CONTROLLING INSECTS ON FLOWERS

AGRICULTURE INFORMATION
BULLETIN NO. 237

U. S. DEPARTMENT OF AGRICULTURE
Insects shown on front cover:
Top left, Japanese beetle; top right, cabbage looper; bottom left, rose chafer; bottom right, saddleback caterpillar.
Every year, insects and related pests cost florists and home flower gardeners many millions of dollars in time, labor, and money. Most pests that attack flowering and ornamental-foliage plants can be controlled by using insecticides and by following good cultural practices.

This bulletin tells how to recognize the more common pests, and suggests what can be done to keep them from damaging plants and gardens. It discusses only the insecticides that do not require unusual precautions in handling.

**CONTENTS**

<table>
<thead>
<tr>
<th>Page</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insects</td>
<td>3</td>
</tr>
<tr>
<td>General feeders</td>
<td>3</td>
</tr>
<tr>
<td>Specific feeders</td>
<td>16</td>
</tr>
<tr>
<td>Beneficial insects</td>
<td>64</td>
</tr>
<tr>
<td>Using insecticide</td>
<td>67</td>
</tr>
<tr>
<td>Dusts</td>
<td>67</td>
</tr>
<tr>
<td>Using insecticide—con.</td>
<td></td>
</tr>
<tr>
<td>Sprays</td>
<td>67</td>
</tr>
<tr>
<td>Application equipment</td>
<td>69</td>
</tr>
<tr>
<td>Precautions</td>
<td>72</td>
</tr>
<tr>
<td>Other control measures</td>
<td>72</td>
</tr>
<tr>
<td>Index</td>
<td>75</td>
</tr>
</tbody>
</table>
HOW TO USE THIS BULLETIN

To get maximum benefit from this bulletin, familiarize yourself with its arrangement as indicated in the table of contents.

If you know the name of an insect that is injuring your plants, refer to the index (p. 75) to find the page on which it is discussed. Suggested measures for control are given at the end of the discussion on each pest.

If you do not know the insect’s name, look under the name of the plant on which you found it (p. 16 to p. 63) and attempt to identify it.

If you are not able to identify an insect, or if it is not listed here, consult the section on insecticides (p. 67 to p. 72) for general control measures. Materials used to combat plant insects, and directions for their preparation, are also discussed in this section.

If you encounter insect problems not discussed here, write to your county agricultural agent, to the agricultural college or experiment station in your State, or to the U.S. Department of Agriculture, Washington 25, D.C. When writing for information about insects or plant injury, send specimens of the insects in a small bottle of rubbing alcohol. In the same package, send injured parts of plants, wrapped in waxed paper or cellophane to prevent drying out or breaking.
INSECTS

Some insects and related pests attack many different plants, showing little or no partiality. These are called general feeders. Other insects and pests prefer specific plants. These are called specific feeders.

General feeders are described in alphabetical order on the pages that immediately follow. Specific feeders are described in the alphabetical list of plants, starting on page 16. For each pest is given an account of how it damages flowers, where it occurs, and what you can do to control it.

GENERAL FEEDERS

Ants

Description.—Many species. Small necks and waists; black, brown, yellow, or red; $\frac{1}{16}$ to $\frac{1}{2}$ inch long. Ants usually live in colonies—in lawns, cultivated areas, or beneath stones or walks.

Damage.—Only a few ant species actually attack flowering plants. Examples: The small, black pavement ant, commonly found in lawns and nesting under stones, eats roots, and girdles tender stems; it digs up and destroys newly planted seeds and seedlings. The red harvester ant lives in large colonies, deep in the soil; in gardens, it clears away all plants in circular areas several feet in diameter.

Often, ants are indirectly responsible for plant damage done by certain aphids and mealybugs. Ants are fond of the honeydew excreted by those injurious insects, and protect them for the food they supply. Example: The cornfield ant and other ants distribute root aphids on China-aster, aster, marigold, zinnia, and many other flowering plants. Ants feed on honeydew produced by the aphids and, in return, care for them during hibernation, protect them from enemies, and excavate chambers around plant roots and transport the aphids to them.

Infested plants are disturbed by burrowing activities of ants and feeding of aphids; the plants dry out, become dwarfed, and sometimes die.

Ants often occur in large numbers on peony buds, attracted to them by secretions from glandular areas around bases of the buds, but they do not damage either buds or flowers.

Distribution.—Throughout United States.

What to do.—Apply chlordane dust or spray to nests or infested areas; or apply a chlordane drench around infested plants. To drench 30 square feet of soil surface, use 1 level teaspoon of 50-percent wettable chlordane powder mixed with 3 gallons of water. Apply with a sprinkling can. Apply $\frac{1}{8}$ teaspoon of 50-percent chlordane wettable powder to the openings of individual nests, and water well.

To control ants on peony buds, dust or spray the plants with chlordane. Also, apply chlordane dust lightly to soil surface around base of plants. Malathion dust or spray will kill ants.
that are present, but will not give long-lasting protection as does chlordane.

Aphids

Description.—Many species. Aphids are sucking insects. They have soft, rounded or pear-shaped bodies; some have wings. Most species have a pair of tubes, or cornicles, projecting from the abdomen. Some aphids appear woolly or powdery because of a waxy covering. Adults and young are green to black, sometimes red, and are \( \frac{1}{25} \) to \( \frac{1}{8} \) inch long. (See inside front cover for natural-color illustration.)

Damage.—Aphids cause curled and distorted leaves. Root-feeding aphids stunt or kill infested plants. Some aphids transmit virus diseases of flowering plants.

Aphids excrete a colorless honeydew which, in most species, attracts ants. In some species, honeydew is a medium for the growth of black fungus or sooty mold.

Distribution.—Throughout United States.

What to do.—Apply malathion dust or spray, or lindane dust (p. 67). Aphids feeding on the roots of asters or other plants can be controlled by killing the ants that put them there; see recommendations for controlling ants (p. 3). To kill aphids already present on roots of infested plants, scoop a depression in the soil around each plant stem and pour in 1 or 2 cups of lindane spray mixture (see Root Aphids, p. 19).

For control of aphids on specific flowering plants, refer to:

<table>
<thead>
<tr>
<th>Aphid Type</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chrysanthemum aphid</td>
<td>24</td>
</tr>
<tr>
<td>Delphinium aphid</td>
<td>32</td>
</tr>
<tr>
<td>Foxglove aphid</td>
<td>22</td>
</tr>
<tr>
<td>Goldenglow aphid</td>
<td>37</td>
</tr>
<tr>
<td>Green peach aphid</td>
<td>33</td>
</tr>
<tr>
<td>Lantana aphid</td>
<td>43</td>
</tr>
<tr>
<td>Leaf-curling plum aphid</td>
<td>27</td>
</tr>
<tr>
<td>Lupine aphid</td>
<td>44</td>
</tr>
<tr>
<td>Melon aphid</td>
<td>39</td>
</tr>
<tr>
<td>Nasturtium aphid</td>
<td>42</td>
</tr>
<tr>
<td>Purple-spotted lily aphid</td>
<td>43</td>
</tr>
<tr>
<td>Root aphids</td>
<td>19</td>
</tr>
<tr>
<td>Spirea aphid</td>
<td>58</td>
</tr>
<tr>
<td>Tulip bulb aphid</td>
<td>60</td>
</tr>
<tr>
<td>Tulip leaf aphid</td>
<td>60</td>
</tr>
<tr>
<td>Waterlily aphid</td>
<td>61</td>
</tr>
</tbody>
</table>

Armyworms

Description.—Caterpillars; several species. Light tan to dark green or black; white stripes on side and back; white, inverted \( \Upsilon \) on front of head; up to 2 inches long.

Damage.—Feed chiefly on grasses, but destroy flowers of gladiolus, dahlia,
chrysanthemum, and other fall-blooming plants.

Distribution.—Central and Eastern United States.

What to do.—Apply DDT dust or spray (p. 67) to infested plants and to grasses and weeds around the garden. Malathion dust or spray is also effective, but is not long lasting.

**Asiatic Garden Beetle**

Description.—Oval-shaped beetle; brown; 1/2 inch long. Hides in soil by day, and feeds at night. Its white, grublike larvae are found in the soil.

Damage.—Adults eat ragged notches in foliage of aster, azalea, chrysanthemum, dahlia, delphinium, rose, zinnia, and many other flowering plants. Larvae feed on roots of grass and many flowering plants during autumn and spring months.

Distribution.—Northeastern United States.

What to do.—Use same control as for Japanese beetle (p. 9).

**Blister Beetles**

Description.—Many species. Slender; gray, black, or striped; 1/2 to 3/4 inch long. One species is metallic blue, wingless, and 1 1/2 inches long.

Damage.—Adults eat leaves of China-aster, Japanese anemone, calendula, chrysanthemum, gladiolus, clematis, dahlia, dianthus, delphinium, phlox, and zinnia plants.

Distribution.—Localized infestations throughout United States, usually occurring from August to October.

What to do.—Apply DDT dust or spray (p. 67) as soon as the beetles appear; repeat application as needed. Screen valuable plants. Handpick the beetles; wear gloves while doing so because the beetles discharge a caustic fluid that may blister the skin. In cases of heavy infestation, it may be necessary to protect plants with cheesecloth or mosquito netting.

**Cabbage Looper**

Description.—Measuring worm; pale green, light stripe along each side of body; up to 1 1/2 inches long; doubles up, or loops, when it crawls. (See front cover for natural-color illustration.)

Damage.—Feeds from underside of leaves, producing large, ragged holes; leaves dark pellets of excrement. Damages calendula, chrysanthemum, geranium, snapdragon, mignonette, and German ivy plants.

Distribution.—Throughout United States; most troublesome in warmer parts of country.

What to do.—Apply DDT, malathion, or toxaphene dust. Handpick and destroy the larvae where only a few plants are infested. If the loopers are resistant to DDT, apply toxaphene dust.

**Carrot Beetle**

Description.—Broad, oval, reddish brown beetle; 1/2 inch long; lives in soil during winter and spring. Larva is whitish grub; lives in soil during summer and fall.

Damage.—Adults and larvae attack roots and underground stems of amaranthus, dahlia, lily, Japanese iris, sunflower, and other garden plants.

Distribution.—Throughout United States, except northernmost areas.

What to do.—Clean up decaying plant material. To control grubs, apply 6-percent chlordane dust in soil at rate of 165 pounds of total dust per acre. For small areas, apply 4 pounds of 6-percent chlordane dust to each 1,000 square feet of soil surface, and work into top 3 inches. Do not apply excessive amounts of chlordane to the soil.

**Cicada-Killer**

Description.—Wasp; yellow and dark brown; 1½ inches long.
Damage.—Kills injurious insects, but is damaging when colonies become established in gardens. Tunnels in soil along paths, terraces, banks, or flower-beds; makes small mounds of excavated earth; disfigures gardens; causes annoyance by flying through gardens in a disturbing manner.

Distribution.—Northern and Eastern States.

What to do.—Kill adults by applying chlordane dust in the burrows which adults excavate to stock with cicada bodies as food for their young.

Corn Earworm

Description.—Larva is a caterpillar; green, brown, or pink; light and dark stripes along sides and on back; up to 1¾ inches long. Adult moths lay eggs in flower parts at night.

Damage.—The earworm is primarily a pest of vegetables and cotton. However, the caterpillars eat holes in gladiolus flower spikes and buds, and in flowers and stems of dahlia, chrysanthemum, rose, sunflower, abutilon, ageratum, amaranth, nasturtium, phlox, poppy, sweetpea, canna, carnation, geranium, hibiscus, and morning-glory plants.

Distribution.—Throughout United States.

What to do.—Dust or spray with DDT or methoxychlor (p. 67).

Cutworms

Description.—Many species. Stout, soft bodied, smooth; dull gray, brown, or black; may be striped or spotted; up to 1¼ inches long. They curl up tightly when disturbed; are active at night; hide in soil during day.

Damage.—Cutworms cut off young plants near soil surface, and may pull them into the openings of their burrows. Some cutworms climb plants and cut off leaves, buds, or petals in flowers.

They are destructive to many flowering plants, particularly to early-season plantings of China-aster, chrysanthemum, carnation, dahlia, rose, marigold, zinnia, and gladiolus.

Distribution.—Throughout United States.

What to do.—Apply 10-percent DDT or methoxychlor dust to soil surface when garden is being prepared for planting. Where an insecticide is undesirable, place a cardboard collar about 3 inches high around stems. Push collar into soil about 1 inch, and allow it to protrude about 2 inches.

Earthworms

Description.—Several species. Slender, cylindrical, soft bodies, composed of many round segments, usually tapering at front end, and flattened at rear end. Pink, brownish, or grass green color; 2 to 10 inches long, capable of great body extension. Oriental earthworm has bad odor when crushed.

Damage.—The earthworm is beneficial to man because it tunnels deep into soil, aiding water and root penetration. It hastens the breakdown of organic matter by eating and digesting leaf mold and making it available for plant growth.

When earthworms are abundant, their castings are a nuisance on golf
courses and lawns. They may damage growing plants by tearing off leaves which they pull into their burrows to eat. Rosette leaves lying close to the ground are most subject to attack. Rudbeckia, geum, petunia, delphinium, and columbine plants are damaged in this way. Earthworms also cause damage by loosening soil around the roots of young plants.

**Distribution.**—Various species occur in moist soil throughout United States. Oriental earthworm occurs in Eastern States from Connecticut to Florida.

**What to do.**—For plants in flower pots, mix 1½ tablespoons of 50-percent chlordane wettable powder in each gallon of water; water plants with this mixture. For common earthworm in the garden, apply 1 pound of 50-percent chlordane wettable powder to each 1,000 square feet of soil surface, and dig or water it in. For oriental earthworm, mix 1 quart of 50-percent chlordane emulsion in 10 gallons of water, and apply to each 1,000 square feet of infested area.

**European Chafer**

**Description.**—Adult is beetle; oval; yellowish brown, darker bands at inner edge of wing covers; ⅜ inch long. Appears in swarms at dusk during June or July. Larva is white; lives in soil.

**Damage.**—Adults cause slight foliage damage by feeding at night. Larvae feed chiefly on grass roots, and on roots of coreopsis, chrysanthemum, and many other garden and lawn plants.

**Distribution.**—Localized in Northeastern United States.

**What to do.**—Use same control as for Japanese beetle (p. 9).

**European Earwig**

**Description.**—Adult and nymph: Prominent forceps at tail end; reddish brown; up to ⅜ inch long; hides during day and feeds at night; emits a foul odor.

**Damage.**—This insect is chiefly a health hazard and public nuisance. It hides in furniture, and in flowers brought into the house; feeds on tender young plant shoots; eats holes in bases of petals and stamens.

**Distribution.**—Northwestern and Northeastern States; infestation is localized; more serious in coastal areas.

**What to do.**—Apply DDT or chlordane dust or spray (p. 67) to infested soil and ornamental plants. Apply also to walks, fence rows, bases of buildings, trees, shrubbery, and woodpiles.

**Field Cricket**

**Description.**—Rounded, grasshopper-like body; prominent antennae; black or brown; ⅜ to 1 inch long. Female has swordlike ovipositor. This cricket hides by day in trash or under boards; chirps and feeds at night.

**Damage.**—Eats foliage, flowers, and tender growth of iris and other flowering plants, especially seedlings.

**Distribution.**—Throughout United States.

**What to do.**—Apply chlordane dust or spray (p. 67).

**Fig Beetle**

See Green June Beetle, page 8.

**Fuller Rose Beetle**

**Description.**—Adult: Beetle; short, broad snout; grayish brown; cream-colored stripe on each side; ⅜ inch long. Active at night; hides by day
among twigs and foliage, or in flowers. Larva: curved; yellowish; brown head; lives in soil.

**Damage.**—Adults eat ragged areas from margins of many outdoor plants, including abutilon, acacia, azalea, begonia, camellia, canna, cape-jasmine, carnation, chrysanthemum, cissus, dracaena, fuchsia, gardenia, geranium, golden glow, hibiscus, lily, palm, penstemon, plumbago, primrose, rose, scabiosa, and vinca. Larvae feed on roots, and girdle underground stems, causing yellowing or death of plants.

**Distribution.**—Southern United States and California; a greenhouse pest in North.

**What to do.**—Apply malathion or chlordane dust when adults are present. Applying DDT to soil, as for Japanese beetle control (p. 9), is effective. Do not apply DDT to azalea or camellia.

**Grasshoppers**

*Description.*—Many species. Adults and nymphs: Strong hindlegs for jumping; brown, gray, black, or yellow; up to 2 inches long. Most grasshoppers are strong flyers.

**Damage.**—Feed on any available vegetation; when abundant, they may completely destroy plants.

**Distribution.**—Throughout United States; especially troublesome in Central and Northwestern States.

**What to do.**—Apply DDT or chlordane dust to all ornamental plants and all weed patches within and surrounding the garden. Protect valuable plants by covering them with coarse, mesh cloth.

**Green June Beetle and Fig Beetle**

*Description.*—Two similar species in United States. Adult: Beetle; flat, broad; green; bronze, coppery, or violet markings; 1 inch long. Larva: Large grub; crawls on back when brought to surface of soil; occurs in compost piles, and in beds or coldframes rich in organic matter.

**Damage.**—Adults feed on ripening fruits. Larvae actively tunnel through soil; uproot plants, loosen their roots, or cover young seedlings.

**Distribution.**—Green June beetle occurs east of Mississippi; fig beetle in Southwest.

**What to do.**—Avoid having piles of grass clippings, manure, or compost, in which adults lay eggs, and from which larvae may move to nearby garden or lawn. To destroy larvae in compost or beds, apply DDT or chlordane in soil, as for Japanese beetle (p. 9). Handpick and destroy adults.

**Imported Fire Ant**

*Description.*—Winged and wingless forms. Have powerful mandibles for biting; can painfully sting; reddish, to blackish red; ⅛ to ¼ inch long. Workers are wingless. Thousands of workers occur with only a few winged forms. Live in hard-crusted mounds about 15 inches in diameter and 10 inches high. Tunnels from the living quarters lead...
to openings some distance from the mound.

**Damage.**—Adults feed on germinating seeds, stems of young, succulent plants just below the ground surface, and on roots, stalks, and buds of older plants. They feed also on bird eggs, and young birds and animals. They damage lawns and flowering plants; are a serious annoyance because of their painful stings.

**Distribution.**—Imported from South America; established in 10 Southeastern States.

**What to do.**—Break open hard surface of each mound. Use a sprinkling can to pour into the mound 3 gallons of water containing 4 tablespoons of 45-percent chlordane emulsifiable concentrate. Or, you may apply 1 to 2 cups of 5-percent chlordane dust, and work it in with a rake. Repeat the treatment in 2 weeks if some ants survive.

To treat lawns or flower gardens, spray each 1,000 square feet of infested area uniformly with 3 to 6 gallons of water containing 3 tablespoons of 45-percent chlordane emulsifiable concentrate. Then, sprinkle treated area with water to wash spray material into the soil.

**Imported Long-Horned Weevil**

**Description.**—Adult: Slender; broad snout; long antennae; wingless; black, covered with greenish-gray scales; ¾ inch long. Crawls about actively during day.

**Damage.**—Eats irregular areas in leaf edges on many ornamental garden plants; rapidly becoming a common garden pest.

**Distribution.**—Eastern United States; spreading rapidly.

**What to do.**—Dust or spray infested plants with chlordane (p. 67).

**Japanese Beetle**

**Description.**—Adult: Oval; shining, metallic green; coppery-brown wings; patches of white hairs at tip and sides of abdomen; ½ inch long. Larva: Grub; dirty white; brown head; about 1 inch long; lives in soil.

**Damage.**—Adults destroy flowers and foliage of rose, zinnia, polygonum, canna, hollyhock, mallow, marigold, rose of Sharon, turquoise vine, and many other plants. Larvae feed on roots of turf grass.

**Distribution.**—Eastern United States.

**What to do.**—Dust or spray plants with DDT or malathion (p. 67). To protect roses and other prized blooms from attack by adults, cut buds before petals unfold, and allow them to open in the house—or erect frame over plants, and cover it with netting. To control larvae, apply 4 pounds of 6-percent chlordane dust, or 11 pounds of 5-percent DDT dust to each 1,000 square feet of soil surface, and work into top 3 inches.

**Caution.**—Do not apply excessive amounts of chlordane to soil. For a natural control, apply dust containing spores of bacteria that cause milky disease of larvae. Follow manufacturer’s directions.
**June Beetles**

*Description.*—Many species. Beetles: Reddish brown or black; $1/2$ to $3/4$ inch long. Larvae: Curved grubs; dirty white, or cream colored; brown heads; live in soil.

*Damage.*—Adults feed at night on foliage of many plants. Larvae feed on living roots of turf grasses, and on roots of many plants; they often destroy rose, azalea, and camellia plants.

*Distribution.*—Throughout United States.

*What to do.*—To control adults, apply DDT dust or spray (p. 67) on foliage. To kill larvae, apply in soil 25 pounds of DDT per acre, or 10 pounds of chlordane per acre. For small areas, apply 4 pounds of 6-percent chlordane dust to each 1,000 square feet of soil surface, and work it into upper 3 inches before planting.

**Millipedes**

*Description.*—Several species. Worm-like; hard-shelled; many pairs of legs; brown or grayish; 1 to $1\frac{1}{4}$ inches long when full grown. Found under boards, flowerpots, and other sheltered places, or in compost piles.

*Damage.*—Feed on roots, tubers, bulbs, and fleshy stems, which usually are partially decayed; they also attack seeds.

*What to do.*—Dust or spray with DDT (p. 67). Eliminate millipede hiding places.

**Mole Crickets**

*Description.*—Several species. Adults and nymphs: Short, stout front legs; shovellike feet; beady eyes; light brown; up to 1$1/2$ inches long.

*Damage.*—Burrow in soil; uproot plants; one species eats seeds.

*Distribution.*—Southeastern and Atlantic Coast States.

*What to do.*—Apply 2 pounds of 6-percent chlordane dust to each 1,000 square feet of soil surface; work it into the upper 6 inches before planting.

