

Indoor Plants

Kentucky Master Gardener Manual Chapter 14

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Cultivating plants inside the home is both a popular hobby and an interior decorating technique. More than 75 percent of all American families use living plants as part of their home decor or cultural expression.

To keep plants healthy and attractive, you must control a number of environmental factors such as light, temperature, humidity, water, and plant nutrients. The right combination results in healthy plants. Too much or too little of any factor results in poor plant health or death.

A houseplant is simply an outdoor plant that is grown indoors. Not all plants are suitable for indoor culture. Some require environmental conditions that are impossible to duplicate indoors. Others adapt to indoor culture if their minimum growth requirements are provided. The key to successful indoor plant culture is to select plants that are adaptable to the conditions in your home.

The normal home provides a number of different environments. Light varies from sunny windows to dim corners. Plants in living areas receive long hours of light (either natural or artificial) year-round, but those in bedrooms normally receive only minimal supplemental light. Humidity usually is much higher in kitchens and bathrooms than in living rooms. Temperatures vary widely. The overall climate may range from humid subtropical to arid desert in various locations.

Management

The environmental factors of light, temperature, and humidity are to a large extent determined by how you manage your home environment for family comfort. Other environmental factors, such as water and nutrient availability, can be managed solely for your plants' sake. By selecting the best site for each plant and managing the supply of water and nutrients, it is possible to grow most common houseplants in any home.

Each plant has its own set of desired environmental conditions. There are many sources of information for specific cultural requirements. Check with the store that supplied the plant or with local county extension agents. Houseplant books (there are hundreds, many available at libraries), and garden encyclopedias (also available at libraries) are also a source of information.



In general, a plant needs an environment as similar as possible to that in which it grows naturally. Understory plants (those that live on the forest floor) can grow in diffuse light. Plants from deserts or other open environments require strong light. Tropical and subtropical species generally do best in humid conditions, and desert species require arid conditions. Cool-climate species prefer cool nights and warm days, while tropical species prefer warm temperatures at all times. Learn about the specific plants you are growing (or plan to acquire) and place them in a location that provides the best combination of environmental factors for their needs.

Cultivating houseplants is enjoyable and rewarding. The basic culture is not difficult, and most plants require only a few minutes of attention each week once their basic environmental requirements are satisfied. They do, however, require this minimal care on a regular basis. Plants are living things and must be managed so that their life-support systems function properly at all times. The following sections discuss several important aspects of plant care.

Light

Perhaps the major environmental factor limiting plant growth indoors is lack of adequate light. As natural light enters homes, it decreases very quickly. For example, a plant 1 foot away from a window may receive 100 foot-candles of light. If it is moved 2 feet away from the window, it will receive only 25 foot-candles of light. At 3 feet it receives only 11 foot-candles, and very few, if any, houseplants do well at such low light intensities.

The most expedient method of adjusting light intensity is to move the plant closer to or farther from a light source such as a window. Unfortunately, this may place the plant in an inconvenient spot.

To increase light intensity you can:

- Moving the plant to a lighter room (southern versus northern exposure)
- Placing the plant near an electric light
- Providing separate artificial light for the plant
- Providing reflected light with a light-colored wall or mirror
- Keeping leaves free of dust and grime

To reduce light intensity you can:

- Place a lace curtain between the plant and window
- Use venetian blinds to intercept and divert direct sunlight
- Reduce reflected light with a dark backdrop
- Shade the plant with another plant
- Move the plant back from a strong light source (for example, a south-facing window)

Temperature

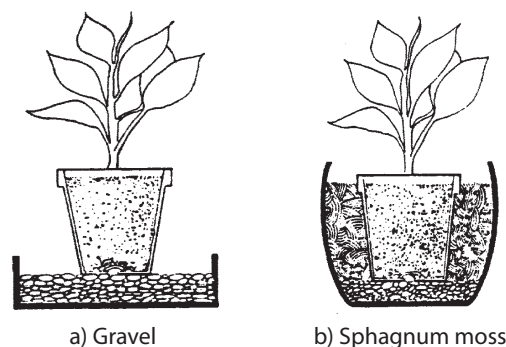
Home temperatures are adjusted for the comfort of people, but temperatures vary considerably in most homes. Bedrooms usually are cooler than bathrooms or living areas. Southern-exposure rooms usually are warmer during the day than northern-exposure rooms. Fortunately, most plants tolerate a fairly broad range of temperatures and thrive at normal home temperatures if other environmental factors are satisfactory.

Humidity

Many plants require a more humid climate than the average home. Ferns, ivies, and other humid-climate plants may grow best in bathrooms or kitchens, where the air usually is more humid. You can increase relative humidity around a plant by placing its pot on a shallow tray of moist gravel (Figure 1a). The gravel will evaporate water into the air around the plants.

