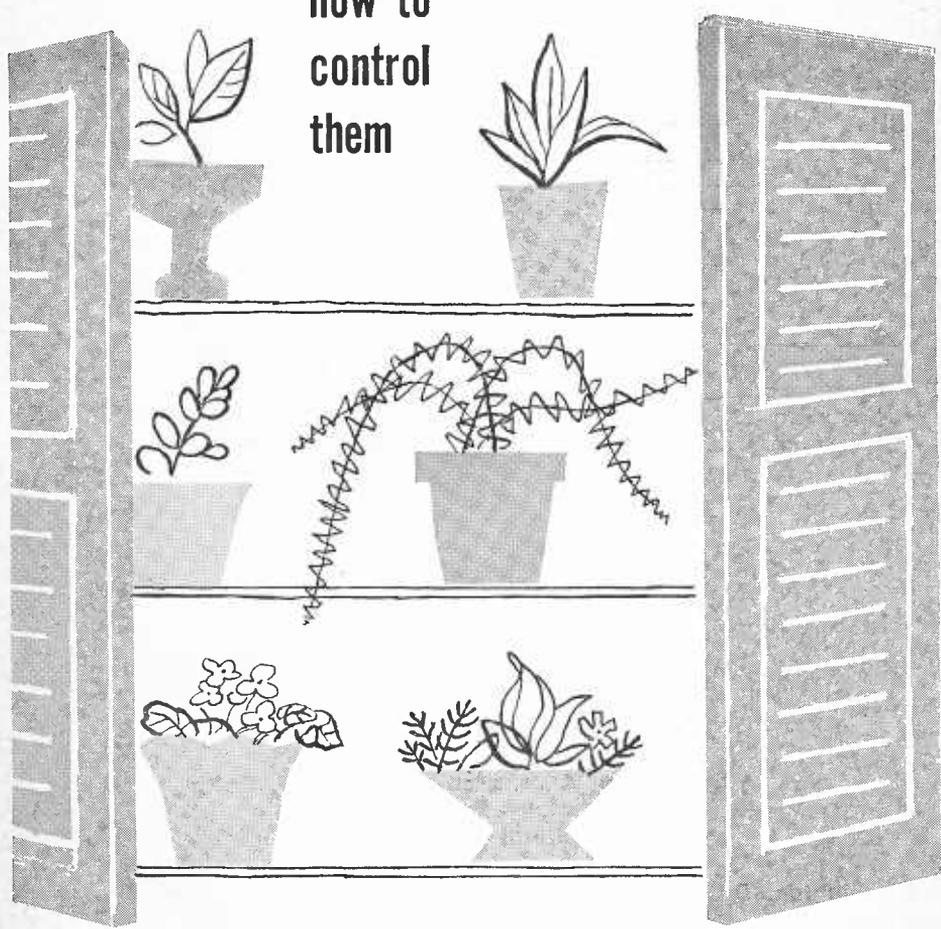


67
Ag 841tg
Home & Garden Bull. 67
ed. rev. 1965
C.1

LIBRARY
RECEIVED
NOV 8 1965
U. S. DEPARTMENT OF AGRICULTURE
BELTSVILLE BRANCH

INSECTS and RELATED PESTS of HOUSE PLANTS

how to
control
them



Home and Garden Bulletin No. 67
U.S. DEPARTMENT OF AGRICULTURE

This bulletin tells how to recognize and control the most common insects and related pests that attack plants in homes and home greenhouses throughout the United States. It has been prepared to answer the thousands of requests for information that come to the Department of Agriculture every year from housewives and home greenhouse operators. Foliage plants and other house plants have become a decorative feature in millions of homes. Commercial growing of these plants is an important segment of the florist industry.

The insecticides recommended are those that are considered most widely useful on indoor plants, least hazardous to handle, and most generally available.

If your insect problem goes beyond the scope of this discussion, you can get additional help from your county agricultural agent, the agricultural college or department of agriculture in your State, or the U.S. Department of Agriculture.

When you write for information, send specimens of the pests in a small bottle of rubbing alcohol well packed to prevent breakage. It will be helpful to include plants or plant parts showing typical injury. Wrap plant material in waxed paper, cellophane, or plastic to keep it from drying out and breaking.

Contents

	Page		Page
Control with sprays and dips.....	3	Insects and related pests—Continued	
Preparation.....	3	Fungus gnats.....	11
Application.....	4	Mealybugs.....	11
Pushbutton sprays.....	6	Millipedes.....	12
Precautions.....	6	Psocids.....	12
Other control measures.....	7	Scales.....	13
Insects and related pests:		Slugs and snails.....	14
Ants.....	8	Sowbugs and pillbugs.....	14
Aphids.....	8	Spider mites (red spiders).....	15
Cutworms and other caterpillars..	9	Springtails.....	15
Cyclamen mite.....	9	Thrips.....	15
Earthworms.....	10	Whiteflies.....	16
False spider mites.....	11		

PHOTO CREDITS

Photographs on pages 10, 12, 13, and 16, courtesy of State University of New York Agricultural and Technical Institute, Farmingdale.