**Nematodes (Eelworms)**

*Description.*—Many species. Thread-like; translucent; sharply pointed at both ends; usually microscopic in size.

*Damage.*—Stunt plant growth, and damage root systems. If root-knot nematodes are present, roots have distinct galls ranging from size of pinhead to 1 inch in diameter. Root-gall damage commonly occurs in peony, clematis, tuberose, and gladiolus plants. Most other flowering plants are attacked.

*Distribution.*—Throughout United States.

*What to do.*—If soil is heavily infested, move garden to another area, if practicable. If not, treat soil with one of the available nematocides. Consult your State agricultural experiment
station for information on the use of these materials in your area.

**Puss Caterpillar**

*Description.*—Broad, flat; covered with long, soft, reddish-yellow hairs, and stinging spines; up to 1 inch long.

*Damage.*—Chiefly a pest of trees, but feeds on rose, ivy, and other garden ornamentals.

*Distribution.*—Southern States, from Virginia to Texas.

*What to do.*—Handpick and destroy; wear gloves. Dust or spray with DDT or malathion (p. 67).

*Caution.*—Contact of skin with spines of this caterpillar causes severe irritation and swelling; injures children more seriously than adults.

**Serpentine Leaf Miner**

*Description.*—Larva: Yellow; 1/4 inch long; lives in leaves. Fly: Tiny; black and yellow. Several generations of this insect occur during a summer.

*Damage.*—Larvae make long, slender, winding, white tunnels in leaves of many ornamentals.

*Distribution.*—Common throughout United States.

*What to do.*—Remove and burn infested leaves. Dust or spray plants weekly with lindane or malathion (p. 67).

**Slugs and Snails**

*Description.*—Many species. Worm-like, legless, slimy. Snails have shells, slugs do not.

Shells of snails vary from off white to brown or black, and may be striped or mottled with contrasting colors; 1/2 to 1 1/2 inches in diameter when full grown.

Slugs are usually mottled with shades of gray, but may be whitish yellow, brown, or black; 1/2 to 4 inches long when full grown. Slugs and snails hide in damp places by day and feed at night.

*Damage.*—Destroy seedlings; eat ragged holes in leaves of many plants; leave glistening trails of slime. Attack iris, hollyhock, coleus, cineraria, geranium, marigold, primrose, saxifrage, violet, and many other plants that have foliage close to the ground.

*Distribution.*—Throughout United States.

*What to do.*—Clean up garden and surrounding areas to eliminate hiding places, which may include mulches. Look for slugs hiding under shingles or pieces of board, and destroy them each day.

Dust foliage with chlordane to discourage feeding by slugs.

Use a commercially prepared bait containing metaldehyde and chlordane, or calcium arsenate, to attract slugs and snails from their hiding places and poison those feeding on it. Sprinkle pellets of the bait on soil, or place bait in small piles, according to directions on the label. If it is necessary to protect pets and persons who might inadvertently come in contact with this bait, place it under small boards or similar cover, or near the bases of plants.

Metaldehyde dust, or a spray containing a metaldehyde liquid suspension, is also effective against slugs and snails. Apply this material on orna-
mental plants and on the soil surface, but not on plants to be eaten. Follow directions on container labels.

**Sowbugs and Pillbugs**

*Description.*—Several species. Oval, flattened bodies; seven pairs of legs; dark gray; up to 1/2 inch long. Hide under boards, trash, in compost piles, or in manure piles. Some species roll up and look like pills when disturbed.

*Damage.*—Feed on roots and tender plant parts, especially on seedlings.

*Distribution.*—Throughout United States.

*What to do.*—Look for and eliminate hiding places. Apply DDT dust or spray (p. 67) to the soil of infested places.

**Spider Mites (Red Spiders)**

*Description.*—Several species. Adults and young: Tiny—barely visible to naked eye; red, or greenish red; found on underside of leaves. They occur in all gardens.

*Damage.*—Yellow, stippled areas on leaves; fine webs on leaves and flowers. Entire leaves become yellowed, gray, or brownish. Flowers are discolored and faded. Plants become stunted; are more severely attacked in dry areas. Roses become defoliated. Spider mites commonly overwinter on hollyhock, phlox, primrose, and violet plants, and on weeds that remain green. In summer, they attack many other plants, including annuals and perennials.

*Distribution.*—Throughout United States.

*What to do.*—Apply malathion dust or spray (see page 67) at weekly intervals. Or, apply a spray containing klethane or tedion. If thoroughly applied, sprays may be more effective than dusts. Syringe plants frequently with a forceful spray of water, to wash off mites and to break webs. Destroy chickweed, mustard, and other weeds on which spider mites overwinter or survive between crops.

**Spotted Cucumber Beetles**

*Description.*—Two similar species. Greenish yellow; 12 black spots; black head; 1/4 inch long.

*Damage.*—Adults feed on flowers of China-aster, canna, chrysanthemum, coreopsis, cosmos, dahlia, garden balsam, lily, morning-glory, rose, Shasta daisy, sweetpea, and zinnia plants. Larvae feed underground on roots of corn.

*Distribution.*—Throughout United States.

*What to do.*—Dust or spray with DDT or malathion (p. 67).

**Springtails**

*Description.*—Many species. Various colors: (milky white, gray, or other color); 1/25 to 1/6 inch long. A common species is the garden springtail which has small, rounded, soft body, and distinct head. It is dark purple, and has yellow spots. Propels self with taillike appendage when dis-
turbed. Occurs in seedbeds and outdoor gardens, especially in damp places.

**Damage.**—Springtails chew holes in leaves and stems of young seedlings, and in tender plant parts close to the ground.

**Distribution.**—Throughout United States.

**What to do.**—Dust or spray with malathion (p. 67).

### Termites

**Description.**—Worker termites that damage plants are known as white ants. They are wingless, slow-moving, ant-like insects; milky white; about \( \frac{1}{6} \) inch long; found in injured plants or pieces of wood beneath soil surface. Termites avoid light. Winged forms are present at swarming time.

**Damage.**—Termite damage to living plants in gardens is greater in warmer parts of country. Usually, it is more severe in recently cleared woodland or in land rich in humus. Termites usually attack plant stakes or other wood in contact with soil. They feed on roots and stems of woody plants by girdling or tunneling. Commonly injured plants include chrysanthemum, heliotrope, begonia, geranium, poinsettia, cosmos, pansy, and oleander.

**Distribution.**—Throughout warmer parts of United States; range is extending in the Northern States.

**What to do.**—Clean up stumps, roots and other woody material in contact with soil, and on which termites feed. Use redwood or other termite-resistant wood for stakes and posts, or treat wood flats, stakes, and coldframes with one of the commercial wood preservatives containing copper naphthenate or a similar material.

To deter termite attack on growing plants in beds, mix chlordane in the soil before planting. Apply 4 pounds of 6-percent chlordane to each 1,000 square feet of bed area, as for control of white grubs (p. 14).

### Whitefly

**Description.**—Several species. Adults: Wedge shaped; white; \( \frac{1}{10} \) inch long. They fly like snowflakes when disturbed. Young: Rounded; flat; scale-like; pale green; waxy threads on spines; stay motionless on underside

**Immature whiteflies on underside of leaf.**
of leaves. Live outdoors in warmer parts of country, and in greenhouses in winter in the North; are carried, or fly, to plants in gardens during the summer.

**Damage.**—Leaves of infested plants become pale, mottled, or stippled; plants lack vigor, turn yellow, and die. Leaves become sticky with honeydew, and often are coated with black sooty mold. Whiteflies attack many plants including gourds, ageratum, heliotrope, aster, begonia, calceolaria, calendula, chrysanthemum, columbine, cineraria, coleus, fern, fuchsia, geranium, golden-glow, hibiscus, Jerusalem-cherry, lantana, lupine, mallow, morning-glory, primrose, sage, and zinnia plants.

**Distribution.**—Throughout United States.

**What to do.**—Apply malathion, DDT, or lindane in dust or spray, (p. 67).

---

**White-Fringed Beetle**

Description.—Several species. Adult: Snout beetle; dark gray; white fringe or band along outer edges of body; 7/16 inch long. Larva: Curved, fleshy; yellowish white; brown head; up to 1/2 inch long; lives in soil.

**Damage.**—Larvae feed on roots of many ornamentals, vegetables, and field crops. They sever the slender roots, and gouge out or bore into fleshy roots. Infested plants redder, turn yellow, or wilt and die. Adults feed on foliage by chewing out notches in edges of leaves. Ornamental plants subject to attack include chrysanthemum, dahlia, daisy, false indigo, iris, lily, marigold, morning-glory, amaranth, sunflower, flowering tobacco, violet, and zinnia.

**Distribution.**—A serious pest, imported from South America. Occurs in the Southeastern United States and in New Jersey. Any newly found infestations should be reported promptly, so that eradication measures can be applied.

**What to do.**—Look for larvae in soil around roots of wilting or sickly plants, especially seedlings during spring months. During summer, look for saw-tooth cuts in edges of leaves; look for beetles on the plants or in the loose mulch around their base. If you find what appear to be adults or larvae, send them in a bottle of rubbing alcohol to your county agricultural agent or State entomologist, and ask his advice on control measures.

If infestation is definitely present, destroy larvae in the soil by applying 1 pound of 15-percent DDT, or 1/4 pound of 50-percent chlordane wettable powder, in about 3 gallons of water, to each 1,000 square feet of soil surface before planting. Or, apply 4 pounds of 5-percent DDT dust, or 4 pounds of 6-percent chlordane dust to each 1,000 square feet, and work the insecticide thoroughly into top 3 inches of soil. Treat all vegetation with DDT dust or spray (p. 67) every 2 or 3 weeks.

---

**White Grubs**

Description.—Larvae of the common, brown May beetle. Several species. Curved; white or yellow; hard brown heads; 1/2 to 1 1/2 inches long when full grown; live in soil. (See inside front cover for natural-color illustration.)

**Damage.**—White grubs feed on roots and underground parts of plants; cut off herbaceous plants entirely; eat the bark of roots of some plants, such as roses. Adult beetles generally feed on
tree foliage, occasionally on flowering plants.

**Distribution.**—Throughout United States.

*What to do.*—Grassland is likely to be infested with white grubs; avoid planting flower-garden plants in newly plowed grasslands. Apply 4 pounds of 6-percent chlordane dust to each 1,000 square feet of planting area, and work into the upper 3 inches of soil before planting.

**Wireworms**

*Description.*—Many species. Slender, resembling a jointed wire; yellow to white; dark heads and tails; $\frac{1}{2}$ to $1\frac{1}{2}$ inches long when full grown. (See inside front cover for natural-color illustration.)

*Damage.*—Puncture many kinds of plants and ornamentals such as aster, chrysanthemum, dahlia, gladiolus, iris, lily, and phlox. Some species eat seeds, and feed on underground parts of seedlings.

*Distribution.*—Throughout United States.

*What to do.*—Avoid planting garden in infested soil. Before planting, apply 11 pounds of 5-percent DDT dust to each 1,000 square feet of soil surface, or apply 4 pounds of 6-percent chlordane. Work the insecticide into the upper 6 inches of soil.

Dust gladiolus corms with 6-percent chlordane in trench at planting time. Or, treat corms before planting with one of the commercial mixtures containing dieldrin and thiram, as recommended for wireworm and scab control. Follow directions on container labels of commercial preparations sold for this purpose.
SPECIFIC FEEDERS

In this section each pest is discussed only once—under the name of a plant on which it is likely to occur. Other insects that commonly attack the plants are named in bold face type, with reference to the pages on which they are discussed. An asterisk (*) before a reference indicates that the pest is particularly injurious to the plant under which it is listed.

ABUTILON

Abutilon Moth

Description.—Larva is a caterpillar; light green; narrow, whitish stripes on back; up to 1½ inches long.

Damage.—Eats ragged holes in leaves of abutilon, hollyhock, hibiscus, and mallow.

Distribution.—Scattered throughout United States.

What to do.—Handpick and destroy caterpillars, or dust plants with DDT or malathion.

* Fuller Rose Beetle. See page 7.

ACACIA

Mealybugs

Description.—Several species including Mexican mealybug, longtailed mealybug, solanum mealybug, Comstock mealybug, and citrus mealybug. Female: Soft-segmented, oval body; covered with powdery wax; waxy filaments projecting from sides and posterior; gray, creamy white, or tan; ¼ inch long. Eggs are contained in waxy sacs beneath posterior of female, that is often attended by ants.

Damage.—Suck juices from stems and leaves, stunting or killing plants. Black, sooty mold often grows on honeydew deposited by mealybugs. Wide variety of plants are attacked, including amaryllis, camellia, cineraria, crassula, cactus, chrysanthemum, croton, daphne, dracena, heliotrope, ivy, Jerusalem-cherry, lantana, oleander, orchid, poinsettia, rubber plant, umbrella plant, yucca, bottlebrush, streliczia, plumbago, passion-flower, wandering Jew, acacia, Shasta daisy, petunia, thyme, begonia, calla, coleus, fern, moonflower, pandanus, primrose, geranium, hollyhock, stock, narcissus, aster, and pansy.

Distribution.—Throughout United States. Some species survive only in greenhouses in the North, and are taken to the garden on plants; other species survive out-of-doors.

What to do.—If only a few mealybugs are present, pick them off with a toothpick, or kill them with a swab of cotton or a matchstick dipped in alcohol. Spray plants with malathion (p. 68); repeat applications two or three times at 2-week intervals, or until infestation is under control.

* Fuller Rose Beetle. See page 7.

*Oleander Scale. See page 47.

AGERATUM

Greenhouse Leaf Tier

Description.—Larva: Caterpillar;
pale green; up to $\frac{3}{4}$ inch long. Adult: Moth; wings wedge-shaped, and flat when at rest; brown; $\frac{3}{4}$ inch long; active at night.

**Damage.**—Caterpillar eats holes in leaves and stalks. Rolls and folds leaves; ties them together with webs, and fills them with fecal pellets. Attacks abutilon, ageratum, anemone, canna, China-aster, carnation, cineraria, chrysanthemum, dahlia, daisy, geranium, heliotrope, kenilworth ivy, lantana, lobelia, nasturtium, passionflower, sweetpea, rose, snapdragon, wandering-Jew, violet, and many other plants.

**Distribution.**—Throughout United States; overwinters in North only in greenhouses; found out-of-doors in warmer parts of country.

**What to do.**—Cut off webbed branches and destroy. Apply DDT or malathion dusts or sprays (p. 67).

---

**AMARANTHUS**

**Webworms**

**Description.**—Many species. Caterpillars; feed in groups, protected by webs. Most common are fall webworms: Pale green or yellow; dark stripe down back; yellow stripe on each side; covered with tufts of long gray hairs.

**Damage.**—Groups of caterpillars envelop branches with webs, and skeletonize leaves of dahlia, rose, verbena, castorbean, clematis, alternanthera, morning-glory, wandering-Jew, violet, and zinnia plants.
May. Try to get dust into soil cracks around plants, and between leaves, to destroy young larvae that are hatching from eggs and attempting to descend to the bulb. Two annual treatments may be necessary.

*Bulb Scale Mite. See page 45.
Gladiolus Thrips. See page 35.
*Lesser Bulb Fly. See page 40.
*Mealybugs. See page 16.

AMPELOPSIS

Black Vine Weevil

*Description.—Adult: Rough; broad snout; black; scattered tufts of yellow hairs; ⅜ inch long. Hides among foliage during day; feeds during night. Larva: Curved; dirty white; brown head.

*Damage.—Adults scallop leaves and flowers, notch margins, cut off needles, chew off or girdle some stems. Larvae feed on young roots in fall; later girdle larger roots or cut them off; gouge out bulbs or crowns of herbaceous plants. More than 80 host plants include strawberry, azalea, taxus, rhododendron, ampelopsis, begonia, cyclamen, gloxinia, geranium, gardenia, ferns, primrose, spirea, and wisteria.

*Distribution.—In cooler parts of the United States—chiefly in Northwestern, North Central, and Northeastern States. It is extending its range southward from Northeastern States to Washington, D. C.

*What to do.—Dust plants with chlordane in June and July to kill adults in foliage. In July, treat soil with chlordane to destroy young larvae: Apply 5 pounds of 6-percent chlordane dust to each 1,000 square feet of soil surface.

ANCHUSA

Six-spotted Leafhopper. See page 24.
*Spider Mites. See page 12.

ANEMONE

*Aphids. See page 4.
Blister Beetles. See page 5.
Greenhouse Leaf Tier. See page 16.

ARBUTUS

Greenhouse Thrips

*Description.—Adult: Winged; blackish brown; tip of abdomen is reddish; ¼ inch long. Larva: Wingless; milky white; usually carries droplet of fecal matter on back.

*Damage.—Adults and larvae cause coarse, stippled areas, and deposit black, fecal matter on leaves. They attack many plants in northern greenhouses, and out-of-doors in areas having warm climates. Plants attacked include arbutus, aster, azalea, carissa, croton, cyclamen, cypress, eugenia, hibbertia, rose, statice, dahlia, ferns, fuchsia, gloxinia, nasturtium, chrysanthemum, orchid, palm, and rubber plant.

*Distribution.—Throughout United States.

*What to do.—Dust or spray with
DDT or malathion (p. 67) or dust with dieldrin.

**ONION THRIPS**

*Description.*—Adult: Slender; winged; active; yellow or brownish; about \( \frac{3}{25} \) inch long. Larva: Wingless; similar to adult, but smaller; white. Winter hosts are weeds, hollyhocks, digitalis, and other plants that remain green throughout cold months.

*Damage.*—Adults and larvae suck juices from plants. White, stippled areas or blotches appear on leaves; tips of leaves wither and die; flower petals become spotted and streaked with white. These thrips transmit spotted wilt virus disease to tomato, calla, and dahlia plants, and to many ornamentals. They infest rose, carnation, asparagus, calla, fern, campanula, hollyhock, chrysanthemum, digitalis, dahlia, gaillardia, gloxinia, mignonette, Jerusalem-cherry, and sweetpea plants.

*Distribution.*—Throughout United States.

*What to do.*—Dust or spray with DDT, or dust with malathion or dieldrin (p. 67).

*Mealybugs. See page 16.

*Spider Mites. See page 12.

**AZALEA**

Azalea Bark Louse

*Description.*—Resembles mealybug (p. 16); up to \( \frac{1}{4} \) inch long. Female and egg sac are covered with matted, white, waxy filament; sac remains after female dies and the eggs hatch. Occurs in axils of twigs or leaves.

*Damage.*—Infested plants become unthrifty and ragged in appearance as branches weaken and die.
Distribution.—Widespread on azaleas. Most common in Southern States.

What to do.—Apply white-oil emulsion (p. 68) about July 15 to destroy the partly grown insects. Cut out and burn weakened branches.

**Azalea Lacebug**

Description.—Adult: Lacy wings; brown and black markings; 1/8 inch long. Nymph: Spiny; colorless at first, becomes black later. Life cycle lasts 35 days; 2 or more generations a year.

Damage.—Nymphs and adults suck sap from underside of azalea and rhododendron leaves. This causes gray, blanched, or coarse-stippled appearance of upper surface, and reduces plant vitality. Underside of leaves become discolored by excrement and cast skins. Plants in the sun are more severely damaged than those in the shade.

Distribution.—Throughout United States.

What to do.—Dust or spray with lindane or malathion (p. 67). Time the application to destroy young nymphs about June 1 in the North, and earlier in the South. If you use a spray, mix 1 tablespoon of 25-percent lindane wettable powder in each gallon of water. Repeat application in 10 days, and again several weeks later. Repeat applications, if needed, throughout the summer. Adults migrate from neighboring plants, and may make the repeat treatments necessary.

**Azalea Leaf Miner**

Description. — Larva: Caterpillar; yellow; 1/2 inch long; lives in mines that it makes between surfaces of azalea leaves or in rolled edges or tips of leaves. Adult: Small moth; narrow, purple and yellow wings, 1/2 inch across.

Damage.—Larvae feed between leaf surfaces, and cause blisters. Later, they roll the tips, or edges of leaves, and feed within rolls.

Distribution.—In most States where azaleas are grown.

What to do.—Spray with malathion or lindane (p. 68) to destroy larvae and adults. DDT in dust or spray will also kill adults, but it will injure some varieties of azalea.

**Azalea Stem Borer**

Description.—Slender beetle; grayish; yellow head; yellow thorax bearing two black spots; 1/2 inch long. Larva is yellow, up to 1 inch long; lives in twigs.

Damage.—Adults girdle twigs in two places, 1/2 inch apart, and deposit eggs between girdles, in the bark. Larvae bore down stems and trunks to ground; stems wilt; branches die.

Distribution.—Eastern United States.

What to do.—Cut and burn infested twigs and branches.

**Azalea Whitefly**

Description. — Adults: Wedge shaped; white winged; 1/16 inch long; fly out in a cloud when disturbed. Nymphs: Oval; pale, greenish white; usually present in great numbers.

Damage.—Adults and larvae suck sap from leaves, which become pale yellow, sticky with honeydew, and often blackened with sooty mold. They infest hairy-stemmed azaleas, including the snow azalea and other species.
Distribution.—Present wherever host azaleas are grown.

What to do.—Spray with diluted white-oil emulsion (p. 68) before adults emerge in spring. Spray in summer with malathion (p. 68) at weekly intervals, to destroy adults.

**Peony Scale**

Description.—Grayish-brown scale; \(\frac{1}{10}\) inch in diameter; found in swollen areas in bark of stems.

Damage.—Sucks sap from plant stems; causes depressions in feeding area that may persist for several years on larger stems, and cause death of small twigs. Attacks shrub peony, azalea, camellia, and rhododendron plants.

Distribution.—Widely distributed in warmer parts of United States.

What to do.—Prepare a spray containing 10 tablespoons of white-oil emulsion in each gallon of water; apply before growth starts in spring. Apply malathion emulsion spray (p. 68) in May and June to control young scales.