Damp sphagnum moss packed between pots in planters also evaporates water into the air (Figure 1b). Moss has the added advantage of acting like a wick to draw up and dispose of excess water in the bottom of the planter box.

Figure 1. Two ways to increase humidity around a plant: (a) A layer of moist gravel or pebbles in a tray beneath the pot and (b) a pot inside a large planter filled with moistened sphagnum peat moss.



Grouping plants together in the same room raises the relative humidity for all. Plants transpire (emit moisture) water continuously. The more plants you grow, the more water they transpire into the air.

A humidifier is another way to raise humidity. The higher relative humidity that plants prefer also is healthier for people.

Misting plants does not significantly increase humidity. It may, however, help keep leaves clean, which also is desirable.

Water

Watering is the most important (and most often abused) cultural practice. Plants must have a continuous and adequate supply of water, but they can absorb water from the soil only under certain conditions.

First, there must be available water in the soil. Soil particles hold some water

too firmly for plants to take up. The water available to plants is water in excess of that required to satisfy the soil itself. The quantity and type of soil mix will determine how much water the pot retains for plant use.

Second, some air must be in the soil for plant roots to function and absorb water. Therefore, the soil must not contain so much water that no room is left for air. A good potting soil will not hold too much water if a hole in the bottom of the container allows excess water to drain away.

The difference between these two extremes (no available water versus saturated soil) is called the available water supply. Proper water management avoids both extremes and maintains a supply of available water at all times.

The following guidelines may help you establish a satisfactory watering schedule:

- Use a well-prepared potting soil to assure good water-retention capacity as well as space for air.
- Make sure containers have at least one drainage hole so excess water can drain away.
- When watering, apply enough water to run out the drainage hole. This usually assures that you have replenished the available water supply and also reduces salt buildup.
- Do not let pots sit in excess water. Pour it away or raise pots so they always are above the level of drained-out water in the saucer.
- Do not water on a time schedule. Allow the soil to become dry on the surface before you water again. This method maintains a good balance of air and water in the soil.
- If some plants require frequent watering, move them into slightly larger pots (with greater water-holding capacity).
- Some plants, such as desert cacti and succulents, should be watered only a little, if at all, during the short days of winter. With the exception of seedlings and very young plants, these plants need no water from about mid-November to mid-March. Most cacti and many succulents are best kept bone-dry and quite cool during the winter.

- Highly organic soils are difficult to rewet once they dry out. They also tend to shrink away from container sides. This can allow water to run between the soil and the inside of the pot without ever moistening the soil. If this happens, submerge the entire pot in water until the medium is fully moistened.
- Flush soluble salts from pots on a regular basis, about every six months. Water three times at 30-minute intervals to wash salts out the drainage hole.

Keep these additional factors in mind when watering:

- Chlorine in tap water will not harm plants.
- Fluoride in tap water can damage sensitive plants. (See Table 1.)
- Room-temperature water is best. Plants such as African violets and their relatives may require even warmer water.

Nutrients

Plants growing in containers have a limited volume of soil from which to extract mineral nutrients (fertilizer). The supply of nutrients rapidly becomes exhausted when the plant is actively growing. Replenish nutrients regularly. The easiest way is to water them in with a solution of soluble fertilizer.

Many soluble fertilizers are available in garden stores. Since they vary in strength (percent of fertilizer nutrients), dilute or dissolve them in your watering can according to the label directions. Mix only enough solution to water your plants once each time you fertilize.

During the long days of the year (Easter to Thanksgiving), when plants are actively growing, fertilize about every other week. During the short days of the year (Thanksgiving to Easter), fertilize only every 4 to 6 weeks. If plants are totally dormant, do not fertilize until new growth starts.

Here are some fertilizing hints:

- Slow or time-release fertilizers are a good way to fertilize houseplants. Follow label directions.
- Plants grow best with small amounts of nutrients constantly available.
- Do not apply fertilizers to dry soil.
- Do not overfertilize. More is *not* better. Plants can die from too much fertilizer. It's better to underdo than overdo.
- Both organic and synthetic fertilizers are acceptable sources of plant nutrients.

Potting and Repotting

Cultivating plants in containers requires occasional replanting from one container to another. Small, rapidly growing plants may require repotting into larger containers every three to four months. You can repot mature houseplants on an annual basis or allow them to remain in containers until they have outgrown them or become pot-bound (Figure 2). If a plant is not doing well, and no obvious reason can be found, it may benefit from repotting.

Handle plants carefully when potting or repotting to avoid injury and to provide optimum growth in the new container. When transplanting, consider such factors as size and condition of the plant, size and type of container, type and amount of soil mixture, and prevention of damage to the plant.