By George V. Johnson and Floyd F. Smith
Entomology Research Division
Agricultural Research Service

Washington, D.C.

Issued May 1960
 Slightly revised September 1965

INSECTS and RELATED PESTS of HOUSE PLANTS . . . How To Control Them

Control With Sprays and Dips

An insecticide spray or dip is recommended for the control of most of the common pests of house plants (pp. 8 to 16). Exceptions are slugs and snails, for which poison baits are more practical.

The insecticides recommended may be applied as dusts, but sprays and dips are preferred because they usually give better control, are less likely to leave objectionable residues, and do not drift to nearby objects so readily when applied.

For best results, apply control measures at the first sign of pests. If infestation continues, repeat treatment in a week or 10 days, unless otherwise noted under control recommendations for specific pests.

It is easier to treat plants in planters and window boxes if the plants are kept in pots and placed to a proper depth in sand, soil, or peat. Infested plants can then be readily removed for treatment, or replaced if necessary.

PREPARATION

Except for pushbutton sprays (see p. 6), all the sprays and dips recommended in this bulletin are prepared at home.

The ingredients of a spray or dip are (1) the recommended insecti-

cide in the form of an emulsifiable concentrate or a wettable powder and (2) water. Sprays or dips made with emulsifiable concentrates leave less visible residue and wet the foliage and insects better than those made with wettable powders. They are, however, more likely to discolor or burn the leaves or flowers of tender plants.

The table (p. 4) shows the amounts of insecticide and water needed to make the sprays and dips recommended in this bulletin. Concentrates and powders on the market contain different percentages of active ingredient. If you buy a product in which the percentage of active ingredient differs from the one given in the table, mix proportionately more or less of it with water.

Add the concentrate or powder to the water and stir until they are thoroughly mixed. Make up only the amount you need immediately. Do not save leftover spray or dip for use on another day.

Products containing combinations of two or more pesticides are also available commercially. These combinations control more kinds of pests than materials containing one active ingredient. Follow the manufacturer's directions for mixing if you use a product of this kind.

Guide for Mixing Sprays or Dips

Insecticides, and forms in which they may be purchased	Amount to mix with—	
	1 quart of water	1 gallon of water
Chlordane:		
45-percent emulsifiable concentrate	½ teaspoon----	2 teaspoons.
40-percent wettable powder-----	1 level tea- spoon.	4 level tea- spoons.
DDT:		
25-percent emulsifiable concentrate	¾ teaspoon---	1 tablespoon.
50-percent wettable powder-----	1½ level tea- spoons.	2 level table- spoons.
Kelthane:		
18.5-percent emulsifiable concen- trate.	¼ teaspoon---	1 teaspoon.
18.5-percent wettable powder-----	¾ teaspoon---	1 level table- spoon.
Lindane:		
20-percent emulsifiable concentrate	¼ teaspoon---	1 teaspoon.
25-percent wettable powder-----	¾ teaspoon---	1 level table- spoon.
Malathion:		
57-percent emulsifiable concen- trate.	½ teaspoon---	2 teaspoons.
Rotenone:		
5-percent emulsifiable concentrate--	1 teaspoon----	4 teaspoons.
Derris or cube root wettable pow- der containing 4 or 5 percent of rotenone.	1 level table- spoon.	4 level table- spoons.

APPLICATION

Some kinds of plants are more difficult to wet than others. If a preparation does not readily spread over and wet a plant, add ½ teaspoon of a mild household detergent (not soap) per gallon of spray or dip. The detergent improves the wetting power of the mixture and reduces visible residues.

Shake or stir wettable-powder sprays and dips frequently when you use them to prevent the powder from settling and to maintain a uniform strength of the preparation.

Sprays.—Sprays are used most often to treat plants, but they may also be used to treat surfaces of soil, pots, saucers, or shelves to help control some pests.

Spray plants until they are wet—no longer. Apply spray with a good hand atomizer or small compressed-air sprayer.

Sprayers should be made of non-corrosive materials and constructed so they are easy to clean. After using a sprayer, wash it out, leave the filler cap or pump off, and place the tank so it will drain and dry.