---

**BEGONIA**

* Aphids. See page 4.
* Black Vine Weevil. See page 18.
* Cyclamen Mite. See page 31.
* Flower Thrips. See page 48.
* Fuller Rose Beetle. See page 7.
* Mealybugs. See page 16.
* Termites. See page 13.

**CACTUS**

Cactus Scale

Description.—Female scale: Circular; gray with darker, raised central spot; \(\frac{1}{20}\) inch in diameter. Male scale: Smaller, slender, white.

Damage.—Heavy infestation completely encrusts leaves of cacti, weakens and kills plants.

Distribution.—Common in Southwest, and in cactus gardens in other States.

What to do.—To destroy newly hatched scales, apply malathion spray (p. 68) at 2-week intervals. White-oil emulsion (5 tablespoons per gallon of spray) is also effective, but some species of cactus are susceptible to injury by oil sprays. Treat susceptible varieties by rubbing scales off with a stiff brush.

---

**Flea Beetles**

Description.—Many species. Adults: Jumping beetles, black, brown, metallic blue, or striped; \(\frac{1}{16}\) to \(\frac{1}{8}\) inch long. Larvae: Tiny; white; feed on roots of plants and seldom are seen.

Damage.—Adults eat numerous tiny holes or pits in foliage of plants in early spring. Particularly damaging to calendula, love apple, heliopsis, nicotiana, petunia, phlox, primrose, stock, sunflower, wallflower, rockcress, and violet. Larvae feed on young roots and stems.

Distribution.—Throughout United States.

What to do.—Dust or spray with DDT or malathion (p. 68).

**Lygus Bugs**

Description.—Several related species including tarnished plant bug. Flat, oval; mottled with white, yellow, and black splotches that give it a tarnished appearance; \(\frac{1}{4}\) inch long. When disturbed, these active insects fly or move
to opposite side of stems; are seldom seen. (See inside front cover for natural-color illustration.)

**Damage.** — Adults suck juices from plants, and introduce a toxin. This causes deformity of leaves, blackened or dwarfed shoots, and imperfect flowers. Plants subject to attack include chrysanthemum, dahlia, calendula, cosmos, gladiolus, garden balsam, marigold, poppy, sage, Shasta daisy, sunflower, zinnia, verbena, and many others. Most serious injury is to chrysanthemum, which develop short branches, slightly swollen nodes, and deformed flowers. Dahlia buds and flower stems become blackened and distorted.

**Distribution.** — Throughout United States.

**What to do.** — Dust or spray with DDT or malathion (p. 67). For best results, do this early in the morning when insects are less active. Clean up and destroy weeds and trash in the fall, to prevent overwintering.

Blister Beetles. See page 5.
Root Aphids. See page 19.
*Six-Spotted Leafhopper. See page 24.
Spotted Cucumber Beetles. See page 12.
Yellow Woollybear Caterpillar. See page 27.

**CALLA LILY**

*Bulb Mite. See page 45.
*Greenhouse Thrips. See page 18.
*Mealybugs. See page 16.
Onion Thrips. See page 19.

**CAMILLIA**

Rhabdopterus Beetles

**Description.** — Several species. Shining black or bronze; ¼ inch long. Active only at night.

**Damage.** — Adults eat long, narrow holes, or slits, in foliage.

**Distribution.** — Throughout United States east of Rocky Mountains.

**What to do.** — Apply methoxychlor spray (p. 68). Do not apply DDT to camellias.

**Tea Scale**

**Description.** — Hard elongate scale; light yellow when young, later dark brown; ½ inch long. Lives on twigs and leaf surfaces.

**Damage.** — Yellowish blotches appear on upper surface of camellia leaves. Leaves drop prematurely; plants weaken; flower production decreases; cuttings may die before roots develop. Tea scale attacks many other plants including ferns, palms, and orchids.

**Distribution.** — Southeastern States and west coast.

**What to do.** — Before growth starts in spring, apply spray containing 5 tablespoons of white-oil emulsifiable concentrate in each gallon of water. After growth starts, apply malathion spray (p. 68) at monthly intervals, to destroy young scales.

*Fuller Rose Beetle. See page 7.
June Beetles. See page 10.
*Mealybugs. See page 16.
*Oleander Scale. See page 47.
*Spider Mites. See page 12.

**CAMPANULA**

Foxglove Aphid

**Description.** — Shining, light green; dark green patch around base of cornicles; about ½ inch long.

**Damage.** — Feeding on flower hosts results in yellowed or blanched spots,
sometimes leaf curling, and a distortion of leaves that resembles virus disease. These aphids attack campanula, columbine, chrysanthemum, evening primrose, foxglove, geranium, gladiolus, lily, pansy, penstemon, physostegia, scarlet sage, verbena, and violet plants.

Distribution.—Widespread in many Northern and Western States.

What to do.—Spray or dust with malathion (p. 67).

*Onion Thrips. See page 19.
Slugs. See page 11.

Canna Leaf Rollers

Description.—Two species of caterpillars: One is pale green, has a dark orange head; up to 1¾ inches long. Other is greenish white, 1 inch long.

Damage.—These insects fold or roll canna leaves; tie leaves with webs, and feed within them. Foliage becomes ragged, brown, and often dies.

Distribution.—Southeastern States, south of Washington, D. C.

What to do.—Kill caterpillars in rolled leaves by pressing leaves with fingers. Dust with DDT before they begin folding or rolling leaves. Clean up and burn dead trash and infested plant parts in fall.

Corn Earworm. See page 6.
*Fuller Rose Beetle. See page 7.
Goldsmith Beetle. See page 51.
Greenhouse Leaf Tier. See page 16.
Saddleback Caterpillar. See p. 55.

Florida Wax Scale

Description.—Thick, white waxy covering on reddish-brown body; sometimes tinted pink; ¾ inch across. Lives on stems of plants.

Damage.—Infested plants become stunted; heavily infested branches die. Scale attacks many shrubby plants; also attacks the perennials, anthurium, cape-jasmine, croton, fern, oleander, pomegranate, and poinsettia.

Distribution.—Southeastern States, from Maryland southward.

What to do.—Before growth starts in spring, apply spray containing 5 tablespoons of white-oil emulsifiable concentrate in each gallon of water. After growth starts, apply malathion spray (p. 68) at monthly intervals to destroy young.

*Fuller Rose Beetle. See page 7.
Whitefly. See page 13.

CARNATION

*Aphids. See page 4.
Cabbage Looper. See page 5.
Cutworms. See page 6.
*Flower Thrips. See page 48.
Fuller Rose Beetle. See page 7.
Greenhouse Leaf Tier. See page 16.
*Mealybugs. See page 16.
Oblique-Banded Leaf Roller. See page 51.
Slugs. See page 11.
*Spider Mites. See page 12.

CASTORBEAN

Garden Webworm

Description. — Larva: Caterpillar; light green; small, dark green spots over body; 1 inch long; conceals self in silken tube on ground. Adult: Moth; buff colored; grayish markings.

Damage.—Caterpillars spin light webbing over plants, and feed on foli-
age underneath. They attack castor-bean, verbena plant, weeds, grasses, and several vegetables.

**Distribution.**—Throughout most of United States.

**What to do.**—Dust or spray with DDT or malathion.

**Armyworms. See page 4.**
**Corn Earworm. See page 6.**
**Potato Leafhopper. See page 40.**
**Serpentine Leaf Miner. See page 11.**
**Spider Mites. See page 12.**

---

**Six-Spotted Leafhopper**

**Description.**—Adult and young: Slender, wedge shaped; greenish yellow to gray; ⅜ inch long. Adult is very active; has 6 black spots on head; prefers open areas.

**Damage.**—Spreads the virus of aster yellows from diseased to healthy China-asters, and to many other ornamental plants including alyssum, anchusa, browallia, cape-marigold, cornflower, calendula, chrysanthemum, cineraria, clarkia, coreopsis, cosmos, dahlia, gaillardia, gladiolus, gypsophila, lobelia, mignonette, petunia, phlox, poppy, rudbeckia, scabiosa, schizanthus, strawflower, sweet-william, vinca, and zinnia. Varying symptoms include general yellowing of foliage, clearing of leaf veins, excessive branching, and greening of flower petals.

**Distribution.**—Throughout United States.

**What to do.**—Plant in sheltered areas near buildings or hedges. Destroy diseased plants. Dust or spray with DDT or malathion at 5-day intervals (p. 67). If plants are highly valued, protect them with cheesecloth or special shade cloth on wooden or wire frames.

**Asiatic Garden Beetle. See page 5.**

---

**CHINESE LANTERN**

**Tortoise Beetles**

**Description.**—Several species. Tortoise-shaped; gold and black, or bright red with black spots. Larvae are spiny, brown or yellow, and carry excrement and cast skins on their backs.

**Damage.**—Feed on foliage of morning-glory, moonflower, and Chinese lantern.

**Distribution.**—Throughout United States.

**What to do.**—Dust or spray with malathion or DDT.

**Four-Lined Plant Bug. See page 36.**
**Imported Long-Horned Weevil. See page 9.**
**Japanese Weevil. See page 34.**
**Striped Cucumber Beetles. See page 30.**

---

**CHRYSDANTHEMUM**

**Chrysanthemum Aphid**

**Description.**—Shiny dark brown, almost black; about ⅛ inch long.
Lygus bug damage to chrysanthemum: Left, normal flower; right, flowers injured in varying degrees.

Occurs on stems, leaves, and flowers of chrysanthemum.

*Damage.* — Dense clusters feed on tender shoots of growing plants and flowers. They stunt growth, and cause slight leaf curling. Sometimes the plants die. When cut flowers with aphids on them are brought into the house, aphids leave them and crawl about; they leave dark stains when crushed.

*Distribution.* — Throughout United States, where chrysanthemums are grown.

*What to do.* — Apply malathion dust or spray (p. 67). Make regular applications of the general purpose spray (p. 68) for control of both insects and diseases on chrysanthemums.

**Chrysanthemum Gail Midge**

*Description.* — Adult is a two-winged gnat; orange; $\frac{1}{4}$ inch long. Adults emerge after midnight, and by morning lay orange-colored eggs, tucking many of them into crevices of tip growth. Larva is a white- or orange-colored maggot.

*Damage.* — Larvae bore into tender tissue of young leaves, stems, or buds of chrysanthemum; create cone-shaped galls in which they develop. Developing buds are distorted, stems and leaves are twisted, by groups of galls. The gall midge attacks all varieties of chrysanthemums.

*Distribution.* — Scattered infestations in many States.

*What to do.* — Spray in evening with lindane (p. 68). Repeat application three times at 5-day intervals, to kill emerging adults and larvae in galls.

**Chrysanthemum Lacebug**

*Description.* — Adult: Lacy wings and hood; $\frac{1}{4}$ inch long. Nymph: Spiny, resembling azalea lacebug.

*Damage.* — Lacebugs bleach foliage, and injure stems of chrysanthemum, aster, and scabiosa; they breed on weeds.

*Distribution.* — Common in many areas throughout United States.

*What to do.* — Apply lindane dust, or malathion dust or spray (p. 67).

**Chrysanthemum Leaf Miner**

*Description.* — Adult: Minute, black fly. Larva: Pale, yellow maggot; occurs in leaf mines; leaves large black specks of excrement.

*Damage.* — Groups of larvae feed in petioles, and between leaf surfaces;
cause large, irregular, blisterlike mines; leaves often drop. Hosts include chrysanthemum, cineraria, eupatorium, daisy, Shasta daisy, and marguerite.

**Distribution.**—Widely distributed in many States.

**What to do.**—Spray with lindane (2 teaspoons of 25-percent emulsion in each gallon of spray) or with malathion (p. 68).

**Climbing Cutworm**

**Description.**—Caterpillar; stout, soft bodied, smooth; mottled brown; 1¼ inches long. Hides in soil by day; active at night.

**Damage.**—Climbs plants at night; feeds in tip leaves, or bores into flower buds or blossoms and cuts off petals.

**Distribution.**—Northern States.

**What to do.**—To destroy cutworms crawling from hiding places to plants, apply ½ pound of 5-percent DDT dust to each 1,000 square feet of soil surface. If only a few plants are involved, scratch the soil surface and destroy larvae as they are exposed.

**Garden Symphylan**

**Description.**—Slender; ¼ inch long; constantly moving long antennae; 12 pairs of legs on adult (fewer legs on larva); white; fragile; active. Found in moist soils that contain decayed humus, particularly near greenhouses. Travels through cracks and openings in soil.

**Damage.**—Eats numerous tiny pits, or holes, in underground parts of plants; eats tiny roots and root hairs. Roots of injured plants have blunted appearance. Plants become stunted; may die. Damages many plants including sweetpea, China-aster, snapdragon, chrysanthemum, rose, aster, and lily.

**Distribution.**—Throughout humid areas of United States.

**What to do.**—Where vegetables are not to be grown, apply 1 pound of lindane dust to each 1,000 square feet, work into soil, and water heavily. Where both vegetables and ornamentals are to be grown, apply 10 pounds of DDT dust to each 1,000 square feet; work into soil before planting.

**Spittlebugs**

**Description.**—Several species. Nymphs are pinkish to yellowish green; up to ¼ inch long; usually found under masses of white froth or spittle, which they produce. They hatch in spring from eggs which were laid the previous fall by variably marked brown or gray leafhopperlike adults.

**Damage.**—Nymphs suck plant juices. This causes stunting and distortion of plants including chrysanthemum, rose, stock, and geum. Adults cause no visible damage.

**Distribution.**—Northern States.

**What to do.**—Dust with DDT, methoxychlor, or lindane. Malathion is ineffective.

**White-Marked Tussock Moth**

**Description.**—Caterpillar; red head; 2 slender tufts of black hairs project forward, 1 large black tuft at rear, 4
Spider mite injury on chrysanthemum.

bunches of white hairs on back; up to 1 1/2 inches long.

Damage.—Usually many caterpillars feed together. They skeletonize leaves of many plants including geranium, German ivy, rose, chrysanthemum.

Distribution.—United States east of Colorado.

What to do.—Apply DDT dust or spray (p. 67). Pick off and destroy infested leaves and groups of larvae.

Yellow Woollybear Caterpillar

Description.—Caterpillar; hairy; yellow, or straw colored; has longitudinal black lines; 2 inches long.

Damage.—General foliage feeder on many plants including canna, dahlia, hollyhock, lily, morning-glory, rose, sunflower, calendula, coleus, chrysanthemum, fuchsia, calla, moonflower, petunia, sage, verbena, and violet.

Distribution.—Widely distributed in United States.

What to do.—Apply DDT dust or spray (p. 67). Pick off and destroy larvae if only few are present.

*Aphids. See page 4.
Armyworms. See page 4.
Blister Beetles. See page 5.
*Cabbage Looper. See page 5.
*Corn Earworm. See page 6.
European Chafer. See page 7.
*European Corn Borer. See page 29.
*Four-Lined Plant Bug. See page 36.
Fuller Rose Beetle. See page 7.
Goldsmith Beetle. See page 51.
Greenhouse Leaf Tier. See page 16.
*Greenhouse Thrips. See page 18.
Harlequin Bug. See page 33.
*Lygus Bugs. See page 21.
Mealybugs. See page 16.
*Onion Thrips. See page 19.
Red-Banded Leaf Roller. See page 52.
*Six-Spotted Leafhopper. See page 24.
*Termites. See page 13.
Whitefly. See page 13.

CINERARIA

Leaf-Curling Plum Aphid

Description.—Adult and nymph are flat backed; pale green; shining; 1/16 inch long; found in crevices of plant tips.

Damage.—Severe distortion, and stunting of growth. Infested leaves are covered with white, crystalline droplets of honeydew. Winter host is plum. Summer hosts include aster, chrysanthemum, cynoglossum, cineraria, dahlia, erigeron, eupatorium, gerbera, heliotrope, lobelia, mertensia, marguerite, and sunflower plants.

Distribution.—Throughout United States. Occurs throughout year in
greenhouses, or on summer hosts in warm areas.

*What to do.*—Spray with malathion. Direct spray into growing points and cupped leaves, to reach deeply concealed aphids. Pick off badly curled leaves and tips before spraying.

*Cabbage Looper. See page 5.*
*Cutworms. See page 6.*
*Greenhouse Leaf Tier. See page 16.*
*Greenhouse Whitefly. See page 38.*
*Mealybugs. See page 16.*
*Six-Spotted Leafhopper. See page 24.*
*Slugs. See page 11.*
*Spider Mites. See page 12.*

---

**Clematis**

Clematis Borer

*Description.*—Larva: Dull white; brown head; up to 2/3 inch long.
*Damage.*—Larvae hollow out stems, tunnel crown and roots of clematis and virgin’s-bower. Vines become stunted; branches die.
*Distribution.*—Locally, where host is grown.
*What to do.*—Cut out and burn infested stems; dig out larvae in crowns. To destroy young larvae, apply DDT dust or spray (p. 67) in early spring.

*Blister Beetles. See page 5.*
*Nematodes (Eelworms). See page 10.*
*Oystershell Scale. See page 46.*
*Soft Scale. See page 50.*
*Webworms. See page 17.*

---

**Columbine**

Columbine Borer

*Description.*—Larva is a caterpillar; salmon colored; pale stripe down back; up to 1 1/2 inches long. Adult is large, brown moth that lays eggs in late fall, near columbine plants; eggs overwinter; larvae hatch in spring and go to columbine plants.
*Damage.*—Larvae bore in petioles and stems of wild and cultivated columbine in April or May; later they bore in crowns and roots. Sawdustlike castings near entrance holes indicate borers at work. Infested plants wilt and die.
*Distribution.*—Where columbine is grown.
*What to do.*—Cut off infested stems, or destroy infested plants. Clean up beds in spring; scrape away soil surface around plants to remove overwintering eggs. To destroy hatching larvae, dust with DDT at weekly intervals in late April and early May.
Columbine Leaf Miner

*Description.*—Adult: Fly; brownish; ⅛ inch long. Larva: Maggot; pale, yellowish green.

*Damage.*—Larvae mine leaves; create winding tunnels filled with black bits of excrement. Several generations occur each season.

*Distribution.*—Common wherever columbine is grown.

*What to do.*—Apply a double-strength lindane spray, or use malathion spray (p. 68) to destroy larvae in mines. When infestation is light, pick off and destroy infested leaves.

Grape Mealybug. See page 35.
Stink Bugs. See page 58.
Whitefly. See page 13.

European Corn Borer

*Description.*—Larva: Caterpillar; flesh colored, black spots, dark-brown head; about 1 inch long; wriggles actively when exposed. Adult: Moth; yellowish brown; 1 inch long.

*Damage.*—Larvae bore in stems of aster, dahlia, gladiolus, chrysanthemum, cosmos, zinnia, and many other ornamental plants.

*Distribution.*—Eastern and Northern States; rapidly extending into Rocky Mountain and Southern States.

*What to do.*—Clean up and burn or bury stalks and weeds in which larvae could spend winter. To destroy young larvae before they enter stems, apply DDT dust to foliage every 5 to 7 days during July and August.

*Lygus Bugs. See page 21.
Root Aphids. See page 19.
Six-Spotted Leafhopper. See page 24.
Termites. See page 13.

Cocklebur Billbug

*Description.*—Adult: Weevil; long, curved snout; reddish; 13 black spots on back; ⅛ inch long. Larva: Legless; curved; white; brown head.

*Damage.*—Larvae bore in pith, and hollow out stems for a foot or more near base of plant. Insect infests dahlia, sunflower, chrysanthemum plants, and several weeds including cocklebur, ragweed, thistle, and joe-pye-weed.

*Distribution.*—In Southeastern United States.

*What to do.*—Stake dahlia plants to prevent breaking of stems. Postpone planting dahlias until June to escape the adult billbugs which appear in May. Destroy weed hosts such as ragweed, thistle, and joe-pye-weed, near gardens.

Giant Hornet

*Description.*—Adult: Dark, reddish brown; orange markings on abdomen; 1 inch long. Large, paper nests are located in hollow trees, or attached to porches or eaves of buildings.

*Damage.*—Adults tear bark from stems of shrubs and flowering plants including dahlia, lilac, and rhododendron. They use bark to build nests during August and September.

*Distribution.*—Eastern United States, from Massachusetts to North Carolina, and west to Ohio.

*What to do.*—If possible, locate and destroy nests, or dust nest openings with 6-percent chlordane. Apply chlor-
dane dust or spray to stems of affected plants, or apply spray containing 2 tablespoons of 50-percent DDT in each gallon of water. Note: This is twice the strength of DDT spray (see p. 68). Apply insecticide before serious plant injury occurs.

**Stalk Borer**

*Description.* — Slender; up to 1¼ inches long. Young borer: Creamy white; dark purple band around body; several brown or purple stripes running length of body. Full-grown borer: Creamy white to light purple; no band or stripes.

*Damage.* — Young borers hatch in early spring from eggs laid on grasses and weeds; bore in grass stems at first, then search for larger, stemmed plants. They bore in stems of aster, dahlia, goldenglow, hollyhock, iris, and lily plants.

*Distribution.* — Common east of Rocky Mountains.

*What to do.* — Remove and destroy nearby weeds; insect breeds in weeds and moves to cultivated plants. Sometimes, infested plants can be saved by splitting the stems and destroying borers. Stake and bind split stems and keep plants watered. Dust nearby plants with DDT to destroy borers moving from one plant to another.

**Striped Cucumber Beetles**

*Description.* — Several species. Elongate; yellowish; 3 black stripes; ⅜ inch long.

*Damage.* — Feed on pollen and petals of many flowers and plants including gourds, Chinese lanterns, lilies, and dahlia; also feed on leaves and stems of gourds and other cucurbits. Transmit cucurbit wilt to gourds, melons, and cucumbers.

*Distribution.* — Two similar species throughout United States; one species occurs on each side of Rocky Mountains.

*What to do.* — Dust dahlia and other flowering plants with DDT, methoxychlor, or lindane (p. 67). Do not apply DDT to gourds. Protect young gourd plants from beetles by using paper or plastic plant covers, called hotkaps; or, cover plants with coarse netting or screen-covered frames until they start to produce vines.

