chapter 13

Houseplants

In a nutshell...

- There are many environmental and health benefits to growing indoor plants.
- Don't overwater. That's the biggest mistake people make with houseplants.
- Your houseplant success depends on the environmental conditions where you put them.
- Check the resources at **hort.extension.wisc.edu** for issues not covered in this chapter.

MASTER GARDENER
UNIVERSITY OF WISCONSIN–MADISON
DIVISION OF EXTENSION

Introduction

When a room lacks a view of nature, interior plants—or houseplants—are another way to bring the outside indoors. A properly placed houseplant can be living décor for almost any interior space. Research shows there are emotional and physiological benefits to having houseplants in offices, schools, and medical settings as well as the home.

Houseplants can also be challenging. Inadequate light conditions, irregular watering, and house pets are just a few of the hurdles. As with outdoor plants, starting with the right plant in the right place and following up with integrated pest management practices—adapted for indoor plants—will put you on the path to success.

Learning objectives

1. Understand how to select and acclimate houseplants to a new environment.
2. Know the basic plant care necessary for healthy houseplants.
3. Understand the importance of light, water, air, temperature, and soil and nutrients for indoor plant growth.
4. Understand how different containers and potting techniques affect houseplant growth and maintenance.

Bringing the outdoors in

Plants are a natural part of our outdoor environment but a very unnatural part of our indoor environment. It is unnatural to remove plants from bright, outdoor sunlight and clean moist air, where they are constantly bathed in rain, and bring them into our dry, dimly lit interiors with artificially controlled temperatures.

Our indoor environments are engineered for human comfort. We subject plants to these comparably stressful conditions because we enjoy having them around. Indoor plants provide:

- Visual enhancement: Plants add natural beauty to our indoor living spaces.
- Emotional health: Caring for plants is a rewarding and therapeutic hobby. Plants also contribute to a relaxing atmosphere for the home or office.
- Environmental health: Plants help filter volatile chemicals from the air and add moisture and oxygen to our interior environment.

Visual enhancement

Plants are beautiful and varied. They range in color, size, and texture. A fine-leaved fern can soften an otherwise harsh angle and a tall weeping fig can lean like a canopy over a seat—creating a cozy corner in a larger space. With a little creativity, you can find a plant that complements any decorating scheme.

Emotional health

Plants bring a feeling of life to sterile interiors. Human beings were not meant to spend their days sitting in rooms staring at screens. Bringing plants into our interior spaces helps us feel connected to the life that is teeming outdoors while we toil away in our homes and offices. Plants also provide a relaxing visual for eyes that may be tired and strained from staring at small print on paper or screens. Employees in offices with potted plants or interior plantings report feeling more content and comfortable. From a business point of view, employees who are happier are more productive.

Many people also derive a sense of satisfaction and well-being from the act of caring for growing things. Since our Wisconsin climate prevents us from gardening in the winter, houseplant cultivation offers an indoor alternative.

Environmental health

Environmental health is an important consideration in deciding whether or not to grow plants in the interior environment.

Plants clean the air

Although most homes are well ventilated, the air in enclosed spaces can contain high amounts of various chemicals—some of which cause allergic reactions and other illnesses. NASA has been studying the use of houseplants as air purifiers for as long as they have dreamed of humans living in space. Their research in this area has shown that foliage plants commonly used in interior spaces have a great capacity for taking in and processing various volatile (airborne) organic compounds (VOCs) while also providing oxygen for humans living in a closed environment.

NASA-recommended recipe for cleaner air

1 to 2 foliage plants/ 100 square feet

In some newer, energy-efficient homes and in office buildings that do not have proper ventilation, air quality can be an important issue. Harmful VOCs such as benzene, trichloroethylene, and formaldehyde are routinely found in new homes as well as older homes with new carpeting, curtains, paint, or stain.

NASA's recommended cure for cleaning interior air is one to two medium-sized plants per 100 square feet of living space. This varies somewhat depending on the type of plant: In general, the more foliage and the darker green the foliage, the more efficient the plant is at removing harmful chemicals from the air. NASA has listed *Spathiphyllum* (peace lily) as one of the best to use as an air cleaner.

Selecting houseplants

There are many sources for foliage plants. Where you purchase or obtain your plants doesn't really matter so much as the quality of the plant and the suitability of that species for your specific environment.

Quality is determined by examining the plant carefully for signs of disease, insects, or environmentally induced problems such as leaf scorch or being root bound. This may require gently removing the plant from the pot to look at its roots. Healthy roots will be white and numerous. Unhealthy roots will be brown, easily broken, and often foul-smelling. Roots extending from the bottom of the pot may be a problem. If the roots and foliage look healthy, it could be that it is a vigorously growing plant that needs a new pot. If they are tightly wound around and around in circles at the bottom of the pot, this may signal an ongoing problem with potential **root girdling**.