Hand atomizers that hold ½ pint to 1 quart of spray are suitable for



N-31647

Spraying a few plants with a hand atomizer.

spraying one or a few plants. The pump of a hand atomizer must be operated while spraying is in progress. Choose an atomizer that will deliver a continuous spray and that has an adjustable nozzle that can be turned to direct the spray upward or downward.

Separate atomizing assemblies that can be fitted on the top of a standard screw-top jar are available in some stores.

Compressed-air sprayers that hold 1 to 2 gallons of spray are suitable for use in small home greenhouses. The pump of a compressed-air sprayer is operated before spraying is started to build up pressure in the spray tank. You must stop spraying at intervals and operate the pump to regain efficient spraying pressure in the tank. The nozzle and spray rod are fastened

to a flexible hose to permit directing the spray advantageously; for best service the nozzle should be attached to the spray rod at an angle of about 45 degrees.

Dips.—It is sometimes more convenient to dip the plants into the insecticide-and-water mixture than to spray them.

Put the mixture into a pail or pan large enough to accommodate the top of the largest plant to be dipped.

Turn the plant upside down and immerse it in the mixture for a few seconds. To keep loose soil from spilling out as you turn the plant over, hold crumpled paper or a cardboard disk firmly over the soil around the plant. Slit cardboard disk to fit around the plant stem.

Keep your hands out of the dip unless you are wearing rubber gloves.



N-31644

Dipping a plant into an insecticide-and-water mixture.

PUSHBUTTON SPRAYS

Ready-to-use spray preparations for plants come in pressurized cans with pushbutton sprayer tops. These preparations are available in department, hardware, and garden-supply stores.

When buying a pushbutton spray, read the label on the container to be sure the spray is one that can be used safely on plants. Some insecticide sprays in pushbutton cans, which are made for uses other than spraying plants, contain oils or other materials that will kill plants or burn foliage.

Pushbutton plant sprays contain small quantities of rotenone, DDT, or other killing agents. They may be used to kill pests that can be hit readily with the spray, such as aphids and whitefly adults on plants or whitefly and fungus gnat adults swarming in windows near the plants.



BN-22505

Using a pushbutton spray.

To apply, follow the directions on the container.

PRECAUTIONS

If insecticides are handled or applied improperly, or if unused parts are disposed of improperly, they may be injurious to humans, domestic animals, desirable plants, and pollinating insects, fish, or other wildlife, and may contaminate water supplies.

Use insecticides only when needed and handle them with care. Follow the directions and heed all precautions on the container label.

Store insecticides in closed, well-labeled containers in a dry place, where they cannot contaminate food-stuff, and where children or pets cannot reach them.

In handling insecticides, avoid repeated or prolonged contact with skin and prolonged inhalation of spray mists; after using insecticides, wash hands and face before eating or smoking.

If possible, move plants outdoors or to a porch or well-ventilated room when you spray or dip them.

DDT, Kelthane, malathion, and rotenone can be used safely without special protective clothing or devices, provided they are in water-spray form. Most concentrates, however, require special precautions. When handling or mixing concentrates, avoid spilling them on the skin and keep them out of the eyes, nose, and mouth. If any is spilled, wash it off the skin and change any contaminated clothing immediately.

Chlordane and lindane can be absorbed directly through the skin in harmful quantities. When working with these insecticides in any form, take the same precautions as with concentrates.

Do not puncture or incinerate pushbutton spray cans.

Other Control Measures

Sometimes you can control insects or related pests of house plants by measures other than use of insecticides.

Preventing infestation.—Examine cut flowers and new plants brought into the home to be sure they are free of pests. It's a good idea to isolate new plants for at least a month before you place them with other plants. During this time you can watch the new plants and discover any infestations that develop.