Dahlia stem, cut open to show larva of pith-nesting bee in tunnel.

Lygus Bugs. See page 21.
*Nasturtium Aphid. See page 42.
*Onion Thrips. See page 19.
Pith-Nesting Bees. See page 52.
*Potato Leafhopper. See page 40.
Root Aphids. See page 19.
Rose Chafer. See page 52.
Saddleback Caterpillar. See page 55.
*Six-Spotted Leafhopper. See page 24.
*Spider Mites. See page 12.
*Spotted Cucumber Beetles. See page 12.
Webworms. See page 17.
Yellow Woollybear Caterpillar. See page 27.

**DELPHINUM**

Cyclamen Mite

_Description._—Invisible to unaided eye. When magnified, adults are seen to be oval or elongate, caramel colored, about $\frac{1}{100}$ inch long, and slow moving. Young are smaller, and milky white. Eggs are oval and pearly white.

_Damage._—Infested delphinium plants are seriously distorted; leaves are cupped or curled, often blackened; flower spikes become stunted, blackened. Florets may not open; if they do, they are streaked with darker color, or blackened.

_Distribution._—In many States; most abundant in cooler regions of the continent.
What to do.—A very difficult pest to control, once established in a crop. Destroy heavily infested plants. Mites on valuable plants can be destroyed by digging plants and immersing them in water at 110° F. for 15 minutes. Cut out badly infested shoots. Spray plants at weekly intervals using a spray containing 2 teaspoons of Kelthane emulsifiable concentrate in each gallon of water. Avoid transporting mites on hands, clothing, or tools.

Delphinium Aphid

Description.—Rounded, shiny orange body; dull black head; dusky brown legs and antennae; ½ inch long. Lives on underside of leaves, and between buds in flower spikes.

Damage.—Heavy infestations cause curling and cupping of leaves, and dwarfing of shoots; flower spikes become stunted; florets fail to open. Injury resembles that done by cyclamen mite, but is less severe, and lacks the blackening symptoms of mite injury.

Distribution.—Scattered infestation on wild species of delphinium; occasionally becomes established in cultivated plants of both annual larkspur and perennial delphinium.

What to do.—Apply malathion spray (p. 68) to lower side of foliage.

*Asiatic Garden Beetle. See page 5.
*Blister Beetles. See page 5.
*Cutworms. See page 6.
*Four-Lined Plant Bug. See page 36.
*Gladiolus Thrips. See page 35.
*Millipedes. See page 10.
*Potato Leafhopper. See page 40.
*Slugs. See page 11.

Asiatic Garden Beetle. See page 5.
Mealybugs. See page 16.
Nematodes (Eelworms). See page 10.
*Onion Thrips. See page 19.
*Spider Mites. See page 12.
*Stalk Borer. See page 30.

Florida Fern Caterpillar

Description.—Caterpillar; resembles cutworm; young are pale green, older ones are velvety black; 1½ inches long. They hide by day along midrib or in crown of plant; feed at night.

Damage.—Eat young leaves of ferns, and strip leaflets from old growth. Chief hosts are nephrolepis and adiantum ferns.

Distribution.—A tropical species, widely distributed in Florida; has been introduced into northern greenhouses on infested plants.

What to do.—Dust or spray with DDT or malathion (p. 67).

Black Vine Weevil. See page 18.
Florida Wax Scale. See page 23.
*Greenhouse Thrips. See page 18.
*Mealybugs. See page 16.
Oleander Scale. See page 47.
Onion Thrips. See page 19.
*Soft Scale. See page 50.
Tea Scale. See page 22.
Whitefly. See page 13.

FLOWERING KALE

Harlequin Bug

Description. — Adult and nymph: Shield shaped; black, brilliantly marked with red or yellow; up to $\frac{3}{8}$ inch long. Overwinters near old cabbage remnants.

Damage. — Sucks sap from plants, which wilt and turn brown as if scalded. Primarily a pest of vegetable crucifers but feeds on flowering plants including chrysanthemum, rose, sunflower, and flowering kale.

Distribution. — Localized in southern part of country, from California to Virginia.

What to do. — Spray with malathion (p. 68). Handpick bugs in spring.

* Aphids. See page 4.
* Cabbage Looper. See page 5.
* Diamondback Moth. See page 59.

FREESIA

Green Peach Aphids

Description. — At least two species — the green peach aphid, and the crescent-marked lily aphid. Winged or wingless; green body; dusky patch or cross markings on back; about $\frac{1}{2}$ inch long.

Damage. — Stunt growth by feeding on stems; cause distortion, curling, and yellow spotting of leaves by feeding on foliage.

Distribution. — Widely distributed wherever freesia is grown.

What to do. — Dust or spray with malathion (p. 67).

Bulb Mite. See page 45.
* Gladiolus Thrips. See page 35.
Nematodes (Eelworms). See page 10.

FUCHSIA

False Spider Mite

Description. — Cannot be seen without magnifying lens. Flat, oval, dark red, slow moving. Young mites, and shiny round eggs, are bright red. Mites occur along veins on underside of leaves.

Damage. — Feeding causes fine, spotted-bronze or rusty-brown areas along veins or over entire leaves on fuchsia, coleus, ageratum, privet, and many other plants. Infested plants may lose their foliage.

Distribution. — Widespread throughout United States.

What to do. — Spray with Kelthane (p. 68) taking care to wet the lower leaf surface thoroughly. Add $\frac{1}{4}$ teaspoon of a common household detergent to each gallon of spray to increase wetting qualities.

Fuchsia Flea Beetle

Description. — Adult: Beetle; bluish-green; $\frac{1}{2}$ inch long.

Damage. — Adults eat pits in leaves,
causing ragged appearance of foliage which becomes deformed and drops; plants become stunted.

Distribution. — Abundant in many areas where fuchsias are grown.

What to do.—Dust or spray with DDT or malathion.

*Aphids. See page 4.
*Cyclamen Mite. See page 31.
*Fuller Rose Beetle. See page 7.
*Greenhouse Thrips. See page 18.
*Mealybugs. See page 16.
*Nematodes (Eelworms). See page 10.
Yellow Woollybear Caterpillar. See page 27.

GAILLARDIA

*Aphids. See page 4.
*Asiatic Garden Beetle. See page 5.
*Four-Lined Plant Bug. See page 36.
*Onion Thrips. See page 19.
*Six-Spotted Leafhopper. See page 24.
*Spider Mites. See page 12.
Stalk Borer. See page 30.

GARDEN BALSAM

*Aphids. See page 4.
*Asiatic Garden Beetle. See page 5.
*Lygus Bugs. See page 21.
*Nematodes (Eelworms). See page 10.
Spotted Cucumber Beetles. See page 12.

GARDENIA

*False Spider Mite. See page 33.

*Florida Wax Scale. See page 23.
*Flower Thrips. See page 48.
*Fuller Rose Beetle. See page 7.
*Mealybugs. See page 16.
*Nematodes (Eelworms). See page 10.
Soft Scale. See page 50.
*Spider Mites. See page 12.
Whitefly. See page 13.

GERANIUM

Japanese Weevil

Description. — Adult: Dark brown; diffused, lighter brown cross bands on broad wing covers make insect inconspicuous; about 3/16 inch long. Hides in vegetation during day; feeds at night.

Damage.—Adults are sometimes very numerous on single plants in a garden; eat broad, rounded notches in leaf margins. Flower-garden hosts include rose, azalea, veronica, geranium, and many shrubs.

Distribution.—Abundant from Connecticut to Washington, D. C.

What to do.—Dust or spray with chlordane two or three times from May to July to destroy adults before they lay eggs.

Black Vine Weevil. See page 18.
*Cabbage Looper. See page 5.
*Corn Earworm. See page 6.
*Cyclamen Mite. See page 31.
Earthworms. See page 6.
*False Spider Mite. See page 33.
Foxglove Aphid. See page 22.
**Fuller Rose Beetle.** See page 7.

**Greenhouse Leaf Tier.** See page 16.

**Imported Long-Horned Weevil.** See page 9.

**Oblique-Banded Leaf Roller.** See page 51.

**Red-Banded Leaf Roller.** See page 52.

**Slugs.** See page 11.

**Termites.** See page 13.

**Webworms.** See page 17.

**White-Marked Tussock Moth.** See page 26.

---

**GLADIOLUS**

*Aphids.** See page 4.

*Cyclamen Mites.** See page 31.

*Flower Thrips.** See page 48.

*Nematomeres (Eelworms).* See page 10.

*Onion Thrips.** See page 19.

*Serpentine Leaf Miner.** See page 11.

---

**GLADIOLUS**

*Gladiolus Thrips*

*Description.* — Adult: Black; creamy band across base of wings; 1/16 inch long. Larva: Wingless; pale yellow to orange; is present with adults.

*Damage.* — Thrips feed and breed on foliage and flowers of gladiolus, aster, carnation, amaryllis, narcissus, freesia, delphinium, hollyhock, and poker plants. Foliage becomes streaked or silvered; flowers become deformed; buds may fail to open; petals are flecked with white. Overwinters on corms which become russetted and corky, and may fail to sprout when planted.

*Distribution.* — Throughout United States.

*What to do.* — Apply DDT dust to growing plants at weekly intervals, from time foliage is 6 inches high until flowering. After harvesting and curing gladiolus corms, shake them in sack with small amount of DDT dust (1 teaspoon for each 100 corms); store as usual.

Untreated corms found to be infested at planting time should be soaked in a Lysol solution for 3 hours; use 1 1/2 teaspoons of Lysol in each gallon of water. Plant immediately after soaking to avoid corm injury from the chemical. Wear rubber gloves when handling treated corms.

---

**Grape Mealybug**

*Description.* — Female: Soft, oval, segmented body; white, powdery wax, and waxy filaments at posterior; brownish cream colored; about 1/4 inch long. White, cottony filaments cover masses of eggs at posterior. Adult male: Winged; does not feed.

*Damage.* — Female attacks many ornamentals including gladiolus corms, calla roots and tops, California poppy, coleus, columbine, carnation, English ivy, and passion-flower. Sucks juices from roots and stems of many plants, causing dwarfing of growth. Mealybug feeding on stored gladiolus corms and calla roots causes them to shrivel and die before planting time. Ants contribute to the damage by distributing mealybugs to favorable food sources.

*Distribution.* — Throughout United States.

*What to do.* — Spray infested plants with malathion (p. 68). Soak infested gladiolus corms and calla roots in malathion spray for 30 minutes. Destroy ants by applying chlordane. (See Ants, p. 3).

---

**Zebra Caterpillar**

*Description.* — Velvety-black cater-
pillar; 2 bright yellow stripes on each side; many fine, yellow, transverse lines; \(\frac{3}{4}\) inch long.

**Damage.**—Feeds on many plants including gladiolus, lily, and sweetpea.

**Distribution.**—Widespread in Northern States.

**What to do.**—Apply DDT spray or dust (p. 67) to young caterpillars.

---

*Aphids. See page 4.*

*Armyworms. See page 4.*

*Asiatic Garden Beetle. See page 5.*

*Blister Beetles. See page 5.*

*Bulb Mite. See page 45.*

*Corn Earworm. See page 6.*

*Cutworms. See page 6.*

*European Corn Borer. See page 29.*

*Flower Thrips. See page 48.*

*Lygus Bugs. See page 21.*

*Nematodes (Eelworms). See page 10.*

*Seed-Corn Maggot. See page 59.*

*Six-Spotted Leafhopper. See page 24.*

*Slugs. See page 11.*

*Spider Mites. See page 12.*

*Stalk Borer. See page 30.*

*Webworms. See page 17.*

*White-Marked Tussock Moth. See page 26.*

---

**GLOBE THISTLE**

**Four-Lined Plant Bug**

**Description.**—Flat; slender; greenish-yellow; four black stripes down back; \(\frac{1}{4}\) inch long. Quickly dodges out of sight or flies away when disturbed. (See inside front cover for natural-color illustration.)

**Damage.**—Damages plants in early spring; causes numerous brown or black circular spots, \(\frac{1}{16}\) inch across, on young leaves. Infests many plants including aster, Chinese lantern, globe thistle, phlox, dahlia, zinnia, and several woody shrubs.

**Distribution.**—Widely distributed in Northern States.

**What to do.**—If practical, eliminate currantlike shrubs in which eggs are laid and overwinter. Dust or spray plants in early spring with DDT or malathion (p. 67). Repeat applications every 7 to 10 days until early July.

*Aphids. See page 4.*
Greenhouse Leaf Tier. See page 16.
Oblique-Banded Leaf Roller. See page 51.
*Painted Lady Butterfly. See page 40.

GLOXINIA

Aphids. See page 4.
*Black Vine Weevil. See page 18.
Greenhouse Thrips. See page 18.
Onion Thrips. See page 19.

GOLDENGLOW

Goldenglow Aphid

Description. — Long legged; bright red; ¼ inch long. Occurs on stems and flower buds.

Damage. — Sucks sap from plants, causing dwarfing of growth; produces objectionable honeydew deposits. Chrysanthemum, goldenrod, Fuller’s teasel, sunflower, and lettuce are attacked by this aphid or by species closely resembling it.

Distribution. — Wherever goldenglow is grown.

What to do. — Apply malathion dust or spray, or Lindane dust.

Goldenglow Sawfly

Description. — Larva: Light gray; darker gray stripes; two rows of black spots along back; ½ inch long. Usually found coiled on leaves.

Damage. — Larvae occasionally defoliate goldenglow.

Distribution. — Wherever goldenglow is grown.

What to do. — Dust or spray with DDT or malathion.

GOURDS

Pickleworm

Description. — Yellowish white; brownish head; has dark spots when young; up to ¾ inch long.

Damage. — Feeds on flowers and leaf buds; tunnels flowers, vines, and fruits of gourds and other cucurbits.


What to do. — Grow crop early to avoid infestation. At first sign of injury, spray or dust with Lindane or Sevin; repeat application each week; worms must be killed before they enter fruits.

Squash Beetle

Description. — Adult: Yellow; 14 black spots; ¾ inch long; resembles Mexican bean beetle, but is larger. Larva: Spiny; yellow.

Damage. — Adults and larvae feed on gourds and related cucurbits.

Distribution. — East of Rocky Mountains.

What to do. — Apply malathion dust or spray (p. 67).

Squash Bug

Description. — Adult: Brownish, flat-backed stink bug; ⅜ inch long. Nymph: Varies from bright green with red head and legs to dark greenish gray
with black head and legs; up to $\frac{3}{8}$ inch long. Egg clusters are shiny, brick red; found on leaves.

**Damage.**—Adults and nymphs feed in colonies; live on gourds and other cucurbits; suck sap from leaves and stems. Plants wilt and die.

**Distribution.**—Throughout United States.

**What to do.**—Apply dieldrin dust.

**Squash Vine Borer**

*Image of Squash Vine Borer*

**Description.**—Adult: Wasplike moth; clear, copper-green wings; orange and black body; lays eggs on gourd and squash vines. Larva: White; lives in stems.

**Damage.**—Larvae bore into gourd and squash vines; eat holes in stems near bases of plants. Vines wilt and die.

**Distribution.**—East of Rocky Mountains.

**What to do.**—Apply methoxychlor, malathion, or lindane dust or spray (p. 67) at 7-day intervals from June 15 to July 15 in the North, and for a longer period in the South. Slit stems and destroy larvae. Mound earth over cut stems to encourage rooting and growth.

*Melon Aphid. See page 39.
*Spotted Cucumber Beetles. See page 12.
*Striped Cucumber Beetles. See page 30.
Whitefly. See page 13.

**Helenium Snout Beetle**

*Image of Helenium Snout Beetle*

**Description.**—Adult: Black, shining beetle; up to $\frac{3}{4}$ inch long. Larva: Small, curved weevil grub; white; brown head.

**Damage.**—Adults feed on growing tips of helenium in May and June. Larvae bore into stems, killing plants, or weakening them so that flowering is prevented.

**Distribution.**—Locally abundant in many areas.

**What to do.**—Dust or spray with DDT at weekly intervals to destroy adults. This will prevent egg laying and development of larvae.

**Greenhouse Whitefly**

*Image of Greenhouse Whitefly*

**Description.**—Adult: Wedge shaped; white; $\frac{1}{16}$ inch long; adults fly like snowflakes when disturbed. Young: Rounded; flat; scalelike; waxy threads on spines; pale green. Stays motionless on underside of leaves. Lives out-of-
doors in warmer parts of country, in greenhouses in winter in North; is taken or flies to plants in gardens during summer.

**Damage.**—Leaves of infested plants become pale, mottled, or stippled; sticky with honeydew; often are coated with black, sooty mold. Plants lack vigor, turn yellow, and die. Many hosts include gourds, ageratum, heliotrope, aster, begonia, calceolaria, calendula, chrysanthemum, columbine, cineraria, coleus, fern, fuchsia, geranium, golden-glow, hibiscus, Jerusalem-cherry, lantana, lupine, mallow, morning-glory, primrose, sage, and zinnia plants.

**Distribution.**—Throughout United States.

**What to do.**—Dust with DDT, malathion, or lindane (p 67).


**HIBISCUS (ROSEMALLOW)**

**Abutilon Moth. See page 16.**


**HIBISCUS (ROSE OF SHARON)**

**Melon Aphid**

**HEMEROCALLIS (DAYLILY)**

**Daylily Thrips**

**Description.**—Dark brown, resembling gladiolus thrips; yellow when young; \( \frac{1}{2} \) inch long.

**Damage.**—Thrips feed on leaves and flower stems, causing brown scarifications. They feed on flower buds, causing them to drop prematurely, before flowers open. Late flowering varieties are most seriously affected.

**Distribution.**—Florida and Northeastern United States, west to Wisconsin.

**What to do.**—Spray weekly with malathion (p. 68) beginning as soon as injury is noted, and before flower spikes are fully developed. This thrip is usually present on hemerocallis. Treat all new plants before setting them in your garden.

mum, cineraria, cyclamen, gardenia, gourd, hydrangea, lily, nemesia, rose, sunflower, syringa, thistle, verbena, and many vegetables and tropical fruits and weeds.

**Distribution.**—Throughout United States; most serious in South.

**What to do.**—Dust or spray with malathion or lindane (p. 67).

Abutilon Moth. See page 16.  
Aphids. See page 4.  
Corn Earworm. See page 6.  
Fuller Rose Beetle. See page 7.  
*Greenhouse Whitefly. See page 38.  

**HOLLYHOCK**

**Painted Lady Butterfly**

**Description.**—Larva is caterpillar; green or brown; mottled black; light-yellow stripes on back and sides; grayish spines; 1½ inches long.

**Damage.**—Feeds on foliage. Ties together terminal leaves of hollyhock, lupine, mallow, globe thistle, and sunflower.

**Distribution.**—Throughout United States.

**What to do.**—Remove infested tips. Dust plants with malathion or DDT.

**Potato Leafhopper**

**Description.**—Adult: Wedge shaped; green; ⅛ inch long; jumps or flies quickly when disturbed. Nymph: Wingless; resembles adult, but is smaller; crawls sideways, like a crab.

**Damage.**—Adults and nymphs attack many plants. They cause hopper burn; brown spot at leaf tip and margin; yellowing, reddening, or bronzing of leaf to midrib. Also cause curling downward, and severe stunting and killing of tips on dahlia and marigold. Flowering plants that suffer severe injury include marigold, dahlia, hollyhock, rose, and lupine.

**Distribution.**—Eastern half of United States. Related species in West and Southwest.

**What to do.**—Dust or spray with DDT or malathion.

Abutilon Moth See page 16.  
Aphids. See page 4.  
*European Corn Borer. See page 29.  
Gladiolus Thrips. See page 35.  
Lygus Bugs. See page 21.  
Mealybugs. See page 16.  
Nematodes (Eelworms). See page 10.  
Onion Thrips. See page 19.  
Red-Banded Leaf Roller. See page 52.  
Rose Chafer. See page 52.  
*Slugs. See page 11.  
*Spider Mites. See page 12.  
Spotted Cucumber Beetles. See page 12.  
*Stalk Borer. See page 30.  
Yellow Woollybear Caterpillar. See page 27.

**HYACINTH**

**Lesser Bulb Fly**

**Description.**—At least three species. Adult: Blackish green; white markings on abdomen; ⅛ inch long. Larva: Wrinkled; dirty grayish yellow; up to ½ inch long; occurs in decaying bulbs.

**Damage.**—This insect injures rotting bulbs; does not destroy healthy bulbs. Seventy-five or more larvae occur in a single bulb of narcissus, hyacinth, ama-
ryllis, iris, onion, or many other plants. Distribution.—In many States where bulbs are grown. What to do.—Destroy infested or rotting bulbs. Plant only healthy bulbs and rhizomes. Treat bulbs with chlordane as for narcissus bulb fly (p. 17).

*Bulb Mite. See page 45.
Nematodes (Eelworms). See page 10.
Yellow Woollybear Caterpillar. See page 27.

**HYDRANGEA**

*Hydrangea Leaf Tier*

Description.—Caterpillar; green; dark brown head; ½ inch long. Damage.—Caterpillar webs terminal leaves tightly around bud, and feeds on bud. Distribution.—In many States. What to do.—Apply preventive sprays of DDT (p. 68) before larvae web leaves together. Squeeze webbed leaves to destroy larvae within, and tear open to permit development of flower buds.

Aphids. See page 4.
*Lygus Bugs. See page 21.
Rose Chafer. See page 52.
*Spider Mites. See page 12.

**IRIS**

*Iris Borer*

Description.—Moth: Brown; black markings; 2-inch wingspread; lays eggs on old leaves of iris and nearby plants in fall; eggs overwinter, and larvae hatch in April and May. Larva: Slender; green at first; becomes pink, smooth, fat caterpillar; has rows of black spots on sides; 1½ inches long when full grown in July.

Damage.—Young larvae feed in leaf sheaths and stems of iris in April and May, then tunnel lower stems; in June and July they gouge out large areas in the rhizomes.