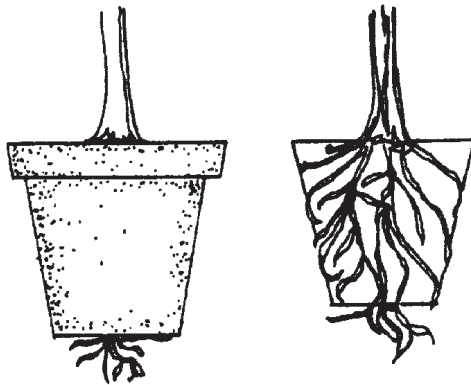


Figure 2. If roots are growing out of the drainage hole, it's time to repot.

Table 1.—Houseplant problem symptoms, possible causes, and treatments.

Symptoms (what you see)	Possible causes	Treatment (corrective action)
Plants are spindly, stems grow abnormally long. Leaves lack color, are undersized, and may fall off.	Too little light	Move plant closer to a window or other light source. Don't fertilize when plants are dormant (winter).
Old leaves curl under. New leaves are smaller than old leaves. Leaves may brown around margins.	Too much light	Move plant farther from window or light source, or filter light through a curtain.
Yellow, brown, or white (bleached) spots on leaves (particularly on upper leaves).	Sun scorch caused by sudden increase in light intensity	Shade plant. Move plants from shade to sun gradually so they can adapt. Some always require shade.
Leaves turn yellow, curl downward, or wilt.	Too much heat	Move plant to a cooler spot. Avoid placing plants near heat registers or hot-air outlets.
Plants wilt even if soil is moist. Margins and tips of leaves burn. White crust may appear on leaf edges and on the soil surface when dry.	Salt buildup in soil	Water three times at 30-minute intervals to wash the salts out the drainage hole. Do not use soft water.
White crust on rim and sides of porous pots. Leaves touching rim wilt and die.	Salt accumulation on pot	Leach soil as above. Wash excess salts off pot with clear water. Wax the rim of the pot to prevent future salt deposits that might touch leaves.
White or yellow spots on leaves of African violets, gloxinias, and other hairy-leaved plants.	Cold water on leaves or in soil	Use room-temperature to luke-warm water for watering plants.
Dark brown spots around leaf margins of tropical foliage plants (especially philodendrons).	Raw natural gas or incompletely burned gas in home	Check gas lines and fittings for gas leaks. Adjust gas burners for blue flame. Have furnace checked for leaks or adjustments.
Plants wilt between waterings, roots fill pot and may grow out drainage hole. Growth slow.	Plant is too big for its pot	Repot in a larger container with a good potting soil mixture.
Sudden wilting or shedding of foliage during cold weather.	Chilling	Move plant away from chilling drafts.
Wilting and loss of foliage after repotting or initial potting.	Transplant shock	Give optimum care until plant adjusts to its new situation.
Tips of leaves turn brown, and leaves wilt. Lower leaves turn yellow and fall off.	Not enough water	Water until some water runs out the drainage hole, or submerge the pot in a pail of water for five minutes. Drain off excess water. Repeat when soil is dry to touch.
Lower leaves curl and wilt. Stems become mushy and rot. Soil in pot usually is wet.	Too much water	Water less frequently. Use pots with drainage holes in the bottom. Do not allow pot to stand in water more than 30 minutes.
Leaf edges are crinkly and brown. Tips of new leaves often dry up.	Lack of humidity	Increase humidity around plants by standing pots on a bed of moist gravel or placing them in planters with moist sphagnum moss packed around the pots. Use a humidifier or move plants to a more humid area (such as a bathroom or over the kitchen sink).
Plants grow rapidly with lots of foliage but few, if any, flowers.	Too much fertilizer	Fertilize less often or at half the suggested rate. Use low-nitrogen fertilizer during blooming season. Do not fertilize when plants are dormant.
Lower leaves lose color and may drop off. New leaves are progressively smaller than previous leaves. Stems are stunted.	Too little fertilizer	Fertilize regularly when plants are growing. Use a soluble fertilizer and apply per package directions.
Brown or black spots on leaves. Tip and marginal burning. Spider plants (<i>Chlorophytum</i>), corn plants (<i>Dracaena</i>), and palms are especially sensitive.	Fluoride in water supply	Use rain or distilled water. Keep pH up to 6.5.