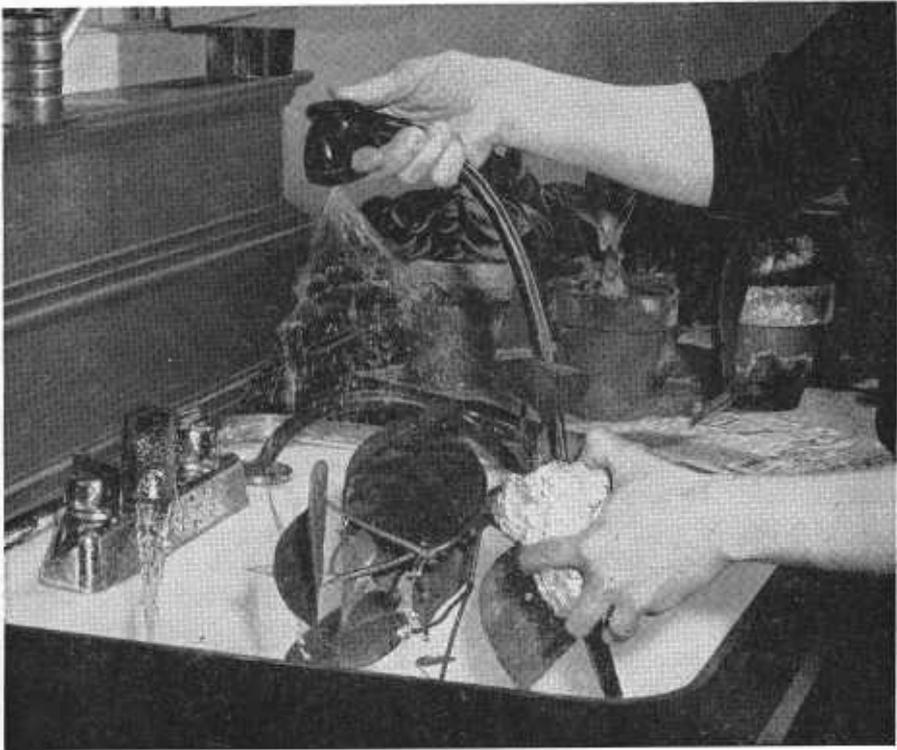
Using sterilized soil for potting may prevent the development of in-

festations of such soil pests as springtails, psocids, and earthworms.

Washing.—Washing with soapy water and a soft brush or cloth may be all that is needed to remove aphids, mealybugs, and scale insects from broad-leaved plants. Use 2 teaspoons of a mild detergent to a gallon of water.

Numbers of these insects may also be washed from the plants with a lukewarm spray of water.

Handpicking.—If one or a few plants are involved, you may be able



N-30557

Spraying a broad-leaved plant with lukewarm water—one way to remove aphids, mealybugs, thrips, and spider mites.

to control aphids and mealybugs by removing them with a toothpick or tweezers. Caterpillars may be picked off plants by hand and destroyed. Cutworms, slugs, and snails may be found in their hiding places during the daytime and destroyed, or picked from the plants at night when they come out to feed.

Use of alcohol.—An easy way to control a light infestation of mealybugs or aphids on one or two plants is to wet or remove the insects with a toothpick, match, or other small thin stick on the end of which is a tuft of cotton wet with rubbing alcohol. (Shown at right.)



N-31642

Insects and Related Pests

ANTS

Description.—Several species can be troublesome on plants in the home or home greenhouse. Ants are $\frac{1}{16}$ to $\frac{1}{2}$ inch long; are black, brown, yellow, or red; and have small necks and waists. They live in nests as colonies—beneath walks or in flowerbeds of home greenhouses or in window boxes or flowerpots.

Damage.—Ants of certain species dig up and carry away newly planted seeds or small seedlings. Plant roots may be injured by the burrowing activities of ants.

Ants of some species are attracted to plants by certain aphids, mealybugs, and scale insects that excrete honeydew. The ants feed on this sweetish, sticky liquid.

What to do.—When ants are associated with aphids, mealybugs, or scale insects, apply control meas-

ures for these pests (see below and pp. 11 and 13). If ants continue to be a nuisance, soak infested soil, pots, boxes, or shelves with chlordane as for earthworms (p. 10).

APHIDS

Description.—Several species are pests of house plants. Common aphids are $\frac{1}{16}$ to $\frac{1}{8}$ inch long; are green, pink, red, or black; and have soft rounded or pear-shaped bodies with long legs and antennae.

In each species there are usually both winged and wingless forms, but the wingless form generally is more numerous. The wings are commonly held rooflike when at rest. Some aphids appear powdery or woolly because of a waxy covering.

Typically, aphids cluster on the undersides of leaves or on young,

tender leaves and stems or flower-buds. Some kinds feed on the roots.

Damage.—Aphids feed by sucking out the plant juices; this feeding causes poor growth, stunted plants, or curled and distorted leaves. Aphids excrete a sweetish, sticky liquid called honeydew. Honeydew of most species is attractive to ants; it imparts a shiny appearance to the foliage and provides a base for the growth of sooty mold.

What to do.—Dip or spray plants, using malathion or lindane (pp. 4 and 5).

Plant sprays available in pressurized cans with pushbutton tops may also be useful (p. 6).

When one or a few plants are infested, handpicking, washing, or using alcohol (pp. 7 and 8) may be a practical way to control aphids.

CUTWORMS AND OTHER CATERPILLARS

Description.—Several species can be troublesome in the home greenhouse. Cutworms and other caterpillars are barely visible to the naked eye when they hatch, but some reach a length of about 1½ to 2 inches when fully grown.

Some species are a solid color, some are striped lengthwise or crosswise, and others are mottled. Colors in shades of green or brown are common for some species, but various combinations of brown, red, yellow, green, gray, and black are also found. A few kinds of caterpillars are covered with dense hair.