Distribution.—Throughout United States, where iris is grown. What to do.—To eliminate overwintering eggs, clean up and destroy old leaves, stems, and debris in fall or winter. To kill young, hatching larvae, dust iris beds with DDT at weekly intervals from time first growth starts until June 1. With aid of pointed stick or pencil, locate and destroy borers in young leaf sheaths that escape dust treatment. Transplant infested iris after it flowers; destroy larvae and infested rhizomes and chestnut brown pupae in soil before replanting. Community effort is important in iris borer control.

*Iris Thrips*

Description.—Adult: Usually wingless; dark brown, almost black; ½ inch long; slow moving. Larva: Soft-bodied; white. Damage.—Rasps surfaces in leaf sheaths, and rasps young leaves as they emerge. Causes russetting, blackening, stunting, weakened growth, and death of tops. Russetted or blackened flower buds and stems often fail to open. This
Snail injury to iris growth.

An insect is distributed to new garden plantings in basal leaves of plants. It damages Japanese iris seriously, and attacks most other types of iris.

**Distribution.**—Eastern United States.

**What to do.**—Dust or spray with DDT (p. 67). Thrips in infested divisions can be destroyed by immersing plants in water at 110° F. for 30 minutes.

---

**Iris Weevil**

**Description.**—Adult: Short snout; black; yellow and white scales; \( \frac{1}{2} \) inch long. Larva: Thick body; Milky white; small, brown head.

**Damage.**—Larvae develop in seed pods of blue flag iris; cause puncture scars on pods of Japanese iris and European iris.

**Distribution.**—Locally abundant where native iris grows.

**What to do.**—Destroy all flower heads after flowers fade, or destroy seed pods before young, adult weevils emerge. If seeds are being saved for breeding, cover blossoms with cheesecloth, or dust with DDT.

---

**IVY, ENGLISH**

**Nasturtium Aphid**

**Description.**—Adult and young: Dull black or dark green; young are spotted with white wax; \( \frac{1}{10} \) inch long. Great numbers occur on succulent leaves or tips.

**Damage.**—Sucks juices from leaves and stems, which become curled, dwarfed, and yellowed. Attacks many plants including globe thistle, dahlia, English ivy, oleander, poppy, zinnia, and nasturtium. Overwinters on euonymus.

**Distribution.**—Throughout United States.

**What to do.**—Dust or spray with malathion or lindane (p. 67).

---

*Aphids. See page 4.*

*Bulb Mite. See page 45.*

*Carrot Beetle. See page 5.*

*Flower Thrips. See page 48.*

*Gladiolus Thrips. See page 35.*

*Lesser Bulb Fly. See page 40.*

*Nematodes (Eelworms). See page 10.*

*Root Aphids. See page 19.*

*Rose Chafer. See page 52.*

*Slugs and Snails. See page 11.*

*Stalk Borer. See page 30.*

*Whitefly. See page 13.*

*Zebra Caterpillar. See page 35.*
Saddleback Caterpillar. See page 55.
*Soft Scale. See page 50.
*Spider Mites. See page 12.
Whitefly. See page 13.

**IVY, GERMAN (SENECIO)**

Aphids. See page 4.
Cabbage Looper. See page 5.
*Cyclamen Mite. See page 31.
Greenhouse Leaf Tier. See page 16.

**JERUSALEM-CHERRY**

*Aphids. See page 4.
*Greenhouse Whitefly. See page 38.
*Mealybugs. See page 16.
Onion Thrips. See page 19.
Orange Tortrix. See page 51.

**LANTANA**

Lantana Aphid

Description.—Wingless: Dark brown disk; fringe of white wax; resembles whitefly; 1/20 inch long.
Damage.—Feeds on orchids, ferns, palms, and lantana.
Distribution.—Localized in various parts of United States; carried through winter in northern greenhouses.
What to do.—Spray with malathion (p. 68).

*Cyclamen Mite. See page 31.
*Garden Fleahopper. See page 57.
*Greenhouse Leaf Tier. See page 16.
*Greenhouse Whitefly. See page 38.
*Mealybugs. See page 16.

**LILY**

Purple-Spotted Lily Aphid

Description.—Adult and young: Yellow; purple patch on back; 1/8 inch long.
Damage.—Feeds on underside of lower leaves, later on stems, and finally on buds and seed pods of lily. It most frequently infests regal, formosanum, and speciosum lilies, and other late-flowering garden lilies. Causes direct feeding injury; foliage yellows; growth of some varieties is killed prematurely.
Distribution.—Eastern United States.
What to do.—Dust or spray with malathion (p. 67). Cut off and burn infested stems in October before females lay eggs. If eggs are laid, they drop to the ground, and from them young aphids hatch the following spring.

*Aphids. See page 4.
*Bulb Mite. See page 45.
Carrot Beetle. See page 5.
Fuller Rose Beetle. See page 7.

**NEMATODES (EELWORMS)**. See page 10.

**LARKSPUR, ANNUAL**

*Cyclamen Mite. See page 31.
*Lygus Bugs. See page 21.
*Six-Spotted Leafhopper. See page 24.
*Spider Mites. See page 12.

**LEUCOJUM**

Lesser Bulb Fly. See page 40.
*Narcissus Bulb Fly. See page 17.

43
LOBELIA

**Negro Bug**

*Description.*—Adult: Short; oval; large thoracic shield; resembles a beetle; black; $\frac{1}{10}$ inch long.

*Damage.*—Causes plants to wilt and die. Often occurs in great numbers on vegetables and other crops; attacks ornamentals including lobelia and cardinal flower.

*Distribution.*—Generally distributed east of Rocky Mountains.

*What to do.*—Spray with malathion (p. 68).

**LUPINE**

**Lupine Aphid**

*Description.*—Long legs and cornicles; green; covered with white, powdery wax; $\frac{1}{8}$ inch long.

*Damage.*—Infests tips of perennial lupines in spring and early summer.

*Distribution.*—Localized where lupines are grown; Northeastern United States, and other cool-summer areas.

*What to do.*—Spray or dust with malathion (p. 67).

**LOVE APPLE**

**Potato Flea Beetle**

*Description.*—Adult: Jumping beetle; rough surface; black or dark brown; $\frac{1}{16}$ inch long.

*Damage.*—Eats many small holes in leaves of young plants; delays new growth; sometimes kills plants. Attacks love apple, Japanese lantern, ground-cherry, phlox, petunia, primrose, sunflower, and violet plants.

*Painted Lady Butterfly. See page 40.*

*Potato Leafhopper. See page 40.*

*Whitefly. See page 13.*
*Leaf-Curling Plum Aphid. See page 27.
Mealybugs. See page 16.
*Spider Mites. See page 12.

**MARIGOLD**

Aphids. See page 4.
Asiatic Garden Beetle. See page 5.
Blister Beetles. See page 5.
Cyclamen Mite. See page 31.
*Garden Fleahopper. See page 57.
Greenhouse Leaf Tier. See page 16.
*Lygus Bugs. See page 21.
*Potato Leafhopper. See page 40.
Root Aphids. See page 19.
*Six-Spotted Leafhopper. See page 24.
*Slugs. See page 11.
*Spider Mites. See page 12.
*Stalk Borer. See page 30.
Yellow Woollybear Caterpillar. See page 27.

**MIGNONETTE**

Cabbage Looper. See page 5.
*Corn Earworm. See page 6.
Onion Thrips. See page 19.
Potato Flea Beetle. See page 44.
*Six-Spotted Leafhopper. See page 24.
*Spider Mites. See page 12.

**MOONFLOWER**

Mealybugs. See page 16.
Nematodes (Eelworms). See page 10.
*Tortoise Beetles. See page 24.

*Yellow Woollybear Caterpillar. See page 27.

**MORNING-GLORY**

Aphids. See page 4.
Asiatic Garden Beetle. See page 5.
Corn Earworm. See page 6.
Four-Lined Plant Bug. See page 36.
*Tortoise Beetles. See page 24.
Whitefly. See page 13.
Yellow Woollybear Caterpillar. See page 27.

**NARCISSUS**

Bulb Mite

_Description._—Adult: Round; glistening white; two dark spots on back; brown legs; size of pinhead. Eggs: Glistening white; round. Young mite is similar to adult, but smaller. Under favorable conditions, young mites transform to brown, shining, turtle-shaped "hypopus" stage, and can live for a long time until transported to favorable food by insects or by other means.

_Damage._—Mites occur in weakened, decayed, or injured tissue; they rarely damage healthy bulb tissue but are sometimes found in apparently healthy roots. They attack amaryllis, crocus, freesia, gladiolus, hyacinth, lily, narcissus, tulip, peony roots, and a few other plants.

_Distribution._—Throughout United States.

_What to do._—Discard rotting or soft bulbs containing bulb mites. Immerse remaining bulbs in hot water (110° F.) for 3 hours.

Bulb Scale Mite

_Description._—Invisible to unaided
eye. When adults are magnified, they are seen as elongate, tan, and about \( \frac{1}{2} \) inch long. White larvae and white oval eggs are found on healthy tissue in narcissus bulbs.

**Damage.**—Mites feed on surface of scales in bulbs, and on bases of young leaves and flower stems. They cause bronzed streaks on leaves and stems, transverse cracks and distortion, and twisting. Injury is less serious to field and garden plantings than to bulbs being forced in the greenhouse. Mites attack narcissus and amaryllis.

**Distribution.**—On narcissus and amaryllis in many States.

**What to do.**—Immerse bulbs in water 110° F. for 3 to 4 hours.

*Lesser Bulb Fly. See page 40.
*Mealybugs. See page 16.
*Narcissus Bulb Fly. See page 17.
*Nematodes (Eelworms). See p. 10.
*Onion Thrips. See page 19.
*Tulip Bulb Aphid. See page 60.

**NEW JERSEY TEA**

**Oystershell Scale**

**Description.**—Scale covering is oystershell shaped; curved; broadened at posterior; dull gray or yellowish brown; \( \frac{1}{8} \) inch long, \( \frac{1}{16} \) inch wide. Living scale is soft-bodied; yellow; found beneath the covering. (See inside front cover for natural-color illustration.)

**Damage.**—Sucks juice from stems and leaves; causes yellowing of foliage, and stunting or killing of shoots on herbaceous perennials. Attacks peony, pachysandra, yucca, heather, New Jersey Tea, and clematis plants. Also attacks many ornamental shrubs, which serve as source of infestations on perennials.

**Distribution.**—Widely distributed throughout United States.

**What to do.**—Scales overwinter as eggs under female shells. Before new growth appears in spring, clean up and burn old, dead stems of peony and New Jersey Tea. Thoroughly spray nearby infested pachysandra and shrubs with white-oil emulsion at double strength (10 tablespoons in each gallon of water). Other dormant oil sprays may be used at strengths prescribed on container labels. After growth starts, spray with malathion to kill young scales. Spray again in late July.

**Rose Chafer. See page 52.**

**NICOTIANA**

(Flowering Tobacco)

**Aphids. See page 4.**

*Cutworms. See page 6.
*Flea Beetles. See page 21.
*Garden Fleahopper. See page 57.
*Hornworms. See page 51.
*Lygus Bugs. See page 21.
*Slugs. See page 11.
Oleander Scale

Description.—Female: Circular; flattened; pale yellow, tinged with purple; \( \frac{3}{10} \) inch in diameter; lives on stems and leaves. Male: Smaller; white.

Damage.—Infested plants have encrusted scales on stems and twigs; lose color and vigor; may die. This scale attacks acacia, aloe, azalea, cactus, camellia, English ivy, fern, oleander, orchid, poinsettia, rubber tree, and yucca plants.

Distribution.—Throughout warmer States; survives in greenhouses in North.

What to do.—Prune out all encrusted branches. In winter, apply white-oil emulsion spray. In summer, apply malathion spray at monthly intervals.

Pachysandra (Sparge)

Euonymus Scale

Description.—Female resembles dark-brown oystershell; \( \frac{1}{16} \) inch long. Male is smaller, slender, and white. (See inside front cover for natural-color illustration.)

Damage.—In heavy infestations stems and leaves become covered with scales; leaves turn yellow; vines die. This scale attacks euonymus, pachysandra, ivy, and other ground covers.

Distribution.—Throughout United States; less numerous in warm regions.

What to do.—In spring, before growth starts, apply dormant oil-emulsion spray diluted as recommended on container. In June, and again in September, apply DDT or malathion sprays (p. 68) to control young scales. Cut off and burn badly infested shoots before spraying.

Orchid Plant Bug

Description.—Orange to red; steel-blue wings; \( \frac{1}{8} \) inch long.

Damage.—Causes irregular stippling on underside of orchid leaves.

Distribution.—Warm areas where orchids are grown.

What to do.—Dust or spray with DDT or malathion.

Aphids. See page 4.
*Mealybugs. See page 16.
*Soft Scale. See page 50.
Termites. See page 13.

Thread Scale

Description.—Slender; brown or gray; \( \frac{1}{8} \) inch long; resembles oyster-shell scale.

Damage.—Heavily infested plants yellow and die. Less heavy infestations cause yellowing and stunting.

Distribution.—In North on greenhouse and house plants; common outdoors in warmer parts of United States.

What to do.—Before growth starts in the spring, apply spray containing 5
tablespoons of a white-oil emulsifiable concentrate in each gallon. After growth starts, apply malathion spray (p. 68) at monthly intervals to destroy young scales.

*False Spider Mite. See page 33.
*Fuller Rose Beetle. See page 7.
Greenhouse Thrips. See page 18.
*Lantana Aphid. See page 43.
*Mealybugs. See page 16.
Onion Thrips. See page 19.
Saddleback Caterpillar. See p. 55.
*Soft Scale. See page 50.
*Tea Scale. See page 22.

**Flower Thrips**

*Description.—At least four species: Flower thrips, Florida flower thrips, and two western flower thrips. Adults: Slender; winged; lemon yellow to brown; ½ inch long; active. Larvae: Wingless; lemon yellow to orange. Readily seen when infested flowers are shaken over a sheet of paper.

*Damage.—Rose and peony buds turn brown; ½ inch long; active. Larvae: and have brown edges on petals. Heavy infestations often occur on Japanese iris, day lily, garden lily, carnation, gladiolus, rose, and peony plants.

*Distribution.—Flower thrips occur throughout States east of Rocky Mountains; other species occur in West or South.

*What to do.—Effective control is difficult during migration period because of reinestation. Migration occurs during May and June in the vicinity of Washington, D. C.; it occurs later in the North, and earlier in the South. Late spring and early summer flowers may be protected by coarse cloth covering on a frame sprayed with dieldrin (1 pound of 25-percent wettable powder in each 100 gallons of water, or 2 teaspoons in each gallon). During migration period, roses and peonies may be cut in tight bud stage, and opened indoors. Spraying with malathion (p. 68) will give some protection for 1
but not more than 2 days. Later in season, flower thrips are reduced in numbers by predators, and usually do not cause serious flower injury.

*Ants. See page 3.
Oystershell Scale. See page 46.
Peony Scale. See page 21.

PERIWINKLE
(Vinca)

*Aphids. See page 4.
Fuller Rose Beetle. See page 7.

PETUNIA

Tomato Russet Mite

Description.—White; pear shaped; invisible to unaided eye.
Damage.—Causes bronzing or russetting of surface of stems and leaves. Injury appears suddenly because mites multiply rapidly. Attacks petunia, groundcherry, and datura plants.
Distribution.—Throughout the year in California and Southern States on petunia, tomato, and related hosts. Distributed to other States on host plants.
What to do.—At first evidence of infestation, apply sulfur dust, malathion dust or spray (p. 67).

*Aphids. See page 4.
*Asiatic Garden Beetle. See page 5.
*Flea Beetles. See page 21.
*Garden Fleahopper. See page 57.
Grasshoppers. See page 8.
Greenhouse Orthezia. See p. 28.
Hornworms. See page 51.
Lygus Bugs. See page 21.
*Mealybugs. See page 16.

PHLOX

Phlox Bug

Description.—Adult: Elongate; oval; flat back; dull orange; black median stripes on back; ¼ inch long. Nymph: Bright red; black wing pads.
Damage.—Nymphs and adults feed on upper surface of young leaves of perennial phlox; cause yellow, stippled areas, stunted growth, deformed blossom heads; sometimes plant dies.
Distribution.—Chiefly Northern States; locally, where perennial phlox is grown.
What to do.—Clean up old phlox stems after frost in fall; burn them to destroy overwintering eggs. Dust or spray plants with DDT or malathion (p. 67) to control nymphs and adults that appear during spring and summer.

*Asiatic Garden Beetle. See page 5.
Blister Beetles. See page 5.
Corn Earworm. See page 6.
Flea Beetles. See page 21.
*Four-Lined Plant Bug. See page 36.
Nematodes (Eelworms). See page 10.
*Spider Mites. See page 12.
*Stalk Borer. See page 30.
Wireworms. See page 15.

PHYSOTEGIA

*Asiatic Garden Beetle. See page 5.
Foxglove Aphid. See page 22.
Japanese Weevil. See page 34.
Verbena Bud Moth. See page 60.

PIPEVINE
(Dutchmans Pipe)

Pipevine Swallowtail

Description.—Caterpillar: Dark brown; four rows of orange- to coral-colored spots; up to 2 inches long. Soft, hornlike projections appear suddenly when caterpillar is disturbed. Adult: Butterfly; blue green; white, yellow, and orange spots in wings.

Damage.—Caterpillars feed on and defoliate Dutchmans pipevine.

Distribution.—Locally abundant throughout United States.

What to do.—Dust with DDT or malathion (p. 67).

POKER PLANT

Armyworms. See page 4.
Corn Earworm. See page 6.
*Flower Thrips. See page 48.
*Gladiolus Thrips. See page 35.
*Lygus Bugs. See page 21.
Onion Thrips. See page 19.

PLUMBAGO

*Fuller Rose Beetle. See page 7.
Mealybugs. See page 16.

POINSETTIA

Soft Scale

Description.—Flat; soft; oval; yellowish green or greenish brown; 1/8 inch long; lives on stems and leaves.

Damage.—Plants become weakened and stunted. Honeydew and sooty mold appear on leaves. Damages many woody plants and others including abutilon, bougainvillea, cassia, clematis, clerdendron, palm, poinsettia, and rose.

Distribution.—Many States in West and South.

What to do.—Make two or three applications of malathion spray (p. 68) at 3-week intervals to kill young scales.

Florida Wax Scale. See page 23.
*Mealybugs. See page 16.
Oleander Scale. See page 47.
Root Aphids. See page 19.
Termites. See page 13.

POMEGRANATE

*Florida Wax Scale. See page 23.
*Fuller Rose Beetle. See page 7.
Whitefly. See page 13.

POPPY

Corn Earworm. See page 6.
Four-Lined Plant Bug. See page 36.
*Green Peach Aphids. See page 33.
Lygus Bugs. See page 21.
Mealybugs. See page 16.
Nasturtium Aphid. See page 42.
Rose Chafer. See page 52.
**PORTULACA**

**Hornworms**

*Description.*—Several species. Adult: Moth; narrow-winged; brown or gray; about 1½ inches long; 2½ inch wingspread; swift flying; resembles hummingbird in flight; visits flowers at dusk. Larva: Caterpillar; prominent horn or posterior; green or gray; diagonal lines on side; up to 4 inches long. White-lined sphinx, which attacks portulaca, is green or black; has yellow or orange spots.

*Damage.*—Hornworms eat foliage, stems, and flowers of petunia, ornamental tobacco, portulaca, and other ornamentals. Infested plants have a conspicuous accumulation of large pellets of fecal matter.

*Distribution.*—Throughout United States; infestations localized.

*What to do.*—Handpick worms. Dust or spray with DDT or malathion (p. 68).

**PRIMROSE**

**Aphids.** See page 4.

*Black Vine Weevil.* See page 18.

**Flea Beetles.** See page 21.

*Fuller Rose Beetle.* See page 7.

**Mealybugs.** See page 16.

**Nematodes (Eelworms).** See page 10.

**Root Aphids.** See page 19.

*Spider Mites.* See page 12.

*Whitefly.* See page 13.

**BUFFALO TREEHOPPER**

*Description.*—Adult: Triangular; two horned projections at front; pointed at rear; grass green; ¾ inch long.

*Damage.*—Females cut curved slits in bark of rose twigs, making entrance wounds for rose canker and other diseases. Also a pest on other shrubs, and on fruit and ornamental trees.

*Distribution.*—Widely distributed in Northern States.

*What to do.*—Remove weeds and avoid planting favorable summer hosts such as alfalfa and sweetclover near gardens. Apply DDT or malathion dust during June.

**Goldsmith Beetle**

*Description.*—Hairy; lemon yellow; bronze underneath; about 1 inch long; frequently attracted to lights. Larva resembles white grub. Insect has life cycle of 2 or 3 years.

*Damage.*—Larvae feed on roots of rose, canna, chrysanthemum, and other ornamentals.

*Distribution.*—Common in Eastern States; more numerous in Southwestern States.

*What to do.*—Use same control as for Japanese beetle larvae (p. 9).

**OBlique-Banded Leaf Roller**

*Description.*—Caterpillar: Pale green; black head; up to ¾ inch long.

*Damage.*—Chews holes in rosebuds; rolls up leaves and ties them together. Feeds on aster, carnation, geranium, globe thistle, sunflower, and verbena plants.

*Distribution.*—Abundant in many States.

*What to do.*—Dust with DDT.

**Orange Tortrix**

*Description.*—Adult: Moth; gray or fawn; dark markings; ½ inch long. Larva: Caterpillar; dirty white; brown head; up to ½ inch long.

51
Damage.—Caterpillars feed on webbed and rolled leaves of many trees and shrubs; feed also on begonia, cineraria, jobs-tears, fern, geranium, Jerusalem-cherry, lantana, lavender, penstemon, rose, and wandering-Jew.

Distribution.—Warmer parts of United States, especially Pacific coast areas.

What to do.—Destroy webbed leaves containing older larvae. Spray with DDT wettable powder to control young larvae.

Periodical Cicada

Description.—Robust; black body; reddish eyes and legs; wings are clear, and have red veins; 1 inch long. Males sing shrilly.

Damage.—Adults damage stems of roses and other woody plants with their ovipositors while laying eggs.