Plant Size

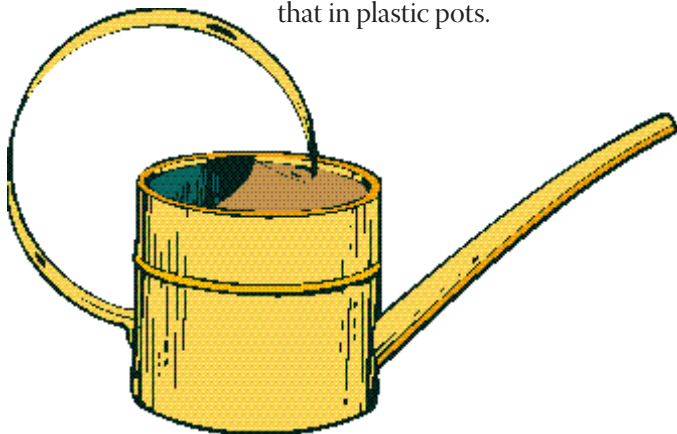
Small plants transplant more easily than larger ones; however, any plant that already is established in a container can be repotted. When first planting into pots, select small plants so you do not have to remove many roots to fit the plant into the container. Pot rooted cuttings when the roots are about $\frac{1}{2}$ inch long. Seedling plants transplant most readily as soon as the first true leaves have formed.

Plant Condition

Most plants transplant best when they are actively growing. Dormant plants or those in flower may not produce root growth and establish themselves in the new pot as readily. Plants should not be wilted when transplanted. Be sure your plants are well watered and free of insects before repotting.

Container Type

Plants can be grown in almost any container, but it is best to use containers with drainage holes. To establish plants in decorative containers without drainage holes, pot the plants in draining pots that fit inside the other containers. You can combine several small pots in a larger planter by packing sphagnum moss around the sides of the pots for support and to help evaporate excess water. Clay pots are no better than plastic ones, but porous and nonporous pots require different management. For one thing, soil in clay pots dries more rapidly and requires more frequent watering than that in plastic pots.



Container Size

Normally it is best to keep a plant in the smallest container needed for its current stage of development. This practice conserves growing space, reduces the likelihood of overwatering, allows for gradual increases in pot size (and new soil) as the plant develops, generally looks better (small plants in large pots look lost), and allows more versatility in moving plants or arranging them in groups.

Adjust container size to manage irrigation schedules. Move plants that need more frequent watering to larger pots with more water storage capacity.

Potting Soil Mixtures

Plants growing in containers require specially prepared soils or growth media. A container-grown plant cannot extend its root system to gather water and nutrients, but is limited to the small volume of soil in the container. Potted plants use the soil in their pots much more intensively than they would if growing unrestrained outdoors. Even the most fertile garden soil will not sustain this intensive use for more than a short time.

Ready-to-use potting soil mixes are available in garden stores. Some of these commercially prepared potting soils are excellent but expensive. If you have only a few houseplants, prepared mixes are convenient and probably the most practical. However, if you grow numerous houseplants, it may be more economical to prepare your own potting soil.

Good potting soil differs from garden soil. It should contain a much higher proportion of coarse mineral particles to maintain sufficient pore spaces in the soil for air, water, and root growth. It must have enough organic matter to hold water and condition the soil (keep it from compacting). It also must contain sufficient mineral nutrients to supply a large part of the plants' needs. (All houseplants need supplemental fertilizer on a regular basis.)

Good potting soils can be prepared by mixing garden soil, coarse sand, pumice or perlite, and peat moss. Most potted plants grow quite well in a mix containing equal parts of these ingredients if you adjust management techniques (watering and fertilizing) to suit their different needs. You can modify this general potting mixture with additional coarse mineral material or peat moss to satisfy specific plant requirements. Instructions are given below.

General mixture

- 1 part garden soil (not clay)
- 1 part washed builder's sand, perlite, or pumice
- 1 part horticultural peat moss
- 1 quart steamed bonemeal per bushel (8 gallons) of mixture
- 1 pint dolomitic lime per bushel of mixture

Mix all ingredients thoroughly by shoveling them from one pile to another at least three times. Pulverize any large lumps or clods as you mix. When the mix is thoroughly blended, add sufficient water to moisten it. Then store it in a sheltered spot until you are ready to use it. A garbage can, wastebasket, or large bucket makes a handy storage container.

This general potting mixture provides a suitable growth medium for most container plants, including vegetables, bedding plants, geraniums, begonias, fuchsias, and ivy.

High-organic mix

- 1 part general potting mixture
- 1 part horticultural peat moss

Many houseplants, such as African violets, gloxinias, philodendrons, rubber plants, and most other tropical foliage plants may do better in a mix containing a higher proportion of organic matter. Adding extra peat moss to the general potting mixture adjusts the mixture to their needs.

Desert plant mix

- 1 part general potting mixture
- 1 part sand or coarse perlite

Cacti and other succulents grow best in a soil mixture with a lower proportion of organic matter that dries rapidly and, therefore, does not retain large quantities of water. Mix the general soil mix with an equal volume of sand or perlite to create an appropriate potting mixture for these plants.