Cutworms are difficult to find because they usually hide in the soil

or deep in the flowers during daytime. Cutworms and some other caterpillars develop from eggs laid by night-flying moths that enter the open ventilators in greenhouses.

Damage.—Leaves, buds, or flowers may be entirely or partly eaten. Some worms cut off young plants near the soil level, or the branches or flowers of larger plants. Dark pellets of excrement may be left on the plant.

What to do.—Handpicking (p. 7) is often adequate for control of cutworms and other caterpillars.

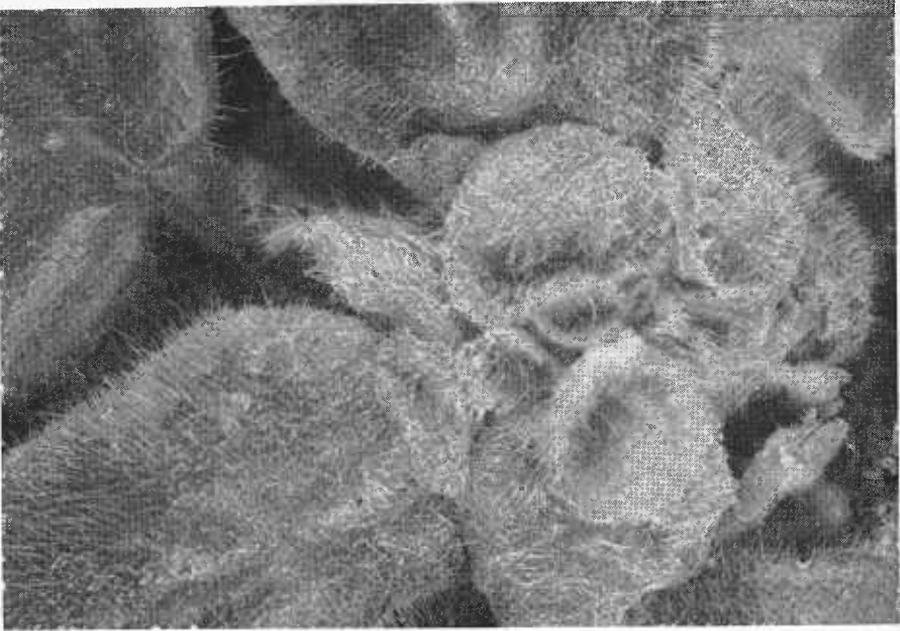
If handpicking is not practical, dip or spray plants, using DDT, malathion, or rotenone (pp. 4 and 5), to control caterpillars on plants. Spraying or drenching the soil surface with DDT or malathion will help control cutworms that hide in the soil.

CYCLAMEN MITE

Description.—Adult mites are too small to be seen with the naked eye. Under a magnifying glass the adults are seen as oval, amber or tan-colored, semitransparent, glistening mites. The young are even smaller and milky white. The eggs are oval and pearly white.

Mites are found mostly in protected places on young tender leaves, young stem ends, buds, and flowers. They crawl from plant to plant where leaves touch; another means of spread is transfer of mites on hands or clothing.

Damage.—Leaves of infested plants are twisted, curled, and brittle. Buds may be deformed and fail to open. Flowers are deformed and often streaked with darker



Cyclamen mite injury to crown of African-violet.

color. Blackening of injured leaves, buds, and flowers is common.

Infested ivy will produce stems without leaves or with small deformed leaves. Infested African-violets develop small, twisted, excessively hairy leaves that may soon die.

What to do.—Trim off badly injured plant parts where practicable. Dip or spray plants, using Kelthane (pp. 4 and 5), at weekly intervals until the new growth is normal. *Prepare the spray from the emulsifiable concentrate and add $\frac{1}{2}$ teaspoon of a mild household detergent (not soap) per gallon of water.*

All stages of the cyclamen mite can be killed with hot water. Immerse infested plants, pot and all, for 15 minutes in water held at 110° F. Success of this treatment depends on careful control of the water temperature.

EARTHWORMS

Description.—Bodies of earthworms are segmented, soft, slender, and cylindrical. Colors are pink, brownish, or greenish. A common species is normally 6 to 10 inches long when mature, but the bodies are capable of great expansion and contraction. Earthworms come to the surface at night, or in the daytime when the soil is wet and shaded. They are generally considered beneficial.

Damage.—Earthworms sometimes eat parts of plant leaves growing close to the soil surface. Castings of earthworms are a nuisance on the walks of the home greenhouse. Earthworms may injure the root systems of plants or loosen young plants in the soil by their continuous tunneling. They are of no value in the soil of plants in pots.