Distribution.—Eastern United States, at irregular intervals.

What to do.—Cut off injured stems. To protect prized plants, construct frame over plants, and cover it with light muslin or cheesecloth. Spray with Sevin, using one tablespoon of 50-percent wettable powder in each gallon of water.

Pith-Nesting Bees
(Leaf-Cutter Bees)

Description.—Several species. Black, metallic green, or purple; about ¼ inch long.

Damage.—Females of some species cut oval-shaped pieces from leaves of rose and other plants. They store the leaves as food for their young, in cells excavated in the pithy stems of plants such as rose or dahlia, or in tunnels in wood. Other species collect aphids, or certain other insects or spiders, and store them in tunnelled stems of growing plants.

Distribution.—Throughout United States.

What to do.—There are no known measures for preventing foliage-cutting by leaf-cutter bees. To prevent tunneling of canes by pith-nesting bees, insert a flat-headed tack in the end of cut stem, or cover end with grafting wax, putty, or paraffine, or apply tree-wound paint.

Red-Banded Leaf Roller

Description.—Caterpillar: Slender; greenish; active; up to ½ inch long.

Damage.—Rolls leaves, or ties them together with webs, and feeds within. Attacks chrysanthemum, rose, violet, geranium, zinnia, hollyhock, and lobelia plants.

Distribution.—Northeastern States to North Carolina and west to Texas.

What to do.—Handpick and destroy larvae in webbed leaves. Spray with TDE (2 pounds of 50-percent wettable powder in each 100 gallons of water—or 4 teaspoons per gallon).

Rose Chafer
denly, damage plants for 4 to 6 weeks during June and July, then suddenly disappear.

**Distribution.**—Throughout northeastern United States; occurs as far west as Colorado.

**What to do.**—Apply DDT dust to beetles; repeat applications as they come to newly opened flowers. Where insecticides are ineffective because of reinfestation, protect prized flowers from beetle attack by using cheesecloth fence or canopy. Beetles seldom fly over the barrier even if it is open at top. Growing cultivated crops in wasteland breeding areas will reduce infestation.

**Rose Curculio**

*Description.*—Curved beak; bright red; black legs; black underneath; 1/4 inch long.

*Damage.*—Adults eat holes in buds of wild and garden roses and peonies; buds fail to open. White larvae develop on seeds and inside buds.

*Distribution.*—Widespread throughout United States; most common in northern, colder regions; especially severe in North Dakota.

*What to do.*—Apply DDT dust or spray (p. 67) to control adults. Collect dried buds and burn them before larvae complete development and enter soil to pupate.

**Rose Galls**

*Description.*—Two or more species. Adults: Tiny, 4-winged wasps. Larvae: Resemble maggots; live in cells of galls.

*Damage.*—Gall-infested stems or roots usually die. Mossy rose gall is a mass of green-to-purple filaments surrounding a cluster of hard cells containing larvae. Rose root gall is a conspicuous, rounded, lobed swelling 1 to 2 inches in diameter at base of rose plant or below ground; numerous cells with larvae distinguish it from crown gall infection.

**Rose Leaf Beetle**

*Description.*—Oval; shiny green; 1/8 inch long.

*Damage.*—Adult eats small holes in buds and flowers of rose, peony, and iris. Larva feeds on roots of weeds and plants in wasteland.

*Distribution.*—New England States, south and west to Arizona and Montana.

*What to do.*—Apply DDT or malathion dust. Clean up wasteland breeding places of larvae.

**Rose Leafhopper**

*Description.*—At least two species: Rose leafhopper, and white apple leaf-
hopper. Adults: Narrow; creamy white; \( \frac{1}{8} \) inch long; actively jump or fly; found under leaf surface of rose and apple plants. Nymphs: Smaller, whitish.

**Damage.**—Adults and nymphs suck juices from plant cells, cause white stippling or yellowing of foliage. Roses and apples are principal host plants of the rose leafhopper, an imported insect. White apple leafhopper attacks rose, apple, currant, gooseberry, and raspberry. Black dots of fecal deposit are found when this leafhopper is present.

**Distribution.**—Widely distributed in Northern and Eastern States.

**What to do.**—Dust with DDT or malathion. General-purpose spray (p. 68) for insects, mites, and diseases on roses is also effective.

### Rose Midge

**Description.**—Adult: Two-winged fly; orange-red body; \( \frac{1}{2} \) inch long; active at night. Larva: White when young, becomes orange; \( \frac{1}{2} \) inch long at maturity.

**Damage.**—Twenty to thirty larvae feed together at base of rose flower or on upperside of young tip leaves or petioles. Injured parts become distorted, turn brown or black, and die. Infestation develops suddenly, and all flower buds and cell tip growths may be destroyed. Damage occurs from summer to fall.

**Distribution.**—Scattered infestations in greenhouses and on outdoor roses in many States.

**What to do.**—At first indication of infestation, spray with DDT (p. 68); cover foliage and ground surface thoroughly. Repeat in 7 to 10 days. Cut off and burn injured tips and buds containing larvae.

### Rose Scale

**Description.**—Circular; scaly; white; \( \frac{1}{8} \) inch in diameter.

**Damage.**—Encrusts bark on older canes of climbing roses, hybrid perpetuals, various rose species, raspberries, and blackberries.

**Distribution.**—Throughout United States.

**What to do.**—Remove and destroy infested canes. When plant growth is dormant, apply spray containing \( \frac{1}{2} \) cup of a white-oil emulsifiable concentrate in each gallon of water. Spray with malathion at monthly intervals in summer (p. 68).

### Rose Slugs

**Description.**—Three species. *Bristly rose slug*: Long, stout bristles; greenish white; \( \frac{1}{8} \) inch long; five to six generations a year; breeds all summer. *Curled rose worm*: Metallic green, white dots, yellow head; \( \frac{3}{4} \) inch long; one or two generations in spring. *European rose slug*: Velvety; yellowish green; up to \( \frac{1}{2} \) inch long; feeds on upper leaf surfaces; one generation in spring.

**Damage.**—Young larvae skeletonize leaves from either top or bottom side, leaving only brown network of veins and one epidermis. Older larvae eat holes in leaves, or eat entire leaves. Most damage occurs in early spring on new foliage; damage continues through summer if bristly rose slug is present. All rose slugs seriously defoliate wild and cultivated roses.

**Distribution.**—Chiefly Northeastern States, south to Virginia, west to Rocky Mountains, and in California.

**What to do.**—Prompt and early treatment is important to avoid serious damage. Dust or spray with DDT or malathion (p. 67). Repeat treatments as needed for continuing infestations of bristly rose slug.

### Rose Stem Borers

**Description.**—Two species. *Rose stem sawfly*: Adult is transparent winged, wasplike; larva is slender, milky white, has a brown head, and is
½ inch long. Raspberry cane borer: Slender, black- and yellow-striped beetle; about ½ inch long. Larvae are yellowish white, have brown heads, are up to 3/5 inch long.

**Distribution.**—Throughout United States.

**Damage.**—Raspberry cane borer girdles tips of shoots, which wilt. Larvae of both species bore downward into pith of stems to crowns of plants in one or two seasons; infested canes die.

**What to do.**—Cut off rose canes below points of injury; burn all infested parts to destroy larvae. Where practicable, apply the same control measures to raspberry, an alternate host of these pests.

### Rose Stem Girdler

**Description.**—Greenish beetle; ½ inch long. Lays eggs under bark of rose and raspberry stems in summer; slender, white larvae develop beneath bark.

**Damage.**—Larvae make spiral mines around canes which swell, sometimes split, usually die. Roses of the rugosa and hugonis types are preferred hosts; other roses also are attacked.

**Distribution.**—Eastern United States.

**What to do.**—Cut off and burn infested canes in spring before adults emerge. Dust with DDT in June and July to destroy adults before they deposit eggs.

### Saddleback Caterpillar

**Description.**—Spiny; reddish brown; green dorsal patch in middle of back contains brown area edged with white; 1 inch long. Usually found singly or in scattered groups on underside of leaves. (See front cover for natural-color illustration.)

**Damage.**—Feeds on canna, dahlia, ivy, lily, palm, rose, and many other plants. Stinging hairs on spines are irritating or poisonous to skin, and cause severe irritation for several hours after contact.

**Distribution.**—Atlantic States.

**What to do.**—Dust or spray with DDT or malathion (p. 67).

### Stinging Rose Caterpillar

**Description.**—Sluglike; marked with red, white, and violet stripes; seven pairs of large, spine-bearing processes; up to ¾ inch long. They usually occur singly or scattered on undersides of leaves.

**Damage.**—Larvae feed on rose and other ornamentals, including shrubs. Contact with poisonous spines causes painful burning sensation for several hours.

**Distribution.**—Locally distributed in many states.

**What to do.**—Clean up refuse in fall to eliminate overwintering cocoons. Dust or spray with DDT or malathion to destroy caterpillars (p. 67). If your skin becomes irritated, ask your pharmacist to recommend a soothing ointment.

### Strawberry Rootworm

**Description.**—Adult: Shining Dark brown; ½ inch long; feeds at night; hides in crinkled leaves during day. Larva: Small; white; brown spotted; brown head; lives in soil.

**Damage.**—Adults riddle leaves with small shot-holes, eat young buds and bark of new shoots. Larvae feed on roots of rose, strawberry, and other hosts in spring. Attack rose, apple, blackberry, mountain ash, peach, pyracantha, raspberry, and strawberry.

**Distribution.**—Throughout United States.

**What to do.**—Dust with 5-percent chlordane to kill adults on foliage. Do this when roses first bloom in spring, and again in July and August.
Tent Caterpillars

Description. — Several species. Unsightly nests or tents of caterpillar webs are found in spring on roadside trees or unsprayed trees. A nest may be inhabited by a hundred or more caterpillars. Caterpillar is sparsely hairy; black; has white and blue markings on upper side; white stripe along middle of back; 1 1/2 inches long when mature. Cocoons are yellowish white.

Damage. — Nests are unsightly. Caterpillars eat foliage on trees, especially wild cherry; appear less frequently on apple, plum, peach, pear, hawthorn, and other trees. Caterpillars may leave nest and wander in various directions in search of food, damaging rose, spirea, flowering almond, and other garden plants.

Distribution. — Throughout United States.

What to do. — Destroy nests as soon as they are seen; tear out by hand or with a brush or pole and crush caterpillars on ground. Do not burn nests in trees. Spray trees with DDT wettable powder (p. 68) before caterpillars migrate from nests. Protect roses and other garden plants by spraying with DDT, or collect and destroy the caterpillars.

Walking Sticks

Description. — Adults: Thin, rounded, slender bodies; long slender legs; resemble twigs; dull gray or brown; up to 3 inches long. Young: Smaller; pale green; resemble stems. Usually occur in colonies.

Damage. — Insects are unsightly on garden plants. In all stages, they feed on foliage of beech, oak, wild cherry, and other forest trees; also on rose, weigelia, and other garden plants.

Distribution. — Northern States east of Rocky Mountains.

What to do. — Spray or dust with DDT or chlordane (p. 67).

*Aphids. See page 4.
Asiatic Garden Beetle. See page 5.
Corn Earworm. See page 6.
European Earwig. See page 7.
*Flower Thrips. See page 48.
Four-Lined Plant Bug. See page 36.
Fuller Rose Beetle. See page 7.
Greenhouse Leaf Tier. See page 16.
Greenhouse Thrips. See page 18.
Greenhouse Whitefly. See page 38.
Harlequin Bug. See page 33.
*Japanese Weevil. See page 34.
*June Beetles. See page 34.
Lygus Bugs. See page 21.
Nematodes (Eelworms). See page 10.
Onion Thrips. See page 19.
Oystershell Scale. See page 46.

Rose aphids on rose.
*Potato Leaf hopper. See page 40.
Puss Caterpillar. See page 11.
Spider Mites. See page 12.
Spotted Cucumber Beetles. See page 12.
*Webworms. See page 17.
White Grubs. See page 14.
Yellow Woollybear Caterpillar. See page 27.

**Rubber Plant**

*Mealybugs. See page 16.
Oleander Scale. See page 47.
Onion Thrips. See page 19.
*Soft Scale. See page 50.

**Rudbeckia**

*Aphids. See page 4.
Asiatic Garden Beetle. See page 5.
*Garden Fleahopper. See page 57.
Six-Spotted Leafhopper. See page 24.
*Spider Mites. See page 12.

**Sage-Scarlet, Blue**

Asiatic Garden Beetle. See page 5.
Foxglove Aphid. See page 22.
Greenhouse Leaf Tier. See page 16.
Greenhouse Whitefly. See page 38.
*Lygus Bugs. See page 21.
Stalk Borer. See page 30.
*Yellow Woollybear Caterpillar. See page 27.

*Scabiosa*

Garden Fleahopper

Description.—Adult: Long legs and antennae; black; 1/10 inch long.
Nymph: Greenish; resembles aphid; jumps like flea beetle.

Damage.—These insects suck sap from leaves, causing coarse, peppered, yellow spots resembling spider-mite injury. Severely injured plants become stunted and may die. Numerous vegetable, ornamental, and weed hosts; damage most severe on shaded plants or on leaves close to ground. Common hosts include chrysanthemum, gladiolus, heliopsis, helianthus, helenium, marigold, morning-glory, portulaca, rudbeckia, scabiosa, verbena, zinnia, and many other ornamentals.

Distribution.—General in United States, except Western States.

What to do.—Dust or spray with DDT or malathion (p. 67).

*Chrysanthemum Lacebug. See page 25.
*Fuller Rose Beetle. See page 7.
*Spider Mites. See page 12.

**Schizanthus**

Asiatic Garden Beetle. See p. 5.
Six-Spotted Leafhopper. See page 24.
Slugs. See page 11.
*Spider Mites. See page 12.

**SHASTA DAISY**

Asiatic Garden Beetle. See page 5.
*Chrysanthemum Leaf Miner. See page 25.
*Flower Thrips. See page 48.
*Garden Fleahopper. See page 57.
*Lygus Bugs. See page 21.
*Spider Mites. See page 12.
Stalk Borer. See page 30.

**SILVER LACE VINE**

*Asiatic Garden Beetle. See page 5.
Flea Beetles. See page 21.
Root Aphids. See page 19.

**SNAPDRAGON**

Stink Bugs

Description.—Several species. Adults: Shield shaped; brown, green, or black; with or without marking; up to $\frac{1}{8}$ inch long, $\frac{1}{3}$ inch wide. Nymphs: Resemble adults, but are smaller. Stink bugs discharge a foul odor.

Damage.—Adults and nymphs suck sap from many vegetables, fruit and field crop plants, also from ornamental plants including snapdragon, columbine, verbascum, beardtongue, sunflower, and lupine.

What to do.—Apply DDT or chlor dane dust. Do not allow weeds to grow in or around garden.

**SPIREA**

**Spirea Aphid**

Description.—Soft-bodied, sucking insect; pair of black tubes or cornicles projecting from abdomen; green; $\frac{1}{10}$ inch long.

Damage.—Large numbers of aphids congregate on new growth and produce honeydew, a medium for sooty mold. They suck juices from the plants, causing stunting and discoloration. They attack spirea, citrus, many shrubs, and herbaceous ornamentals.

Distribution.—Widespread in United States.

What to do.—Apply malathion dust or spray (p. 67) or lindane dust.
Diamondback Moth

Description.—Adult: Small moth; gray or brown; white markings that form a diamond when wings are folded. Larva: Light green, black hairs; slender; up to 1/2 inch long; wriggles rapidly, and drops from plant on a silken thread which it produces.

Damage.—Larvae eat small holes in leaves and buds. Primarily a pest of cabbage and other crucifers; also attacks ornamentals, sweet allysum, candytuft, stock, and wallflower.

Distribution.—Throughout United States.

What to do.—Dust or spray with DDT or malathion (p. 67).

*Sapids. See page 4.
*Sapage Looper. See page 5.
*Sapae Beetles. See page 21.
Imported Long-Horned Weevil. See page 9.

*Sapugs. See page 21.
Mealybugs. See page 16.
Spittlebugs. See page 26.
Springtails. See page 12.

STRAWFLOWER

Garden Fleahopper. See page 57.
*Sapugs. See page 21.
*Sap-Spotted Leafhopper. See page 24.

SUNFLOWER

*Sapids. See page 4.
Asiatic Garden Beetle. See page 5.
Carrot Beetle. See page 5.
Corn Earworm. See page 6.
Flea Beetles. See page 21.
Four-Lined Plant Bug. See page 36.
Harlequin Bug. See page 33.
*Sapugs. See page 21.
Mealybugs. See page 16.
Oblique-Banded Leaf Roller. See page 51.
Painted Lady Butterfly. See page 40.
*Sapider Mites. See page 12.
Yellow Woollybear Caterpillar. See page 27.

SWEET ALYSSUM

*Diamondback Moth. See page 59.

SWEETPEA

Seed-Corn Maggot

Description.—Legless; sharply point-
ed at one end; yellowish white; ¼ inch long.

*Damage.—Bores into sprouting seed of many plants, including sweetpeas and tender shoots of gladiolus; prevents development of plants; particularly destructive early in season.

*Distribution.—Throughout United States.

*What to do.—Coat the seeds with insecticide by stirring them in a watery mixture of 50-percent chlordane wettable powder. Use one of the commercial insecticide-fungicide mixtures available in most seed stores. Spray or dust seeds with chlordane or lindane in the trench at planting time, before covering. Apply either chlordane or lindane dust to soil around young plants; repeat weekly until pest is controlled. Postpone planting until warm weather when germination is more rapid.

*Aphids. See page 4.

*Cutworms. See page 6.

*Four-Lined Plant Bug. See page 36.


*Greenhouse Leaf Tier. See page 16.

*Lygus Bugs. See page 21.

*Nematodes (Eelworms). See page 10.

*Onion Thrips. See page 19.

*Root Aphids. See page 19.

*Serpentine Leaf Miner. See page 11.

*Spider Mites. See page 12.

*Zebra Caterpillar. See page 35.

*SWEET-WILLIAM

*Flea Beetles. See page 21.


*Spider Mites. See page 12.

TULIP

Tulip Bulb Aphid

*Description.—Grayish; wax covered; about ¼ inch long; sometimes winged.

*Damage.—Aphids in great numbers suck juice from exposed leaves on growing plants; cause severe distortion, stunting, sometimes kill plants; build up dense colonies on bulbs in storage, especially those with cracked outer scales; severely damage stored tulips and iris bulbs; attack belamcanda and various garden types of rhizomatous iris.

*Distribution.—In most Northern and Western States.

*What to do.—Apply lindane dust to bulbs before storing them.

Tulip Leaf Aphid

*Description.—Small, ¼ inch long; green; clusters occur on leaves and shoots.

*Damage.—Heavy infestation causes leaves and flowers to fail to open; plants sometimes die. This aphid attacks iris, as well as tulips.

*Distribution.—Probably present throughout United States. Winters between crops on dormant bulbs.

*What to do.—Apply lindane dust to bulbs. Dust or spray infested plants with malathion (p. 67).

*Flea Beetles. See page 4.

*Bulb Mite. See page 45.


*Spider Mites. See page 12.

*Wireworms. See page 15.

VERBENA

Verbenas Bud Moth

*Description. — Adult: Small, purple
brown moth. Larva: Greenish yellow; black head; about ½ inch long.

*Damage.—Larvae tunnel new shoots of verbena and physostegia.

*Distribution.—Eastern United States.

*What to do.—Cut off and burn wilting shoots containing larvae.

**Verbena Leaf Miner**

*Description.—Small, yellow larva or maggot. Is found in blisterlike mines in leaves. Adult is tiny midge or 2-winged fly, ¼ inch long.

*Damage.—Larvae feed between leaf surfaces, each making a blisterlike or blotchlike mine.

*Distribution.—Throughout United States, wherever verbena is grown.

*What to do.—Apply lindane or malathion spray (p. 68).

*Aphids. See page 4.

Blister Beetles. See page 5.

*Cyclamen Mite. See page 31.

Flower Thrips. See page 48.

Greenhouse Leaf Tier. See page 16.


*Lygus Bugs. See page 21.

Oblique-Banded Leaf Roller. See page 51.

*Spider Mites. See page 12.

Webworms. See page 17.


Yellow Woollybear Caterpillar. See page 27.

**VIOLET**

*Aphids. See page 4.

Cyclamen Mite. See page 31.

Flea Beetles. See page 21.

Greenhouse Leaf Tier. See page 16.

Mealybugs. See page 16.

Red-Banded Leaf Roller. See p. 52.

*Slugs. See page 11.

*Spider Mites. See page 12.

Violet Sawfly. See page 48.

Webworms. See page 17.

Yellow Woollybear Caterpillar. See page 27.

**WALLFLOWER**

*Aphids. See page 4.

Diamondback Moth. See page 59.

Flea Beetles. See page 21.

*Slugs. See page 11.

**WATERLILY**

**Waterlily Aphid**

*Description.—Shining green or black; with or without wings; ¼ inch long.

*Damage.—Heavy infestations on leaves and stems of waterlilies cause disfiguration and decay of leaves; flowers become discolored, stems distorted. Other summer hosts include waterplantain, cattail, and pondweed. This aphid winters on plum.

*Distribution.—Localized in many States, on waterlily.

*What to do.—Remove fish in pools; lower water level; spray plants with malathion. Change water before replacing fish. If fish cannot be removed, fill pool to overflowing and wash aphids into lawn with hose. If fish are not present, spray plants with malathion. Destroy aphids on plums with malathion spray (p. 68) before they migrate in spring to waterlilies.

**Waterlily Beetle**

*Description.—Several species. Adults: Dark brown; dull yellow thorax, ¼ inch long. Larvae: Dark
brown above; yellow beneath. One species is dark metallic blue.

**Damage.**—Adults and larvae eat ragged holes in upper surface of leaves and flowers.

**Distribution.**—Widespread in many parts of the United States, in natural ponds and garden pools.

**What to do.**—Submerge leaves with hoops or netting for few days. Direct malathion dust carefully on flowers and foliage. General dusting or spraying will contaminate water and kill fish.