Determine if the plant's needs for healthy growth are compatible with the conditions of the home or office. Consider the plant size and growth potential, the available light, air temperature, and airflow. Plants will adjust, but whether they thrive or simply survive will depend on the location.

Sources for houseplants

Garden centers and nurseries

Garden centers are obvious choices for selecting healthy foliage plants, as they usually have caring, educated employees who maintain the plants in a greenhouse or similar structure. Often foliage plants are maintained in these structures for long periods of time, so check for root-bound plants. Some of the lower light-loving plants, such as palms, are often in worse shape in the garden center greenhouse because of the high light level. It's good to check for leaf scorch on plants in this environment. Once scorched, leaves are damaged forever and will have to be removed to improve the appearance of the plant.

Florists

Florists do a lot of business in foliage plants as living plants are a favorite gift. Florist have a fast turn-around time with foliage plants, which is good since they don't usually have a proper growing environment to keep them healthy for long periods of time.

- Many florists like to use oil-based sprays on their foliage plants to give them a shine, but this is not a healthy practice. Shine compounds coat the leaves and block the pores (**stomates**), making it very difficult for the plant to breathe. In addition, these sprays often attract dust, or cover up a layer of dust, which can reduce the interception of light by the leaf.
- Another potential problem is that florists often group plants into a common container. Although it makes for an attractive display, if you receive one of these gift arrangements the first thing you should do is separate the plants and repot each one. Each plant species has distinct environmental requirements, and the competition in a common container is almost always lethal for all but one of the combined plants.

Retail outlets and grocery stores

Discount stores are great places to find bargains if the consumer knows how to choose a healthy plant specimen. It helps to know when the plants are shipped to the store. Don't hesitate to ask when the next shipment of foliage plants is due to arrive and go to the store the day after delivery. The sooner the plant is out of the store and into the home, the better. These stores often have poor facilities for plant care and the plants tend to decline rapidly.

Grocery stores are a great place to make a spontaneous plant purchase, whether for a gift or yourself. They usually have high quality, flowering plants at fair prices. Grocery stores like to turn over plant inventory quickly, and sometimes discount prices to move them faster. To grocery stores, plants are another produce item with a limited shelf life.

Interior landscaping companies

Interior landscaping firms deal with large numbers of quality foliage plants, primarily for office buildings and public facilities such as shopping malls and restaurants. A typical plant maintenance company in a large metropolitan area may get a semi-truck load of tropical plants from Florida every week. That's a lot of plants. Some of these companies have retail operations and will allow anyone to purchase plants and interior plant supplies. Some companies hold special sale days where they open their business operation to the public. Still others will never open to the public. Check your local phone book under "plants" and call around to see which ones will sell to you. The advantage is that they get a large variety of high quality plant materials and can special order just about anything, even a 20 foot Washington palm tree. Some of these companies also rent plants for special occasions.

Online stores

Many online sources carry plants, with the advantage that almost any species or **variety** is available. The disadvantage is that shipping the plant can be costly and is not a good idea in winter. Tropical plants are subjected to chilling injury at temperatures below 50˚F, so if a plant is purchased online, keep this in mind. Reputable online stores will not ship between November and March. To search for plants online, just type in "tropical foliage plants" or "houseplants" to find a large number of websites.

Other sources

Friends are a great way to add to your foliage plant collection. As a gardener, it is fun to try your hand at different methods of propagation. Many of our tropical plants are propagated vegetatively, and through practice you'll find that most are not that difficult. See the end of this chapter and chapter 19, Plant Propagation for instructions and advice.

Acclimitization

Many foliage plants are shipped from Florida and placed directly in a retail store for sale within a few days. What a shock to go from warm sunshine to small, dark truck and then a dim interior in Wisconsin. Fortunately, plants are resilient; otherwise we would never be able to grow them in our homes and offices. They have an amazing ability to adjust to a new environment through gradual chemical and physiological changes. This is called **acclimatization**.

House plant growers are aware of the potential problems that can occur when plants are moved to a new environment and should have taken steps prior to shipping to help the plants prepare for and cope with their new conditions. However, the grower cannot prepare the plant for the unique environment of any particular home. If plants have not been properly acclimated, they may look great for a couple of days and then start to decline, sometimes quite rapidly. Once a new plant is in the home, there are four keys to successful acclimation: location, water, cleaning, and patience.

Location

Choose a location carefully based on the plant's specific light and temperature needs and space considerations (more on light and temperature requirements in the next section). Plants have a great ability to acclimate, but don't confuse them by moving them around every week.