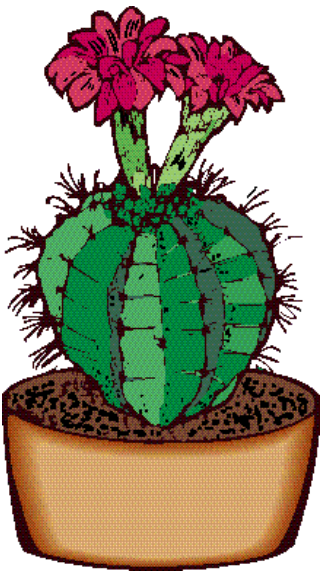
Sterilizing soil

It normally is unnecessary or even undesirable to sterilize potting soils. Garden soils contain millions of beneficial living organisms. Only rarely do they contain disease organisms that might damage houseplants. Seedlings are most susceptible to attack by soilborne disease organisms during their first two to four weeks of growth. To prevent damping-off disease on seedlings, it may help to heat-treat the soil used for seedling production.

Baking soil in an oven is the easiest method of heat-treating. Place slightly moist soil in a heat-resistant container, cover it, and bake it in a 250°F oven. Use a candy or meat thermometer to ensure that the mix reaches 140°F for at least 30 minutes.

Using potting mixes

By making a supply of general potting soil mixture and retaining a small quantity of additional peat moss and sand, you can adjust your mixture for any type of plant. This arrangement requires only a minimal amount of storage space, and your potting soil is ready to use at any time. Before using it, be sure it is damp. Dry soil mixture is difficult to handle and may damage tender roots before the plant is watered.



The Potting Process

It is not necessary to cover drainage holes. Any item that might inhibit free drainage of surplus water from the pot is best avoided. Plants will not suffer if a bit of potting mix comes out with the first irrigation or two. Do not use a gravel layer or other so-called drainage material at the bottom of the pot. It actually slows down drainage by shortening the soil column. Different layers of material also are likely to lead to perched water tables (restricted drainage) in the container. Always fill the entire pot with the growing medium—right to the bottom.

If you are repotting from another pot, gently remove the plant and crumble some of the old soil ball away (Figure 3).

If you are potting a new plant, trim the root system if necessary to fit the pot (Figure 4). Do not bend or wind roots into the pot. It is better to prune them to fit without bending.

Place the resulting ball in the center of the new container and fill around it with potting soil while holding the plant in the desired position (Figure 5). To help settle the medium, slap the sides of the container as the soil filters around the plant roots. Thumping the bottom of the pot on the potting bench also aids in this process. Avoid pressing or tamping the soil down too hard. This often eliminates air space in the mix and causes drainage problems.

Finish filling the pot to approximately $\frac{1}{2}$ inch from the top. In standard flower pots, fill to one-half the depth of the rim. This leaves enough space for applying sufficient water to saturate the soil.

As soon as you finish potting or repotting plants, fill the pot to the brim with water. Keep adding water until it comes out the drainage hole to be sure you have completely filled the reservoir capacity of the potting soil.

If extensive root pruning was necessary, keep the plant away from strong light or heat until new roots grow. Increasing the humidity around the plant will help in reestablishment.

Propagation

Many houseplants are easily propagated by cuttings. For further information on propagating houseplants, see Kentucky Cooperative Extension publication *Propagating Plants in and around the Home* (HO-67).

Houseplant Problems

Most houseplant problems are related to cultural or environmental stress. Table 1 shows symptoms, possible causes, and treatments to help you recognize and deal with some of the many houseplant problems. Unhealthy container plants usually return to normal, healthy growth once they receive acceptable growing conditions. This recovery may require a few weeks to several months. If you find you cannot achieve proper conditions for certain types of plants, it may be best to discard them and get varieties that grow successfully in the conditions you are able to provide.

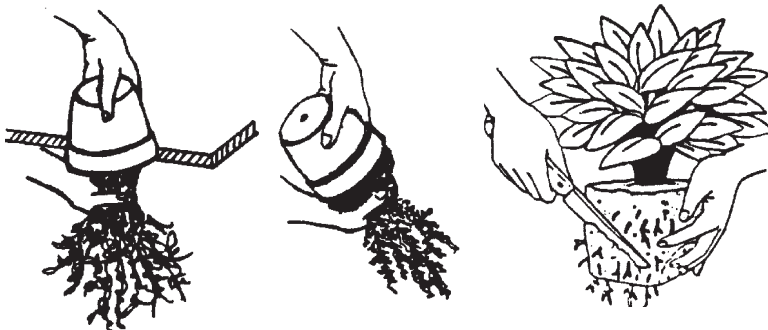


Figure 3. Removing plants from pots.



Figure 4. Trimming roots before repotting.