### Waterlily Leaf Cutter

**Description.**—Two species. Caterpillars; \( \frac{1}{3} \) to \( \frac{1}{2} \) inch long; live under water and breathe by means of gills. One species is found in stems, the other in flattened, oval cases made of leaf pieces. Larva; \( \frac{1}{3} \) to \( \frac{1}{2} \) inch long.

**Damage.**—One species bores in stems; the other cuts oval pieces from leaves and sews them together to form case in which to live. Leaves are soon reduced to a ragged, rotten mass.

**Distribution.**—Widespread in natural ponds, and in commercial and private waterlily pools.

**What to do.**—If infestation is light, cut out borer-infested stems, or gather and destroy the leaf cases floating on water or attached to leaves. If infestation is heavy, remove fish from pool, lower water level, and carefully apply malathion dust or spray to plants (p. 67). Change water before returning fish.

---

**Yucca Moth**

**Description.**—White; 1 inch long; lives in flowers of yucca.

**Damage.**—Moths lay eggs in flowers while pollinating them. Larvae hatch from the eggs, and tunnel into the seed pods.

**Distribution.**—Native to Southwest; occurs in gardens throughout United States where yucca is grown.

**What to do.**—Apply malathion dust or spray (p. 67) into open flowers. Presence of moths is essential for pollination if seeds are wanted.

---

**Yucca Plant Bug**

**Description.**—Adult: Blue-black; reddish head and thorax; \( \frac{1}{8} \) inch long. Young: Bright scarlet, often numerous on leaves; runs fast and hides at base of leaves when disturbed.

**Damage.**—Coarse, stippled feeding spots appear on leaves, which turn yellow. Black specks of excrement stain foliage.

**Distribution.**—Most abundant in Southwestern and Southeastern States; present wherever yucca is grown.

**What to do.**—Apply malathion or DDT dust or spray (p. 67).

---

**Aphids. See page 4.**

**Mealybugs. See page 16.**

---

62
Oleander Scale. See page 47.
Onion Thrips. See page 19.
Oystershell Scale. See page 46.
Stalk Borer. See page 30.

**ZINNIA**

* Aphids. See page 4.
* Asiatic Garden Beetle. See page 5.
  Blister Beetles. See page 5.
  Cyclamen Mite. See page 31.
  European Corn Borer. See page 29.
  Flea Beetles. See page 21.

Flower Thrips. See page 48.
Four-Lined Plant Bug. See page 36.
* Garden Fleahopper. See page 57.
* Lygus Bugs. See page 21.
Mealybugs. See page 16.
Red-Banded Leaf Roller. See p. 52.
* Root Aphids. See page 19.
* Spider Mites. See page 12.
  Spotted Cucumber Beetles. See page 12.
  Stalk Borer. See page 30.
Webworms. See page 17.
BENEFICIAL INSECTS

Certain insects cause no damage and are beneficial to man. Some destroy other insects that are injurious to food crops or to ornamental plants.

Harmless insects that kill injurious insects are friends of flower growers. Learn to recognize the beneficial insects, and avoid destroying them. Following are descriptions of a few of the most important beneficial insects.

**Ant Lion (Doodlebug)**

*Description.*—Rough; sickle-shaped jaws; brown, up to ½ inch long. Lives at bottom of conical pits in sand.

*Benefit.*—Feeds on ants and other injurious insects. Does not damage plants.

*Distribution.*—Many parts of United States; most abundant in South.

**Aphid Lion**

*Description.*—Adult: Fragile; hair-like antennae; golden eyes; gauzy, green wings. Places eggs singly on stalk. Larva: Elongate body, tapering at both ends; large, sickle-shaped jaws; prominent, projecting hairs; yellowish, or mottled with red or brown; about ¼ inch long. (See inside back cover for natural-color illustration of larva.)

*Benefit.*—Larvae feed on aphids, mealybugs, scales, thrips, and mites.

*Distribution.*—Throughout United States.

**Assassin Bugs**

*Description.*—Several species. Legs; light brown; ½ to ¾ inch long. These insects walk over plants in a slow, clumsy manner. Their forelegs are usually in a prayerful position, and are used to capture and hold other insects. (See inside back cover for natural-color illustration.)

*Benefit.*—Assassin bugs feed on the immature forms of injurious insects.

*Distribution.*—Throughout United States.

**Damsel Bugs**

*Description.*—Several species. Resemble assassin bugs; pale gray; about ¾ inch long; forelegs used for capturing prey. (See inside back cover for natural-color illustration.)

*Benefit.*—Damsel bugs feed on aphids, fleahoppers, and small larvae of injurious insects.

*Distribution.*—Throughout United States.

**Flower Bugs (Pirate Bugs)**

*Description.*—Several species. Adults: Oval, flat; about ¼ inch long. Most species are black, marked with
white spots or streaks. Nymphs: Similar to adults; amber. Found on flowers and under loose bark. (See inside back cover for natural-color illustration.)

Benefit.—Adults and larvae feed on small insects such as mites; they also feed on eggs and larvae of many destructive insects.

Distribution.—Throughout United States.

Ground Beetles

Description.—Many species. Adults: Broadly oval, dorsally flattened bodies; narrow heads; color usually dull black or brown. Commonly occur on ground surface under stones or loose trash. They hide by day, are active at night, and run rapidly when disturbed. Larvae: Bodies are slender, flattened, and slightly tapering to the tail, which terminates in two spines or bristle-like processes.

Benefit.—Adults and larvae feed on caterpillars and other insects.

Distribution.—Throughout United States.

Lady Beetles

Description.—Many species. Adults: Oval; shiny; red or tan, with or without black spots; about ½ inch long. Larvae: Carrot-shaped; warty; blue, orange, or gray; ½₆ to ¼ inch long. (See inside back cover for natural-color illustration.)

Benefit.—Feed on aphids, spider mites, scales, and mealybugs. Do not damage plants.

Distribution.—Throughout United States.

Praying Mantid

Description.—About 20 species. Bodies of most species are green; wings are green with brown front margins. Large abdomens, slender thoraxes, wedge-shaped, movable heads. Front legs are large and have spines for grasping prey. Sizes range from 2½ to 5 inches in length.

In fall, females lay eggs on shrubs or tall grasses and cover them with a frothy fluid that hardens. Young mantids hatch in spring; they resemble adults, but lack wings.

Benefit.—Young mantids feed on aphids and other small insects. Older mantids devour many kinds of larger insects that they capture in the garden.

Distribution.—Throughout United States; prevalent in northeastern parts.
Spiders and Mites

Eight-legged creatures (not insects). Many species. They range in size from the orb-weaving black-and-yellow garden spiders and large hunting spiders that have leg spreads of 2 inches or more to microscopic, predaceous mites \(\frac{1}{50}\) inch or less in length. Some spiders have hairy bodies and legs; others have smooth, glistening surfaces; color may be black, brown, yellow and black, or gray. Color of predaceous mites may be gray or pinkish gray. Some spiders construct webs for snaring their prey; others run or jump to capture their prey.

Benefit.—All spiders and predaceous mites feed by sucking out the body juices of other insects. Large, web-forming spiders attack large, flying and crawling insects; small, hunting and jumping spiders attack small insects such as flies, beetles, caterpillars, aphids, and leafhoppers. Predaceous mites are important in the natural destruction of many plant-feeding pests including spider mites, cyclamen mites, aphids, thrips, larvae, and the eggs of many insects.

Most spiders are your friends. In the United States, the black-widow (hourglass) spider is the only species that can cause highly poisonous bites, and even the black widow is shy and rarely bites a person except on provocation. Learn to recognize and avoid the black widow spider; it has a glistening black, rounded body, and a red, hour-glass spot on the underside.

Distribution.—Many species of spiders and mites occur throughout the United States.

Syrphid Flies

Description.—Many species. Adults: Bright yellow and black; \(\frac{1}{4}\) to \(\frac{1}{3}\) inch long; hover above flowers and plants. Larvae: Sluglike; brown, gray, or mottled. (See inside back cover for natural-color illustration.)

Distribution.—Throughout United States.

Benefit.—Eat injurious insects. Single larva eats aphids at rate of one per minute. Harmless to plants.

Wasps

Description.—Many species of parasitic wasps, varying widely in size, color, and general body structure. (See inside back cover for natural-color illustration.)

Benefit.—Destroy injurious insects by laying eggs in their bodies.

Distribution.—Throughout United States.

What to do.—Learn to recognize beneficial wasps, and protect them from insecticide as far as practical. Distinguish them from hornets and yellow jackets that make nests from paper or wood fiber.

Tiny wasp depositing egg in an aphid.
USING INSECTICIDE

You can apply insecticide as a dust or as a spray. Dusts or sprays will give equally satisfactory control if properly used. Dusts usually cost more than sprays for controlling pests in the home flower garden. However, ready-to-use dusts are more convenient; they save time for the grower who wishes to follow an effective schedule of applications.

In windy weather, sprays are easier to handle than dusts.

Whether you use a dust or a spray, be sure the material contains the correct percentage of active ingredient. Refer to the formulations recommended here, and follow the directions on container labels. Insecticides listed under Dusts and Sprays are referred to under the “What to do” headings that appear in this bulletin with the discussions of insects.

For best results, start your control program early in the season. Scale insects are best controlled by applying sprays during cool-season periods when the plants are not in active growth. Apply insecticide at the first sign of pests. If infestation continues, repeat the treatment in a week or 10 days.

Do not use old insecticide that may have become weak or ineffective. Start each growing season with a fresh supply.

DUSTS

Selecting dusts

Ready-to-use dusts are available from insecticide dealers. If desired, you can buy a dust that contains a fungicide and one or more insecticides. Such a “general-purpose” dust is preferred by many gardeners because it kills a larger variety of pests. You may wish to obtain two or more dusters, and fill each with a specific insecticide suited for a particular purpose.

Unless otherwise specified in this bulletin, purchase dusts that contain the following percentages of active ingredient:

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malathion</td>
<td>4.0</td>
</tr>
<tr>
<td>Methoxychlor</td>
<td>5.0</td>
</tr>
<tr>
<td>DDT</td>
<td>5.0</td>
</tr>
<tr>
<td>Lindane</td>
<td>2.0</td>
</tr>
<tr>
<td>Chlordane</td>
<td>6.0</td>
</tr>
<tr>
<td>Toxaphene</td>
<td>10.0</td>
</tr>
<tr>
<td>Dieldrin</td>
<td>1.5</td>
</tr>
<tr>
<td>Kelthane</td>
<td>2.0</td>
</tr>
<tr>
<td>Tedion</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Applying dusts

Apply an even, light coating of dust, at the rate of 1 ounce to each 75 square feet of border area, or to each 30 feet of row. Force dust through the foliage so it reaches both sides of each leaf. Apply dust when the air is still—preferably at dusk or early in the morning.

SPRAYS

Few sprays can be purchased ready to use. It is generally necessary to make the spray by mixing water with a wettable powder (WP) or with an emulsifiable concentrate (EC). Before you buy a powder or concentrate, read the container label to make sure it is prepared for use on plants.
# GUIDE FOR MIXING SPRAYS

## SPECIFIC-PURPOSE SPRAYS

<table>
<thead>
<tr>
<th>Spray number</th>
<th>Insecticide and formulation</th>
<th>Amount of purchased product to mix with water</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>100 gallons of water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 quart</td>
</tr>
<tr>
<td>1.000</td>
<td>MALATHION: 57-percent EC</td>
<td>2 pounds</td>
</tr>
<tr>
<td>2.000</td>
<td>METHOXYCHLOR: 50-percent WP</td>
<td>2 pounds</td>
</tr>
<tr>
<td>3.000</td>
<td>DDT: 50-percent WP or</td>
<td>3 pints</td>
</tr>
<tr>
<td></td>
<td>25-percent EC</td>
<td></td>
</tr>
<tr>
<td>4.000</td>
<td>SEVIN: 50-percent WP</td>
<td>2 pounds</td>
</tr>
<tr>
<td>5.000</td>
<td>CHLORDANE: 50-percent WP</td>
<td>2 pounds</td>
</tr>
<tr>
<td>6.000</td>
<td>LINDANE: 25-percent WP or</td>
<td>1 pound</td>
</tr>
<tr>
<td></td>
<td>25-percent EC</td>
<td>1 pint</td>
</tr>
<tr>
<td>7.000</td>
<td>KELTHANE: 18.5-percent EC</td>
<td>1 pint</td>
</tr>
<tr>
<td>8.000</td>
<td>TEDION: 25-percent WP</td>
<td>1 pound</td>
</tr>
<tr>
<td>9.000</td>
<td>WHITE-OIL EMULSION: 100-percent EC</td>
<td>2 gallons</td>
</tr>
</tbody>
</table>

## GENERAL-PURPOSE SPRAY

<table>
<thead>
<tr>
<th>Spray number</th>
<th>Insecticide and formulation</th>
<th>Amount of purchased product to mix with water</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DDT or METHOXYCHLOR, 50-percent WP</td>
<td>2 pounds</td>
</tr>
<tr>
<td></td>
<td>plus MALATHION, 4-percent EC plus WETTABLE SULFUR plus ZINEB, 65-percent WP</td>
<td>1 quart</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 pounds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 pounds</td>
</tr>
</tbody>
</table>

1WP = wettable powder; EC = emulsifiable concentrate. Products on the market contain various percentages of actual insecticide. If you buy a product in which the percentage differs from that called for in this table, mix proportionately more or less of it with water.

2When mixing this spray, use either DDT or methoxychlor, and include malathion, wettable sulfur, and zineb in the quantities indicated.
Mixing sprays

You can modify your spray formula to make it suitable for use against particular pests, or in particular seasons of the year. Specific recommendations regarding this are given here in the discussions of plants and insects.

Spray materials are sold in different strengths. The accompanying table shows the strengths recommended in this bulletin for use in the home flower garden. If you buy a product in which the percentage of active ingredient differs from that called for in the table, mix proportionately more or less of it with water.

When mixing a spray, first stir the powder or concentrate vigorously. If you use an emulsifiable concentrate, add an equal amount of water to it, and shake or stir thoroughly to make a stable emulsion. Add this emulsion to the full amount of water, and stir until completely mixed.

If you use a wettable powder, stir it vigorously in a small amount of water to make a smooth paste or slurry. Add this to the full amount of water, and stir until completely mixed.

Applying sprays

Apply 1 quart of spray to each 75 to 100 square feet of border area, or to each 50 feet of row. Usually, spraying should be stopped just before the spray starts to run off the foliage. Shake applicator frequently to prevent powder from settling to bottom of the spray tank.

APPLICATION EQUIPMENT

To obtain full benefit from your insecticide, obtain a good duster or sprayer that will enable you to reach both upper and lower leaf surfaces. A wide assortment of hand dusters and sprayers is available under various trade names. You can apply insecticides easily and efficiently if you use equipment manufactured expressly for the purpose you wish to accomplish.

Keep your equipment in good condition. A sprayer must be cleaned after each use, and is subject to maintenance problems. If a duster breaks down, it usually must be replaced by a new one.

Dusters

Plunger.—Plunger dusters have capacities of 1 to 3 pounds. They are the most practical dusters for small gardens. Usually, they are equipped with tube and nozzle attachments that enable you to direct dust to the underside of leaves. The cost of a good plunger duster is less than that of a good sprayer.

Bellows.—Bellows dusters hold several pounds of dust, and are suitable for large gardens. They are equipped with extension tubes and deflectors that enable you to dust the underside of leaves quickly, without stooping.

Rotary.—Rotary (or crank) dusters have capacities ranging from ½ pound to 15 pounds of dust. They can be used satisfactorily on small or large areas. These dusters usually deposit the dust more uniformly than do plunger-type dusters. They are more efficient and
Using a bellows-type hand duster.

durable than other types of hand dusters such as the small plunger and the knapsack bellows.

Sprayers

Hand atomizers.—These sprayers have capacities ranging from 1/2 pint to 3 quarts. They are very useful in spraying small plantings, but some types of hand atomizers do not effectively direct the spray to the underside of leaves.

If you purchase a hand atomizer, select one equipped with an adjustable nozzle that can be turned upward or downward, and that will deliver a continuous spray. The nozzle and spray chambers should be made of noncorrosive material, and constructed so they can be easily cleaned.

Compressed-air sprayers.—These are usually made of galvanized steel, stainless steel, or brass, and range in capacity from 1 to 5 gallons. They are the most satisfactory sprayers for use in the garden. Some types are not equipped with an agitator, and must be shaken frequently while being used.

If given proper care, a compressed-air sprayer will last many years under ordinary use. If you buy one, select a type that can easily be filled and cleaned, and for which replacement parts are available.

Pushbutton sprays.—Ready-to-use
spray preparations for plants come in pressurized cans with pushbutton spray-
er tops. The preparations are available in garden-supply stores and contain small quantities of pyrethrum, rotenone, DDT, or other killing agent. They may be used to kill pests that can be hit readily with the spray, such as aphids, and whitefly adults.

Although insecticides in pressurized cans are expensive, their convenience may make them practical in the garden where only a few plants are to be treated. To apply, follow directions on the container.

Using a compressed-air sprayer.

Proportioner sprayers. — These sprayers are for use on the garden hose. They include a jar containing the insecticide, with a unit for screwing on the jar and hose. When the water is turned on, the insecticide in solution or suspension is sucked from the jar and mixed with the water at the nozzle as it is sprayed on the plant. Hose sprayers are wasteful of insecticide because more liquid is applied than with a compressed-air sprayer; also, dilution of insecticide is less accurate. However, they have the advantage of convenience in application and may be expected to give reasonable control of pests. Some hose sprayers vary widely in the uniformity of spray dilution as the jar is emptied of insecticide. Select a sprayer model known to deliver a uniform spray at all times and under varying water pressures. Follow directions accompanying sprayer for dilution of insecticide and filling the jar.
PRECAUTIONS

Insecticides are poisonous to humans and to animals. Those recommended in this bulletin can be used safely if you observe the following precautions:

- Handle insecticides with care. Follow the directions and heed precautions printed on container labels.

- Avoid repeated or prolonged inhalation of insecticides; keep them away from the eyes, nose, and mouth. Mix or prepare sprays or dusts in the open air; work on the windward side of the area to be treated.

- Apply an insecticide only to the plants for which it is recommended. Do not apply heavier dosages than those recommended.

- Be sure that your insecticides are clearly labeled. Store them in closed containers, in a safe place, out of the reach of children and pets. Label each duster with its insecticide contents, and store in a safe place between operations.

- Chlordane, dieldrin, and lindane can be absorbed directly through the skin in harmful quantities. After working with these materials, wash all exposed surfaces of the body with soap and water. Change your clothing if you spill any of these materials on it.

- Some flower-garden pests are also pests of vegetables. Insecticide recommendations in this bulletin are restricted to the control of pests on ornamental plants that are not to be eaten. For control of pests on vegetables in the home garden, consult Home and Garden Bulletin No. 46, “Insects and Diseases of Vegetables in the Home Garden.”

OTHER CONTROL MEASURES

Cultural and preventive measures can greatly reduce the amount of damage that might be done by pests to ornamentals. Such measures also contribute to the beautification of home grounds and gardens, and to community improvement.

Follow these practices:

- Use adequate fertilizers.

- Grow only the plants and varieties that are suited to your particular soil and climate.

- Select vigorous, healthy plants that are free of insects. Avoid plants that are unusually susceptible to insect attack; avoid invalid types that require special care.

- Keep your garden or nursery free of weeds and grass. Keep it clean. Burn trash, mature and dead plants, and fallen leaves except materials intended for composting.

- In dry weather, and in arid regions, water thoroughly once a week instead of sprinkling daily. You can use mulches in summer to conserve soil moisture and keep plants healthy.

- If you are establishing a garden in a recently cleared woodland area, treat the soil for lawns and flower gardens with chlordane (as described under Termites).
One-year-old rose plants that were not treated with pesticides.

