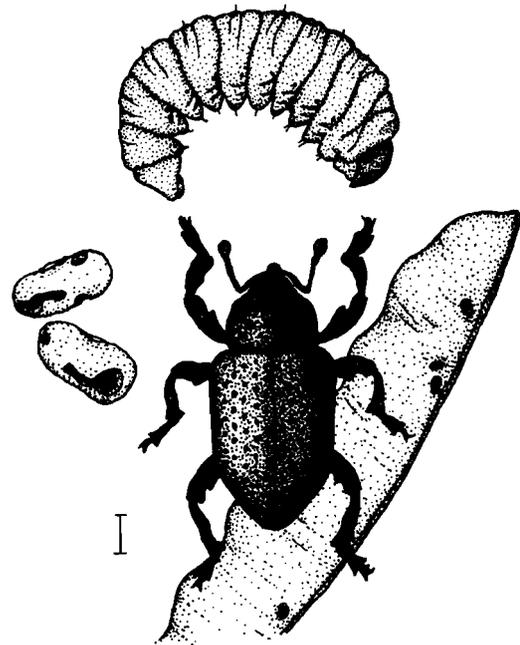
**Pickleworms** restrict their feeding to members of the cucurbit family and feed primarily on squash and cucumbers. The small caterpillars feed on the plant until they are large enough (1/4 inch long) to bore into the fruit. The larvae are yellow colored and are marked with small black spots until they reach 1/2 inch or longer, when they lose the spots and become a clear, pale green color.

The worms feed inside the fruit until they reach 3/4 to 7/8 inch in length. They then emerge from the fruit to pupate in the soil. Small masses of moist green gummy-like excrement are pushed out from holes in the fruit.

Control is difficult and preventive spray applications must be made to protect the fruit, particularly in late summer and early fall crops.



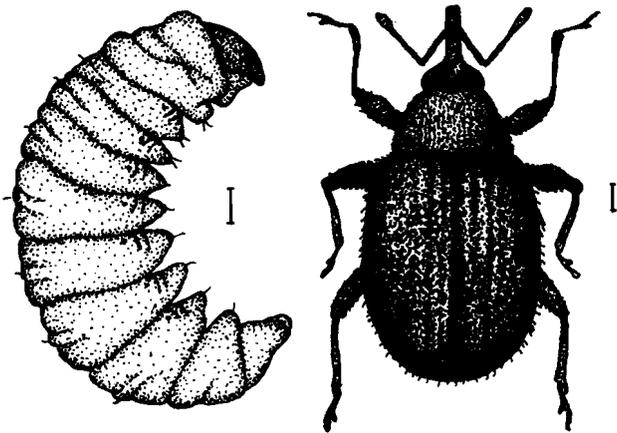
**Cowpea curculios** are small dark weevils about 1/8 to 1/6 inch long with snout-like mouthparts. They are often the limiting factor in growing field or southern peas. The female feeds by drilling a hole through the pod into a developing pea. An egg is inserted into the feeding site where it hatches and develops into a tiny, white, grub-like larva which feeds inside the pea.



Infested peas can be identified by a small brown spot on the pod just above a developing seed. If the pod is carefully torn apart, the grub will often be found.

Preventive insecticide controls must be used before the female has fed and laid eggs within the seed.

**Pepper weevils** are similar to curculios and are a severe pest of peppers. Adults are shiny, brownish-black in color and about 1/8 inch long. Eggs are laid in the flower bud or fruit, and the small, white, brown-headed grubs tunnel through the seed mass.

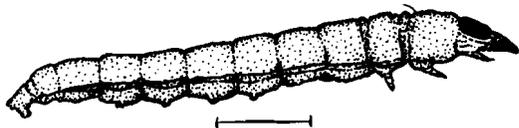


Control of this pest must also be preventive. The peppers should be sprayed at bloom time and approximately once weekly thereafter to prevent weevil build-up. The grower should also never purchase plants for transplanting that have blooms since these may contain weevil eggs.

**Tomato pinworm** larvae will tunnel and attack fruit particularly around the calyx and stem end. (See description and control under foliage feeders).

**Wireworms** feed on potato tubers, sweet potato roots, carrots, radishes, turnips, and other vegetables with underground edible parts. (See control under root feeders).