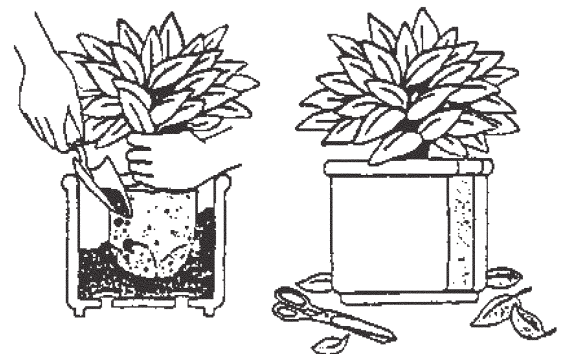


Figure 5. Repotting a plant.

Other problems are caused by insects. Some of the more common ones are described below. Prevention is a key to managing houseplant pests. If your plants develop a pest problem, there are various chemical and nonchemical controls available. The key to success against pests is to get control of all their life stages. Consistent application of a pesticide every five to seven days for a period of a month or more may be necessary. Nonchemical controls also must be consistent.

Diseases normally are not a problem for plants grown in homes or other typical indoor environments. (An exception is powdery mildew on a very few species of plants, such as grape ivy.) Plants grown in greenhouses, however, are susceptible to several disease problems.

Major Pests

Aphids

Aphids are small insects about $\frac{1}{16}$ to $\frac{1}{8}$ inch long. They are six-legged, variously colored, and some look powdery or woolly. Both wingless and winged forms can be found on plants. Under the right conditions, aphids multiply rapidly and can spread quickly to other plants in the house. Aphids have sucking mouthparts that pierce plant tissue and suck out juices. Damaged leaves lose their green color and look stunted, distorted, or curled. Heavy infestations may damage or actually kill plants.

The excreta (honeydew) given off by aphids is another problem associated with this pest. This material is sticky, gives leaf surfaces a shiny look, and provides food for the development of sooty mold.

Whiteflies

Whiteflies are tiny insects about $\frac{1}{10}$ to $\frac{1}{16}$ inch long that resemble tiny moths. Their bodies and wings are covered with a white, powdery substance. When at rest, they hold their wings rooflike over their bodies. Both the immature stages and adults have

sucking mouthparts. There are five distinct stages in the whitefly's development:

1. The egg, which is laid on the underside of a leaf and often is covered with a powdery material
2. The newly hatched or "crawler" nymph, which is flat, nearly transparent, and can move
3. The intermediate nymph, which has no antennae or legs and therefore cannot move
4. The dark nymphal stage, which is somewhat segmented
5. The adult

A single female can lay up to 400 eggs, and whiteflies continuously breed in homes and greenhouses. Damage by whiteflies resembles aphid damage. In addition, the adults are active fliers and become a household nuisance.

Scales

Several different scales infest houseplants. The adults generally are quite small, ranging from $\frac{1}{16}$ to $\frac{1}{8}$ inch in diameter, and may be white, black, brown, gray, or tan. They attach rigidly to plants. Many scales are shaped somewhat like a ball and have no distinctive features except for being flat or slightly bulging. Some have distinctive shapes, such as oyster shells (that is, oyster shell scale), while others look like turtle shells. The scale actually is a hard or soft covering that protects the insect. The adult male is the only winged member of the scale group.

Damage by scales is similar to that from aphids and whiteflies. Honeydew and sooty mold often are present. Severe plant injury or death may be the final result of poor control.

Chemical control of adults often is impossible. The female usually lays eggs under a scale. When eggs hatch, tiny crawlers emerge and begin to move about in search of a place to feed. The crawler stage is the most easily killed with chemical sprays.

Mealybugs

Several different mealybugs are among the most serious pests of houseplants. Most appear powdery. They are about $\frac{3}{16}$ inch long, flat, and slender. Some have waxy filaments extending from their bodies. Most species move freely but slowly on plants. Females are wingless, while males have a single pair of wings. Eggs are laid in clusters and are covered by waxy or fuzzy material.

Mealybugs attack all plant parts. Damage is similar to that caused by aphids. Honeydew and sooty mold frequently occur on plants infested with mealybugs.

Spider mites

Mites often are referred to as insects. However, they are not insects since they have eight legs, only two body regions, and no wings. They are, in fact, closely related to spiders. Spider mites are extremely small. A hand lens of at least 10X magnification often is needed to see them.

Usually, mite damage appears long before the mites themselves are noticed. Plants damaged by mites lack vigor, lose color, and have speckled leaves. Webbing is characteristic of spider mites. The web helps them spread to other plants, often on air currents.

There are three stages in a mite's development: egg, a series of nymphal stages, and adult. All stages except the egg stage damage plants.