One-year-old rose plants that were treated weekly with pesticides.
Two plots of asters that were planted at the same time: In background, plot that was treated to control the six-spotted leafhopper. In foreground, plot that was not treated.
## INDEX

<table>
<thead>
<tr>
<th>Abutilon, insects on</th>
<th>Page 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abutilon moth</td>
<td>Page 16</td>
</tr>
<tr>
<td>Acacia, insects on</td>
<td>Page 16</td>
</tr>
<tr>
<td>Ageratum, insects on</td>
<td>Page 16</td>
</tr>
<tr>
<td>Alternanthera, webworms on</td>
<td>Page 17</td>
</tr>
<tr>
<td>Amanthus, insects on</td>
<td>Page 17</td>
</tr>
<tr>
<td>Amaryllis, insects on</td>
<td>Page 17</td>
</tr>
<tr>
<td>Ampelopsis, black vine weevil on</td>
<td>Page 18</td>
</tr>
<tr>
<td>Anchusa, insects on</td>
<td>Page 18</td>
</tr>
<tr>
<td>Anemone, insects on</td>
<td>Page 18</td>
</tr>
<tr>
<td>Ant lion (doodlebug) (beneficial)</td>
<td>Page 64</td>
</tr>
<tr>
<td>Ant(s), general</td>
<td>Page 3</td>
</tr>
<tr>
<td>Aphid lion (beneficial)</td>
<td>Page 64</td>
</tr>
<tr>
<td>Aphids (general)</td>
<td>Page 4</td>
</tr>
<tr>
<td>Arbutus, greenhouse thrips on</td>
<td>Page 18</td>
</tr>
<tr>
<td>Armyworms (general)</td>
<td>Page 4</td>
</tr>
<tr>
<td>Asiatic garden beetle (general)</td>
<td>Page 5</td>
</tr>
<tr>
<td>Asparagus fern, insects on</td>
<td>Page 19</td>
</tr>
<tr>
<td>Assassin bugs (beneficial)</td>
<td>Page 64</td>
</tr>
<tr>
<td>Aster, root aphids on</td>
<td>Page 19</td>
</tr>
<tr>
<td>Azalea bark louse</td>
<td>Page 19</td>
</tr>
<tr>
<td>Azalea, insects on</td>
<td>Page 19-21</td>
</tr>
<tr>
<td>Azalea lace bug</td>
<td>Page 20</td>
</tr>
<tr>
<td>Azalea leaf miner</td>
<td>Page 20</td>
</tr>
<tr>
<td>Azalea stem borer</td>
<td>Page 20</td>
</tr>
<tr>
<td>Azalea whitefly</td>
<td>Page 20</td>
</tr>
<tr>
<td>Bees. See Pith-nesting bees</td>
<td>Page 52</td>
</tr>
<tr>
<td>Beetle(s). See specific kind</td>
<td>Page 5</td>
</tr>
<tr>
<td>Asiatic garden beetle</td>
<td>Page 5</td>
</tr>
<tr>
<td>Blister beetles</td>
<td>Page 5</td>
</tr>
<tr>
<td>Carrot beetle</td>
<td>Page 5</td>
</tr>
<tr>
<td>Fig beetle</td>
<td>Page 8</td>
</tr>
<tr>
<td>Flea beetles</td>
<td>Page 21</td>
</tr>
<tr>
<td>Fuchsia flea beetle</td>
<td>Page 33</td>
</tr>
<tr>
<td>Fuller rose beetle</td>
<td>Page 7</td>
</tr>
<tr>
<td>Goldsmith beetle</td>
<td>Page 51</td>
</tr>
<tr>
<td>Green June beetle</td>
<td>Page 8</td>
</tr>
<tr>
<td>Ground beetles</td>
<td>Page 65</td>
</tr>
<tr>
<td>Handsome yucca beetle</td>
<td>Page 62</td>
</tr>
<tr>
<td>Helium snout beetle</td>
<td>Page 38</td>
</tr>
<tr>
<td>Japanese beetle</td>
<td>Page 9</td>
</tr>
<tr>
<td>June beetles</td>
<td>Page 10</td>
</tr>
<tr>
<td>Lady beetles</td>
<td>Page 65</td>
</tr>
<tr>
<td>Potato flea beetle</td>
<td>Page 44</td>
</tr>
<tr>
<td>Rhabdopterus beetles</td>
<td>Page 22</td>
</tr>
<tr>
<td>Rose leaf beetle</td>
<td>Page 53</td>
</tr>
<tr>
<td>Spotted cucumber beetles</td>
<td>Page 12</td>
</tr>
<tr>
<td>Squash beetle</td>
<td>Page 37</td>
</tr>
<tr>
<td>Striped cucumber beetles</td>
<td>Page 30</td>
</tr>
<tr>
<td>Tortoise beetles</td>
<td>Page 24</td>
</tr>
<tr>
<td>Waterlily beetle</td>
<td>Page 61</td>
</tr>
<tr>
<td>White-fringed beetle</td>
<td>Page 14</td>
</tr>
<tr>
<td>Begonia, insects on</td>
<td>Page 21</td>
</tr>
<tr>
<td>Black vine weevil</td>
<td>Page 18</td>
</tr>
<tr>
<td>Blister beetles (general)</td>
<td>Page 5</td>
</tr>
<tr>
<td>Blue sage, insects on</td>
<td>Page 57</td>
</tr>
<tr>
<td>Borer(s). See specific kind</td>
<td>Page 20</td>
</tr>
<tr>
<td>Azalea stem borer</td>
<td>Page 20</td>
</tr>
<tr>
<td>Clematis borer</td>
<td>Page 28</td>
</tr>
<tr>
<td>Columbine borer</td>
<td>Page 28</td>
</tr>
<tr>
<td>European corn borer</td>
<td>Page 29</td>
</tr>
<tr>
<td>Iris borer</td>
<td>Page 41</td>
</tr>
<tr>
<td>Rose stem borers</td>
<td>Page 54</td>
</tr>
<tr>
<td>Squash vine borer</td>
<td>Page 38</td>
</tr>
<tr>
<td>Stalk borer</td>
<td>Page 30</td>
</tr>
<tr>
<td>Buffalo treehopper</td>
<td>Page 51</td>
</tr>
<tr>
<td>Bug(s). See specific kind</td>
<td>Page 64</td>
</tr>
<tr>
<td>Assassin bugs</td>
<td>Page 64</td>
</tr>
<tr>
<td>Azalea lace bug</td>
<td>Page 20</td>
</tr>
<tr>
<td>Damsel bug</td>
<td>Page 64</td>
</tr>
<tr>
<td>Flower bugs</td>
<td>Page 64</td>
</tr>
<tr>
<td>Four-lined plant bug</td>
<td>Page 36</td>
</tr>
<tr>
<td>Harlequin bug</td>
<td>Page 33</td>
</tr>
<tr>
<td>Lygus bugs</td>
<td>Page 21</td>
</tr>
<tr>
<td>Negro bug</td>
<td>Page 44</td>
</tr>
<tr>
<td>Orchid plant bug</td>
<td>Page 47</td>
</tr>
<tr>
<td>Phlox bug</td>
<td>Page 49</td>
</tr>
<tr>
<td>Pirate bugs</td>
<td>Page 64</td>
</tr>
<tr>
<td>Squash bug</td>
<td>Page 37</td>
</tr>
<tr>
<td>Stink bugs</td>
<td>Page 58</td>
</tr>
<tr>
<td>Yucca plant bug</td>
<td>Page 62</td>
</tr>
<tr>
<td>Bulb fly. See specific kind</td>
<td>Page 40</td>
</tr>
<tr>
<td>Lesser bulb fly</td>
<td>Page 40</td>
</tr>
<tr>
<td>Narcissus bulb fly</td>
<td>Page 17</td>
</tr>
<tr>
<td>Bulb mite</td>
<td>Page 45</td>
</tr>
<tr>
<td>Bulb scale mite</td>
<td>Page 45</td>
</tr>
<tr>
<td>Butterfly. See Painted lady butterfly</td>
<td>Page 40</td>
</tr>
<tr>
<td>Cabbage looper (general)</td>
<td>Page 5</td>
</tr>
<tr>
<td>Cactus, cactus scale on</td>
<td>Page 21</td>
</tr>
<tr>
<td>Cactus scale</td>
<td>Page 21</td>
</tr>
<tr>
<td>Calendula, insects on</td>
<td>Page 21</td>
</tr>
<tr>
<td>Calla lily, insects on</td>
<td>Page 22</td>
</tr>
<tr>
<td>Camellia, insects on</td>
<td>Page 22</td>
</tr>
<tr>
<td>Campanula, insects on</td>
<td>Page 22</td>
</tr>
<tr>
<td>Canna, insects on</td>
<td>Page 23</td>
</tr>
<tr>
<td>Canna leaf rollers</td>
<td>Page 23</td>
</tr>
<tr>
<td>Cape-jasmine, insects on</td>
<td>Page 23</td>
</tr>
<tr>
<td>Carnation, insects on</td>
<td>Page 23</td>
</tr>
<tr>
<td>Carrot beetle (general)</td>
<td>Page 5</td>
</tr>
<tr>
<td>Castorbean, insects on</td>
<td>Page 23</td>
</tr>
<tr>
<td>Caterpillar(s). See specific kind</td>
<td>Page 32</td>
</tr>
<tr>
<td>Florida fern caterpillar</td>
<td>Page 32</td>
</tr>
<tr>
<td>Puss caterpillar</td>
<td>Page 11</td>
</tr>
<tr>
<td>Saddleback caterpillar</td>
<td>Page 55</td>
</tr>
<tr>
<td>Stinging rose caterpillar</td>
<td>Page 55</td>
</tr>
<tr>
<td>Tent caterpillars</td>
<td>Page 56</td>
</tr>
<tr>
<td>Yellow woollybear caterpillar</td>
<td>Page 27</td>
</tr>
<tr>
<td>Zebra caterpillar</td>
<td>Page 35</td>
</tr>
<tr>
<td>Chafer. See specific kind</td>
<td>Page 7</td>
</tr>
<tr>
<td>European chafer</td>
<td>Page 7</td>
</tr>
<tr>
<td>Rose chafer</td>
<td>Page 52</td>
</tr>
<tr>
<td>China-aster, insects on</td>
<td>Page 24</td>
</tr>
<tr>
<td>Chinese lantern, insects on</td>
<td>Page 24</td>
</tr>
<tr>
<td>Chrysanthemum aphid</td>
<td>Page 24</td>
</tr>
<tr>
<td>Chrysanthemum gall midge</td>
<td>Page 25</td>
</tr>
<tr>
<td>Chrysanthemum, insects on</td>
<td>Page 24-27</td>
</tr>
</tbody>
</table>
Chrysanthemum lacebug ............................................. 25
Chrysanthemum leaf miner ........................................ 25
Cicada, periodical .................................................. 52
Cicada-killer (general) ............................................. 5
Cineraria, insects on .............................................. 27
Clematis borer ..................................................... 28
Clematis, insects on ................................................ 28
Climbing cutworm .................................................. 26
Cocklebur billbug ................................................... 29
Coleus, insects on .................................................. 28
Columbine borer ................................................... 28
Columbine, insects on ............................................. 28
Columbine leaf miner .............................................. 29
Corn earworm (general) .......................................... 6
Cosmos, insects on ................................................ 29
Cutworm(s), (general) ............................................. 6
Cyclamen mite ........................................................ 31
Dalhia, insects on .................................................. 29-31
Damsel bugs (beneficial) ....................................... 64
Daylily, insects on ................................................ 39
Daylily thrips ....................................................... 39
Delphinium aphid .................................................. 32
Delphinium, insects on ........................................... 31-32
Diamondback moth ................................................ 59
Digitalis (foxglove), insects on ............................... 32
Doodlebug ............................................................ 64
Dutchmans pipe, pipevine swallowtail on ............... 50
Earthworms (general) ............................................. 6
Eelworms .............................................................. 10
English ivy, insects on .......................................... 42
Eutonymus scale .................................................... 47
European chafer (general) ..................................... 7
European corn borer ............................................. 29
European earwig (general) .................................... 7
False spider mite .................................................. 33
Ferns, insects on .................................................. 32
Field cricket (general) .......................................... 7
Fig beetle (general) ................................................ 8
Flea beetles .......................................................... 21
See also Fuchsia flea beetle .................................. 33
Potato flea beetle .................................................. 44
Flea hopper, garden .............................................. 57
Florida fern caterpillar ....................................... 32
Florida wax scale .................................................. 23
Flower bugs (pirate bugs) (beneficial) .................... 64
Flower thrips ....................................................... 48
Flowering kale, insects on .................................... 33
Flowering tobacco, insects on ............................... 46
Fly (les). See specific kind .................................... 40
Lesser bulb fly ..................................................... 40
Narcissus bulb fly ................................................ 17
Syrphid flies ........................................................ 66
Four-lined plant bug ............................................. 36
Foxglove aphid ..................................................... 22
Foxglove, insects on ............................................. 32
Freesia, insects on ................................................. 33
Fuchsia flea beetle ............................................... 33
Fuchsia, insects on ................................................. 33
Fuller rose beetle (general) ................................... 7
Gaillardia, insects on .......................................... 34
Garden balsam, insects on .................................... 34
Garden flea hopper ............................................... 57
Garden symphyllan ................................................ 26
Garden webworm ................................................... 23
Gardenia, insects on ............................................. 34
Geranium, insects on ............................................ 34
Gerbera, insects on .............................................. 35
German ivy, insects on ......................................... 43
Giant hornet ........................................................ 29
Gladiolus, insects on ............................................. 35-36
Gladiolus thrips .................................................... 35
Globe thistle, insects on ....................................... 36
Gloxinia, insects on .............................................. 37
Goldenglow aphid .................................................. 37
Goldenglow, insects on .......................................... 37
Goldenglow sawfly ................................................. 37
Goldsmith beetle ................................................. 51
Gourds, insects on ................................................ 37
Grape mealybug .................................................... 35
Grasshoppers (general) ......................................... 8
Green June beetle (general) .................................... 8
Green peach aphids ............................................... 33
Greenhouse leaf tier ............................................. 16
Greenhouse orthezia ............................................. 28
Greenhouse thrips ................................................ 18
Greenhouse whitefly ............................................. 38
Ground beetles (beneficial) ................................... 65
Groundcherry, insects on .................................... 38
Grubs, white .......................................................... 14
Handsome yucca beetle ......................................... 62
Harlequin bug ....................................................... 33
Helenium (sneeze weed), helenium snout beetle on .... 38
Helenium snout beetle .......................................... 38
Heliotrope, insects on ........................................... 38
Hemerocallis (daylily), insects on ........................... 39
Hibiscus (Rose of Sharon), insects on .................... 39
Hibiscus (Rosemallow), insects on ......................... 39
Hollyhock, insects on ............................................ 40
Hornet, giant ........................................................ 29
Hornworms ........................................................... 51
Hyacinth, insects on ............................................. 40
Hydrangea, insects on ........................................... 41
Hydrangea leaf tier ............................................... 41
Imported cabbage worm ........................................ 46
Imported fire ant (general) ..................................... 8
Imported long-horned weevil (general) .................... 9
Iris borer ............................................................ 41
Iris, insects on ...................................................... 41-42
Iris thrips ............................................................ 41
Iris weevil .......................................................... 42
Ivy ................................................................. English, insects on ............................................. 42
German (Senecio), insects on ................................. 43
Japanese beetle (general) ....................................... 9
Japanese weevil ................................................... 34
Jerusalem-cherry, insects on ................................. 43
June beetles (general) ........................................... 10
Kale, flowering, insects on ................................... 33
Lady beetles (beneficial) ....................................... 65
Lantana aphid ....................................................... 43
<table>
<thead>
<tr>
<th>Page</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scabiosa, insects on</td>
<td>57</td>
</tr>
<tr>
<td>Scale. See specific kind</td>
<td>21</td>
</tr>
<tr>
<td>Cactus scale</td>
<td>21</td>
</tr>
<tr>
<td>Enonymus scale</td>
<td>47</td>
</tr>
<tr>
<td>Florida wax scale</td>
<td>23</td>
</tr>
<tr>
<td>Oleander scale</td>
<td>47</td>
</tr>
<tr>
<td>Oystershell scale</td>
<td>46</td>
</tr>
<tr>
<td>Peony scale</td>
<td>54</td>
</tr>
<tr>
<td>Rose scale</td>
<td>54</td>
</tr>
<tr>
<td>Soft scale</td>
<td>50</td>
</tr>
<tr>
<td>Tea scale</td>
<td>22</td>
</tr>
<tr>
<td>Thread scale</td>
<td>47</td>
</tr>
<tr>
<td>Schizanthus, insects on</td>
<td>57</td>
</tr>
<tr>
<td>Seed-corn maggot</td>
<td>59</td>
</tr>
<tr>
<td>Serpentine leaf miner (general)</td>
<td>11</td>
</tr>
<tr>
<td>Shasta daisy, insects on</td>
<td>58</td>
</tr>
<tr>
<td>Silver lace vine, insects on</td>
<td>58</td>
</tr>
<tr>
<td>Six-spotted leafhopper</td>
<td>24</td>
</tr>
<tr>
<td>Slugs (general)</td>
<td>11</td>
</tr>
<tr>
<td>rose</td>
<td>54</td>
</tr>
<tr>
<td>Snails (general)</td>
<td>11</td>
</tr>
<tr>
<td>Snapdragon, insects on</td>
<td>58</td>
</tr>
<tr>
<td>Sneezeweed, helenium snout beetle on</td>
<td>38</td>
</tr>
<tr>
<td>Soft scale</td>
<td>50</td>
</tr>
<tr>
<td>Sowbugs (general)</td>
<td>12</td>
</tr>
<tr>
<td>Spider mites (red spiders) (general)</td>
<td>12</td>
</tr>
<tr>
<td>Spiders (beneficial)</td>
<td>66</td>
</tr>
<tr>
<td>Sprea aphid</td>
<td>58</td>
</tr>
<tr>
<td>Sprea, insects on</td>
<td>58</td>
</tr>
<tr>
<td>Spittlebugs</td>
<td>26</td>
</tr>
<tr>
<td>Spotted cucumber beetles (general)</td>
<td>12</td>
</tr>
<tr>
<td>Springtails (general)</td>
<td>12</td>
</tr>
<tr>
<td>Spurge, insects on</td>
<td>47</td>
</tr>
<tr>
<td>Squash beetle</td>
<td>37</td>
</tr>
<tr>
<td>Squash bug</td>
<td>37</td>
</tr>
<tr>
<td>Squash vine borer</td>
<td>38</td>
</tr>
<tr>
<td>Stall borer</td>
<td>30</td>
</tr>
<tr>
<td>Stinging rose caterpillar</td>
<td>55</td>
</tr>
<tr>
<td>Stink bugs</td>
<td>58</td>
</tr>
<tr>
<td>Stock, insects on</td>
<td>59</td>
</tr>
<tr>
<td>Strawberry rootworm</td>
<td>55</td>
</tr>
<tr>
<td>Strawflower, insects on</td>
<td>59</td>
</tr>
<tr>
<td>Striped cucumber beetles</td>
<td>30</td>
</tr>
<tr>
<td>Sunflower, insects on</td>
<td>59</td>
</tr>
<tr>
<td>Sweet alyssum, insect on</td>
<td>59</td>
</tr>
<tr>
<td>Sweetpea, insects on</td>
<td>59</td>
</tr>
<tr>
<td>Sweet-william, insects on</td>
<td>60</td>
</tr>
<tr>
<td>Symphyten, garden</td>
<td>26</td>
</tr>
<tr>
<td>Syrphid flies (beneficial)</td>
<td>66</td>
</tr>
<tr>
<td>Tea scale</td>
<td>22</td>
</tr>
<tr>
<td>Tent caterpillars</td>
<td>56</td>
</tr>
<tr>
<td>Termites (general)</td>
<td>13</td>
</tr>
<tr>
<td>Thread scale</td>
<td>47</td>
</tr>
<tr>
<td>Thrips. See specific kind</td>
<td>39</td>
</tr>
<tr>
<td>Daylily thrips</td>
<td>48</td>
</tr>
<tr>
<td>Flower thrips</td>
<td>35</td>
</tr>
<tr>
<td>Gladiolus thrips</td>
<td>18</td>
</tr>
<tr>
<td>Greenhouse thrips</td>
<td>41</td>
</tr>
<tr>
<td>Iris thrips</td>
<td>19</td>
</tr>
<tr>
<td>Onion thrips</td>
<td>46</td>
</tr>
<tr>
<td>Tobacco, flowering, insects on</td>
<td>46</td>
</tr>
<tr>
<td>Tomato russet mite</td>
<td>49</td>
</tr>
<tr>
<td>Tortoise beetles</td>
<td>24</td>
</tr>
<tr>
<td>Tulip bulb aphid</td>
<td>60</td>
</tr>
<tr>
<td>Tulip, insects on</td>
<td>60</td>
</tr>
<tr>
<td>Tulip leaf aphid</td>
<td>60</td>
</tr>
<tr>
<td>Verbena bud moth</td>
<td>60</td>
</tr>
<tr>
<td>Verbena, insects on</td>
<td>60</td>
</tr>
<tr>
<td>Verbena leaf miner</td>
<td>61</td>
</tr>
<tr>
<td>Vinca, insects on</td>
<td>49</td>
</tr>
<tr>
<td>Violet, insects on</td>
<td>61</td>
</tr>
<tr>
<td>Violet sawfly</td>
<td>48</td>
</tr>
<tr>
<td>Walking sticks</td>
<td>56</td>
</tr>
<tr>
<td>Wallflower, insects on</td>
<td>61</td>
</tr>
<tr>
<td>Wasps (beneficial)</td>
<td>66</td>
</tr>
<tr>
<td>Waterlily aphid</td>
<td>61</td>
</tr>
<tr>
<td>Waterlily beetle</td>
<td>61</td>
</tr>
<tr>
<td>Waterlily, insects on</td>
<td>61</td>
</tr>
<tr>
<td>Waterlily leaf cutter</td>
<td>62</td>
</tr>
<tr>
<td>Webworms</td>
<td>17</td>
</tr>
<tr>
<td>Weevil. See specific kind</td>
<td>18</td>
</tr>
<tr>
<td>Black vine weevil</td>
<td>9</td>
</tr>
<tr>
<td>Imported long-horned weevil</td>
<td>42</td>
</tr>
<tr>
<td>Japanese weevil</td>
<td>34</td>
</tr>
<tr>
<td>White grubs (general)</td>
<td>14</td>
</tr>
<tr>
<td>Whitefly (general)</td>
<td>13</td>
</tr>
<tr>
<td>See also specific kind</td>
<td>20</td>
</tr>
<tr>
<td>Azalea whitefly</td>
<td>38</td>
</tr>
<tr>
<td>Greenhouse whitefly</td>
<td>14</td>
</tr>
<tr>
<td>White-fringed beetle (general)</td>
<td>26</td>
</tr>
<tr>
<td>White-marked tussock moth</td>
<td>15</td>
</tr>
<tr>
<td>Winterworms (general)</td>
<td>27</td>
</tr>
<tr>
<td>Yellow woollybear caterpillar</td>
<td>62</td>
</tr>
<tr>
<td>Yucca, insects on</td>
<td>62</td>
</tr>
<tr>
<td>Yucca moth</td>
<td>62</td>
</tr>
<tr>
<td>Yucca plant bug</td>
<td>62</td>
</tr>
<tr>
<td>Zebra caterpillar</td>
<td>35</td>
</tr>
<tr>
<td>Zinnia, insects on</td>
<td>63</td>
</tr>
</tbody>
</table>
Color illustrations of four-lined plant bugs, lygus bug, and euonymus scale, inside front cover, are by courtesy of Long Island Agricultural and Technical Institute, Long Island, N. Y. Color illustration of wireworms is by courtesy of Ray Kriner, Green Castle, Md.
BENEFICIAL INSECTS

- **Aphid lion larva**
- **Assassin bug attacking worm**
- **Adult flower bug attacking worm**
- **Lady beetle**
- **Syrphid fly**
- **Parasitic wasp**
- **Damsel bug**
PLANT DAMAGE...