**Potato tuberworms** are the larval form of small moths. The adult moth lays eggs on exposed Irish potato tubers as well as on the underside of leaves. The caterpillars are dark-headed and are pinkish-white or greenish in color and their bodies reach 3/4 inch in length when mature. The pest attacks tubers in the field and in storage. Infested potatoes are



riddled with slender, dirty-looking, silk lined burrows and the outside of the potato may have "crusty-like" spots on them.

Prevention includes planting early and harvesting as soon as mature. Delayed harvest may result in more pest damage in hot dry weather. Potatoes should be stored in a cool dry place that is screened or enclosed so that the moth cannot lay eggs on the stored potatoes.

**Stinkbugs** have been discussed under foliage feeders, but they also feed on edible seeds and fruit. This feeding often results in pitted or distorted fruit. This pest is particularly damaging to pods of okra, beans, and peas.

### Management and Control

There are numerous insect management techniques that can be used in the overall approach to control or reduction of insect populations so that vegetable gardens can be grown more efficiently. Some of the practices that can be used are:

1. Rotate the garden plot as often as possible.
2. Rotate the individual crops within the garden when the same plot is used more than one season.
3. Till or plow the soil well in advance of planting and pay particular attention to a plot that has previously been in grass. The garden should be well plowed and free of weeds, grass, etc., at least 30 days prior to planting.
4. Seeds should be planted at proper and uniform depths so that rapid germination is insured.
5. Seeds should be treated with an insecticide prior to planting if possible. Some seed companies treat their seed and will indicate this on the label. Malathion is a commonly used insecticide for seed treatment.
6. Transplants should be purchased from a reputable dealer, and should be free of insects at the time of planting.
7. Every effort should be made to keep the plants vigorously growing and in a state of good health. This should include a proper fertility and watering program. A healthy plant is often able to survive insect attack.
8. Randomly select plants and monitor or scout the garden twice weekly. This includes inspecting the plants from the bud to the soil including both upper and lower leaf surface.
9. Often large insects can be removed by hand and destroyed without use of chemicals, this should be practiced if possible.

10. Learn to identify beneficial insects (praying mantis, spiders, big-eyed bugs/assassin bugs, lady beetles, and all wasps). Often chemicals are used in error against these beneficials.
11. Learn to properly identify garden pests and use chemicals only when a pest problem exists.
12. Most plants that produce fruits, pods, ears, etc., can stand 10 to 15% foliage loss without loss of potential yields. Do not panic and start spray programs at the first sign of leaf feeding. This rule would not apply to plants whose edible parts are the leaves.
13. Insecticides should be carefully selected to control the pest in question or to reduce its numbers so that the garden will efficiently produce. **Do Not** expect any insecticide to kill 100% of the pest in question and **Do Not** keep spraying or adding insecticide to accomplish this false goal.
14. When a chemical is used, be sure to spray the plant thoroughly so as to contact all tissue surface.
15. In order to reduce bee and other pollinator mortality, sprays are best applied late in the afternoon or early evening hours. Also, many garden pests are night feeders so this spraying schedule often accomplishes more. To reduce spray burn, make sure the plants are not under moisture stress. It is best to irrigate the garden thoroughly before spraying.
16. When baits are used they should be applied late in the afternoon since most insects (cutworms, crickets, etc.) that respond to baits are night feeders.
17. Sprays usually give better results than dusts. In many cases dusts will drift and kill many beneficial arthropods. Also, dusts are easily washed off by rain and irrigation, or blown off by wind, and it usually requires more actual insecticide in the dust form than in the spray form to accomplish the same degree of control.
18. Harvest the fruits, seeds, leaves, etc., as soon as they are ripe. Allowing over-ripe fruits to remain on the plants often invites additional insect, rat and/or mice problems.
19. As soon as a plant is no longer productive remove it from the garden and destroy it. **Do Not** pull it up and leave it in the garden area.
20. When the entire gardening project is over, cut down all remaining plants and plow them into the soil.
21. Do not use garden vegetable plants in any form to add to a mulch bed or compost bin. Vegetable plants can harbor insects, disease organisms and nematodes that can easily survive organic decomposition.

Freddie A. Johnson is Associate Professor and Extension Entomologist, Entomology Department and Susan Davis Reese was Assistant in Vegetable Crops, IFAS, University of Florida, Gainesville. Illustrations by Ron Stephens, Illustrator, Entomology Department.

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