Cyclamen mites

Although named for cyclamens, these mites also damage many other plants. Adults are too small to see with the naked eye. Under a magnifying glass, they are seen as oval, amber or tan-colored, semitransparent, and glistening. The young are even smaller and milky white.

These 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. They also can be transferred to other plants by hands or clothing.

Damage consists of twisted, curled, and brittle leaves, deformed buds, and flowers that often are streaked with darker color. Blackening of leaves also is common.

Minor or Less Common Pests

Leafminers

Many different insects commonly are called leafminers. Members of the fly, sawfly, and moth/butterfly groups are the most common. The larval stage is responsible for the leafmining damage, which appears as a winding, discolored trail or an irregular blotch within leaf tissue. Damage from these insects rarely is serious; it usually is merely unsightly. Simply remove and destroy the infested leaves to solve the problem.

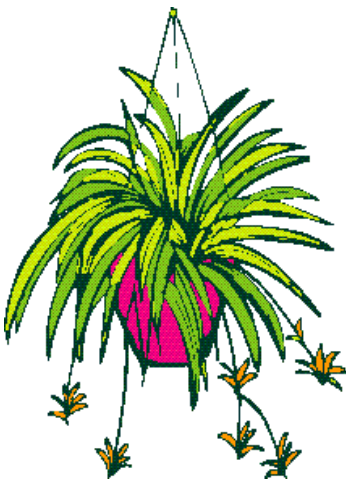
Fungus gnats

These small, black flies are first noticed around windows. The larvae feed on decaying matter and therefore most often are found in highly organic soils. Most species seldom damage plant roots unless a great many insects are present. Generally, they are merely annoying.

Caterpillars

The larvae of many moths and some butterflies sometimes feed on houseplants. They range from very tiny ($\frac{1}{8}$ inch or so) up to 1½ inches long. Color of adults and caterpillars varies, although gray, whitish, and brownish are most common. Caterpillars may have stripes, spines, or bumps in any combination according to species. They have three pairs of true legs and also may have a series of false legs along the tail end.

Their presence usually is the result of an uninvited, fertile female moth who slips past a screen door and lays eggs inside. Caterpillars, as well as other pests, also can develop on plants that have been placed outdoors during the summer. Remove and destroy the eggs or caterpillars when you notice them.



Beetles

Flea beetles and other leaf-feeding beetles are potential houseplant pests. These beetles have chewing mouthparts. Beetles have four life stages: egg, larva, pupa, and adult. In many species, both adults and larvae feed on plant tissue.

In most species, the adults can fly, which in some cases may explain their presence in homes. Again, the likelihood of beetle infestation increases when plants are placed outdoors. Removal of the insects probably is the most convenient and effective control.

Thrips

Thrips are small, slender insects about $\frac{1}{16}$ inch long. Many have two pairs of fringed wings, which are folded flat over the back when at rest. Some are predators and some are scavengers, but most are serious plant pests. Their mouthparts are used for rasping leaf surfaces. Damage appears as whitening or speckling of leaves. Small, black droplets also may be noticeable, and some plants may have a silvery appearance. Flowers also are damaged.

Leafhoppers

Leafhoppers are small to moderate-sized sucking pests ($\frac{1}{16}$ to $\frac{1}{4}$ inch long) related to aphids. Only occasionally are they pests of houseplants. They vary in color and are wedge shaped. Damage usually appears as mottling or speckling of leaves and may be confused with mite injury.

Springtails

Springtails are small ($\frac{1}{8}$ inch or less) and vary in color. They are wingless and, as the name implies, many are capable of jumping. Although they may chew on small seedlings or tender plant parts, they mostly prefer to feed on decaying organic matter. They can become a nuisance when numerous.

Slugs and snails

These soft-bodied, fleshy, legless creatures are related to clams. They can be very destructive to a wide variety of plants. They usually require a moist environment. Houseplants may become infested when they are placed outdoors. Slugs and snails are voracious feeders and frequently devour whole plants or plant parts. Their presence is marked by the slime trails they leave behind.

These animals lay small, round, milky white eggs in the soil. Some commercial slow-release fertilizer pellets closely resemble slug eggs and often are identified as such even by professionals.

Hand removal of slugs usually is all that is necessary. Look for them under mulch, pots, and pot rims. Placing shallow dishes of beer near plants is helpful, as slugs are attracted to beer and will crawl in and drown.

Millipedes

Millipede populations can build up in potted plants. They sometimes feed on plant parts, but more frequently on decaying organic material. They become a nuisance when present in large numbers. Many species can occur on plants. They vary in color and can be tiny or up to $1\frac{1}{2}$ inches or more in length. They are easily identified by their many legs, round shape, and slow movement.