What to do.—Prepare a chlordane drench. Guide for mixing:

45-percent chlordane
emulsifiable con-
centrate----- $\frac{2}{3}$ teaspoon
Water----- 1 gallon

OR

40-percent chlordane
wettable powder-- $1\frac{1}{2}$ level teaspoons
Water----- 1 gallon

Soak the soil with the spray; apply at the rate of 1 gallon per 10 square feet.

FALSE SPIDER MITES

Description.—A few species can infest plants in the house or home greenhouse. These are flat, oval, dark-red mites too small to be easily seen with the naked eye. The young and eggs are bright red. All stages of false spider mites are found mostly on the undersides of leaves, generally along the veins or other irregularities on the leaves.

Damage.—Feeding by these mites causes finely stippled bronze or rusty-brown areas along veins or on entire leaves. Edges of infested leaves may die, or the leaves lose some color and drop off. Infested plants are weakened and become stunted in growth.

What to do.—Dip or spray plants, using Kelthane (pp. 4 and 5); be sure to wet the undersides of the foliage. Add $\frac{1}{2}$ teaspoon of a mild household detergent (not soap) to the spray to increase its wetting action.

FUNGUS GNATS

Description.—Adult fungus gnats are delicate, gray or dark-gray, fly-like insects about $\frac{1}{8}$ inch long. They are attracted to light and

when present in the house swarm over the windows. The immature forms, which live in soil, are whitish maggots, and attain a length of about $\frac{1}{4}$ inch. Maggots are most likely to be found in soils containing large quantities of decaying vegetable matter.

Damage.—The maggots cause injury to the root systems by burrowing in the soil. They may feed on the roots and crowns of plants. Severely injured plants make little growth, appear off color, and may drop foliage. Adult fungus gnats do no damage but are a nuisance.

What to do.—For the control of the maggots in home greenhouses, drench the soil surface with chlordane as for earthworms.

Soak the soil of infested pots, planters, or boxes with the spray, either by immersion or by flooding.

To kill the adults, use one of the pushbutton plant sprays (p. 6).

MEALYBUGS

Description.—Several species are common pests of house plants. Mealybugs are softbodied, appear as though dusted with flour because of their waxy covering. They grow to be about $\frac{3}{16}$ inch long. Some species have waxy filaments extending from the rear of the body. Mealybugs are found at rest or crawling slowly on stems, where stems and leaves join, and on leaves (especially along veins on undersurfaces). Their eggs are laid in

clusters enclosed in white waxy, cottony or fuzzy material. Mealybugs are sometimes attended by ants.

Damage.—Mealybugs suck out the plant juices, thus stunting or killing the plants. Sooty mold grows on the honeydew excreted by some species of mealybugs.

What to do.—Dip or spray plants, using malathion (pp. 4 and 5) and being careful to wet the mealybugs thoroughly. To increase the wetting power of the preparation, add a mild household detergent (not soap) at a rate of about $\frac{1}{2}$ teaspoon per gallon.

If one or a few plants are infested you may be able to control mealybugs by handpicking, by washing, or by using alcohol (pp. 7 and 8).

MILLIPEDES



TC-7138

Description.—Several species may become numerous in the home greenhouse. Millipedes grow to a length of about $1\frac{1}{2}$ inches. They are slow-moving, wormlike creatures with many short legs along the body. The hard bodies are brown, tan, or gray.

Millipedes are found under boards or flowerpots or in other sheltered areas; they are likely to be most numerous in moist places where there is plenty of organic material. They are most active at night and tend to assume a coil form when disturbed.



One species of mealybug on coleus.

Damage.—Millipedes may feed on seeds, roots, tubers, bulbs, or fleshy stems of plants, but mostly they eat decaying organic material. They become a nuisance when present in large numbers.

What to do.—Eliminate hiding places and excessive organic materials where possible.

Drench the soil surface and hiding places of millipedes with DDT spray (p. 4).

PSOCIDS

Description.—Psocids have soft oval bodies, grow to about $\frac{1}{32}$ to $\frac{1}{16}$ inch long, and are pale yellowish white to gray. Some species have wings and others are wingless. Sometimes psocids cluster in numbers of a hundred or more. They feed on dead animal or vegetable matter, lichens, and fungi.

Psocids may occur in large numbers in the soil or on pots and benches, especially in undisturbed locations in the home greenhouse. Minute, quick-moving psocids are often found on old books and papers stored in slightly damp places.

Damage.—Psocids may be found on living plants, but, so far as known, do not feed on them. When present in large numbers, psocids are a nuisance.

What to do.—Spray soil, pots, saucers, and shelves with chlordane (p. 4).