Centipedes

These animals are not plant pests. They feed on many insects and insect relatives and thus are beneficial. While they resemble millipedes because of their many legs, they are very flat and fast moving. They vary in size ($\frac{1}{4}$ to 2 inches) as well as in color. Some of the larger ones often bite when disturbed. If their presence is annoying, remove them carefully and place them outdoors where they can continue to be useful in nature's scheme of things.





Preventing Pest Problems

Routine precautions will help you avoid unhappy encounters with houseplant pests. First, when you buy plants, inspect the leaves and stems carefully. Even those that seem clean might harbor pests. Isolate new plants for a week or two in a separate room or garage to prevent pests from flying from the new plants to your existing ones. Keep close watch on the plants to see whether a pest population is building up.

Putting houseplants outdoors in the summer can invite a whole series of pest problems. If you put your plants outside, treat them as newly purchased when you bring them back indoors.

Sometimes pests come indoors on their own. Good screen windows keep out most flying insects such as moths and beetles.

Using soil from outdoors is another source of infestation; you might bring in uninvited members of the soil fauna such as mites and slug eggs. Commercially prepared potting soil might be a better choice. If you use outside soil, pasteurization at 140°F is an option; it normally eliminates undesirable organisms but does not harm desirable ones. (See “Sterilizing Soil,” earlier in this chapter.)

Pests are transferred from plant to plant in a variety of ways. Some of the more subtle ways are through human activity. Consider the times you handle garden store plants or admire a friend’s collection. In doing so, you can pick up scale crawlers

or mites and bring them home to your own plants. It is wise to be on the lookout for plant pests before you handle strange plants.

Many pests survive because they have suitable hiding places. Avoid buildup of dead leaf material that might provide such sites.

Controlling Pests

Nonchemical control

Several techniques can be alternatives to chemical controls. Some require more work than using chemical sprays, but they often give equally good control.

Removal of infested parts

If only a few leaves are infested (for example, with leafminers), it is quite effective to simply remove and destroy that portion of the plant. If roots are being damaged by mealybugs or grubs, it is advisable to take a cutting and start over. Discard infested soil and thoroughly clean the pot or container.

Disposal

Some plants may be so badly damaged that they are too far gone to save. Getting rid of them is the simplest answer.

Hand removal

This method is fairly effective for a number of pests and usually needs no supplemental chemical control. Slugs, caterpillars, many beetles, and other large insects can be eliminated in this manner. Many of these pests feed at night. Thus, this method is most effective if done at night using a flashlight. Where scales or mealybugs are few in number, a thumbnail or toothpick can remove them. After removing pests, watch plants closely for a few weeks in case you overlooked some smaller individuals.

Swabbing with alcohol

Cotton swabs dipped in rubbing alcohol are effective in controlling aphids and mealybugs. This method is practical for light infestations but is extremely tedious for heavy infestations, particularly on large plants.

Spraying with soapy water

Using soapy water gives good control if done correctly. The authors have used soapy water with good results on several kinds of plants.

Some plants may be harmed by this technique, so try it on a small area of a plant first. Use only insecticidal soap that is registered for use on houseplants. Read the label carefully, not only for use instructions but also for information concerning possible plant damage.

This treatment is not totally effective against winged adults (such as whiteflies), since they leave the plant during treatment and return later. Thus, it is necessary to spray the adults with a registered insecticide to get complete control of all stages of the pest.

Chemical control

Few pesticides are registered for indoor use on houseplants. Read labels carefully for where and how to use a pesticide. If indoor use is not designated, take the plant to be treated outdoors away from child and pet traffic areas. Do not bring it back indoors until the spray has dried. It may be well to leave the plant in the garage a day or two for extra safety.

Avoid spraying houseplants indoors, even according to label directions, as many sprays have objectionable odors and can cause allergic reactions in some people. Do not use pesticides where spray can drift onto cooking utensils or food.

Plant damage from pesticides

Injury to plants from pesticide applications has several common symptoms:

- Total burn, marginal burn, or spotting of leaves or flowers
- Cupped, curled, and yellow leaves
- Distorted leaf or flower buds

As a rule, flowers and flower buds in advanced stages of development are most susceptible to pesticide injury.

Usually, these injuries do not kill a plant. Leaves may drop, but new leaves form and the plant usually recovers.

Soil-applied pesticides also may produce these symptoms or stunted growth because of injury to the root system. Severe root injury causes sudden wilting and death of aboveground plant parts.

Reduce the possibility of damage by applying pesticides during the cooler hours of the day and by letting plants dry in a well-ventilated place. Powders and dusts generally are less injurious to plants than are spray concentrates, although they may leave an unsightly residue.

Carefully read the pesticide label. In many cases, it will indicate specifically which plants are sensitive to the pesticide and those for which it is recommended.