SCALES

Description.—Several species are common on plants in the home or home greenhouse. Scale insects have a shell-like covering, or scale, that protects the entire body. Most species are about $\frac{1}{16}$ to $\frac{1}{8}$ inch in diameter, but a few species are about 4 times larger. Some are hemispherical in shape, some oval, and some are shaped like an oystershell. Colors range from white to black, but browns and grays predominate.

Some species lay eggs in a whitish sac secreted from under the scale; these can be mistaken for mealybugs if not examined closely for the presence of the shell-like covering. Some kinds of scales infest mainly the leaves of plants, others are found both on stems and leaves, and still others attack chiefly the stems.

Damage.—Scale insects obtain food by sucking the plant juices; this feeding causes poor growth or stunted plants. These insects excrete droplets of a sweetish, sticky

liquid called honeydew; honeydew of most species is attractive to ants. It imparts a shiny appearance to the foliage and provides a base for the growth of sooty mold.

What to do.—Dip or spray plants, using malathion (pp. 4 and 5). Add $\frac{1}{2}$ teaspoon of a mild household detergent (not soap) per gallon of spray to increase its wetting power and efficiency. Several applications at intervals of 3 to 4 weeks may be required to kill all the scale insects. Scales may cling to plants for a month or more after they are dead. Living scales will show some juice when mashed. Dead scales soon become dry and chaffy.

If only one or a few plants are infested, washing (p. 7) may be a practical way to control scale insects.

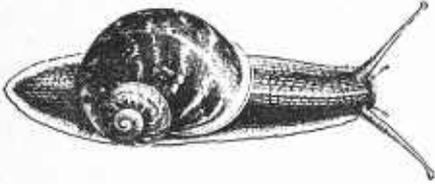


Hemispherical scale on fern.

SLUGS AND SNAILS



EPQ-1910



EPQ-1917

Description.—Several species can be troublesome in the home greenhouse. Both snails and slugs have fleshy, soft, slimy, legless bodies that range in color from whitish yellow to black; most are mottled with shades of gray. These pests are slow moving and grow to lengths of about $\frac{1}{2}$ inch to 4 inches.

Snails have a hard spiral shell on the back. Shells range from about $\frac{1}{4}$ to 1 inch in diameter, and are off-white to brown or black in color.

Slugs and snails normally hide during the day under pieces of wood or pottery, fallen leaves, or mulches and are active at night, but they may be active on damp, dark days.

Damage.—Slugs and snails feed on the leaves, flowers, stems, or roots of plants by scraping off the tissue or eating holes in the leaves or flowers. They leave a glistening trail of slime wherever they crawl.

What to do.—Insofar as practicable, eliminate hiding places. Put out a few pieces of shingles or boards for traps. Collect and destroy trapped slugs and snails every

day or two; look for them also under the pots and under the pot rims. Collect slugs and snails from the plants at night.

If further control measures are needed, use a commercially prepared slug and snail bait containing metaldehyde. Apply it as directed on the container.

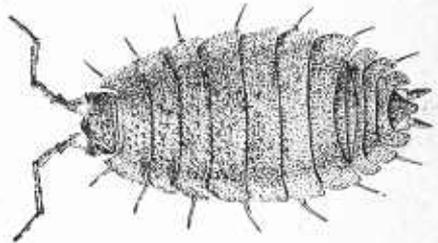
SOWBUGS AND PILLBUGS

Description.—Several species can be troublesome in the home greenhouse. Sowbugs and pillbugs have segmented, shell-like bodies. They are oval, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, and gray to brown.

Sowbugs and pillbugs are commonly found in places with high humidity. They are most active at night and usually hide in loose soil or under any convenient cover during the day. When disturbed, pillbugs roll up in a ball, and sowbugs scurry for cover.

Damage.—Sowbugs and pillbugs usually feed on decaying organic materials but sometimes eat roots and tender plant parts, especially those of bedding plants and seedlings.

What to do.—Eliminate hiding places where possible.



TC-7141

Sowbug.

Spray soil surface, under boardwalks and benches, along foundations, or other infested areas with DDT (p. 4).

SPIDER MITES (RED SPIDERS)

Description.—Several species are common pests of house plants. They are most abundant when conditions are dry and warm. These tiny, oval, greenish, yellowish, or reddish mites are barely visible to the naked eye. They are found first on the undersurfaces of leaves; when numerous, they spread to other parts of the plant.

If infestation is heavy, spider mites form a frail, silky webbing that stretches from leaf to leaf to cover the plant. Mites can be seen as they crawl over this webbing.

Damage.—Spider mites injure plants by feeding on the plant juices. Injury is first visible as whitish or yellowish speckled areas on the top surfaces of leaves. As feeding progresses, the leaves take on a bronzed or yellowed appearance and may die or drop from the plant. Heavily infested plants become stunted and may die. Flowers may be faded.

What to do.—Syringe tough plants with a forceful spray of water to break up webbing and dislodge spider mites. Dip or spray plants, using malathion or Kelthane (pp. 4 and 5), within 2 days after syringing. Treat tender plants with malathion or Kelthane.

Be sure to wet the undersides of leaves.

Several applications at weekly intervals will be required to control spider mites.

SPRINGTAILS

Description.—Several species can be troublesome in the soil in flowerpots and home greenhouses. Springtails range in size from microscopic to about $\frac{1}{5}$ inch long. Some species have slender, segmented bodies, others have globular bodies without distinct segmentation. They are whitish to blackish; some are tinted blue or purple. Most kinds are able to jump.

Springtails sometimes become plentiful in moist situations where there is much organic material; large numbers of them can then be seen on the surface of the soil. Mostly they feed on decaying matter.

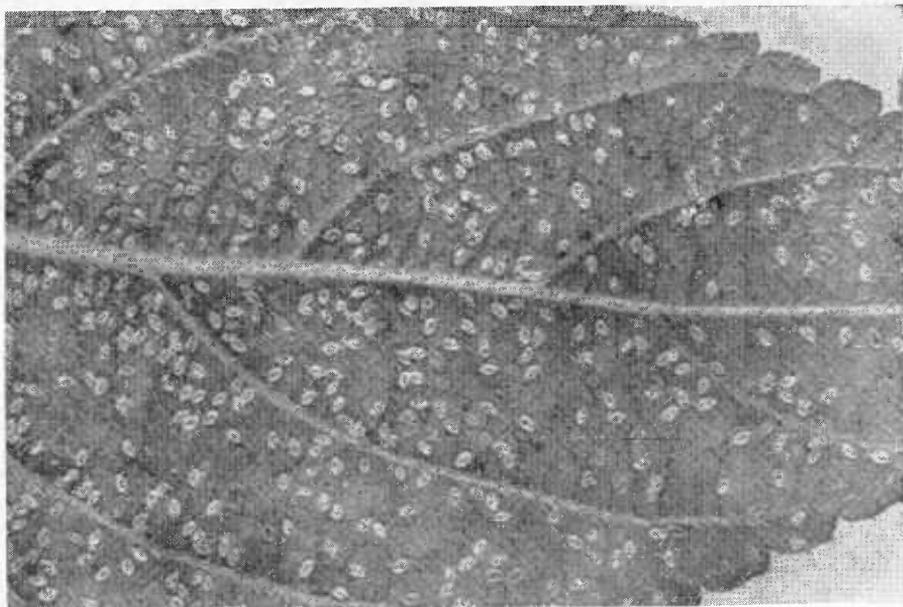
Damage.—Springtails may chew on seedlings or on tender parts of plants, particularly the parts near ground level. They are a nuisance when numerous.

What to do.—Spray soil surface, pots, saucers, shelves, and affected parts of plants with chlordane or malathion (p. 4).

THRIPS

Description.—Several species may infest house plants. Thrips are slender, barely visible to the naked eye. Adults may be tan, brown, blackish brown, or black, with lighter marking. The young are whitish to yellow or orange, and some species carry droplets of black excrement on their backs. The adults fly or leap away, or run rapidly about on the plant when disturbed. The young are less active.

Damage.—Both adults and young cause plant injury, most com-



Immature whiteflies on undersurface of leaf.

monly on the leaves or flowers, by sucking out the plant juices. Typical injury appears as irregular or streaked silvered areas that are speckled with little black dots of excrement. Foliage may blotch or drop, and flowers may be streaked or distorted.

What to do.—Dip or spray plants, using malathion or DDT (pp. 4 and 5).

WHITEFLIES

Description.—A few species can be troublesome; one of these is an important pest of house plants. The adults are about $\frac{1}{16}$ inch long, and have white, wedge-shaped wings. When infested plants are moved, the adults take flight; they resemble small snowflakes or bits of paper ash swirling in the air.

The scalelike young are mostly pale green to yellow or whitish, oval in outline, and flat on top. Except for newly hatched young, the immature stages are attached to the leaves, mostly on the undersurfaces.

Damage.—Both adults and young feed on the leaves of plants by sucking out the juices. Infested leaves become pale, turn yellow, and die or drop off. Surfaces of leaves become covered with sticky honeydew excreted by the insects. Sooty mold develops on the honeydew.

What to do.—Dip or spray plants, using malathion, rotenone, or lindane (pp. 4 and 5). Be sure to wet the underside of the foliage. Several applications at weekly intervals may be required to control whiteflies.