Water

Carefully monitor the soil moisture during the first few weeks. This is a very delicate time for the plant. The foliage and tissues are conditioned for high light and warm temperatures and have been busily growing and using up large quantities of water and nutrients. However, water use in the indoor environment can be drastically different from water use in the nursery. If too little water is given during this time, the plant will stress unnecessarily. Expect to cut back on watering as the plant adjusts to its new environment. Once acclimated, the plant may need only infrequent watering.

Cleaning

Plants get sprayed with many things while at the nursery and before shipping. Plants will be happier and more attractive if any residues are removed and given a natural shine with a cotton cloth. This cleaning can be done outdoors if it is warm enough, but if the temperature is less than 60˚F, it is best to clean indoors.

For large plants, put them in the shower and soak them with lukewarm water. Use a soft cotton cloth to wipe the leaves dry. For smaller plants, you can use the sink. No soap is necessary for the plant itself, but you may want to wash the outside of the pot with a soap solution. Thoroughly water the plant and let it drain completely before putting it into its decorative container.

Patience

It takes about eight weeks for a plant to acclimate to a new location. During that time it may drop some leaves, but others should begin to grow. The leaves that remain and the new growth will have acclimated to the specific conditions (light, temperature, water, and nutrients) of the plant's new home.

After a plant starts to get acclimated, check it for any pests or diseases and to do any moderate pruning that may be necessary to make it better fit the space. To prune an indoor tree, follow the same pruning guidelines as for an outdoor tree (see chapter 11, Woody Ornamentals). This is also a good time to evaluate whether or not the plant is pot-bound and will need to be repotted. If repotting is necessary it is best to do it as soon as possible after purchase as the roots will also need time to acclimate to their new environment.

Bringing plants outdoors

Some tropical plants tolerate the move well from a sunny patio to a dim living room, but others do not. Before deciding to move a plant outdoors, consider where it has been all winter and spring and what its life will be like in the outdoors. Acclimation takes time, and plants, once adjusted to a new location, like to stay there. Some houseplants, such as palms, don't tolerate full sun—even a few hours on a patio could prove fatal.

For flowering patio plants or others that are routinely moved in and out, consider these precautions:

- Move the plant to shade or partial shade initially to give it a chance to adjust. Let it stay at that location for at least a week before moving the plant into full sun.
- Increase watering to allow for the additional amount needed for evaporation from the pot as well as increased **transpiration** rates from leaves due to wind, sun, and other drying factors. Plants in full sun generally need to be watered daily.
- Transplant pot-bound plants before moving them outdoors. The larger volume of soil and available water will help reduce stress.
- Fertilize regularly—weekly for many of the flowering plants—with a fertilizer designed to support growth and promote flowering.
- Keep the plant clean and inspect regularly for insects.
- Before bringing the plant back into the house, clean both the pot and plant thoroughly, prune back excess growth (no more than ⅓ of the total plant size), and respond appropriately if there are any insects (more details later in the chapter).

Some plants can be moved successfully outdoors and back indoors without too much stress. Many succulents, cacti, and orchids do well in the outdoor shade, and then transition readily indoors in the fall. An example is jade plant, which will turn a beautiful shade of red in full sun and then return to its green color when brought back inside.

Many houseplants, however, cannot tolerate our summer sun and will scorch easily. Think twice before moving plants outdoors for a breath of fresh air. If plants are moved outdoors for the summer, remember to follow the steps for acclimation when they are brought back inside. Even with proper acclimation, some plants may suffer if they are taken outdoors and back inside every year (see box).

Basic indoor plant care

Location, location, location—find the right place and plant care will be much easier. Certain basic conditions need to be provided:

- Light—the most critical factor.
- Water—not too much, not too little.
- Temperature—tropical temperatures about 55 to 75˚F.
- Air—if it's okay for you, it's probably okay for your plants.
- Soil and nutrients—a light soilless mix with good drainage and regular fertilization.

The case of the hibiscus

With all that is said in this section on acclimatization, you may be thinking, "If it takes two months to acclimate, and I put my plants outside in June, and bring them back inside in September, my plants are spending a good bit of time just adjusting back and forth." This is true, and some plants can adapt faster than others. In some cases, the plant may just prefer to be left in one spot all year round.

A good example is *Hibiscus rosa-sinensis*, or Chinese hibiscus. This plant is beautiful and will flower almost all year long if left in a bright location indoors. It will also tolerate full sun, however, and many people use it as a patio plant.

- The first year it is gorgeous and blooms all summer. That's because it has been grown in sunny Florida and your patio is as close as it will ever get to those conditions. When it is moved indoors in the fall, the leaves turn yellow and fall off.
- By mid-winter, if it has survived, it will have completely replaced all of its leaves with new, structurally different leaves. These leaves are developed specifically for the lower light of the indoors. They typically will be larger, darker green, and thinner than the leaves it had in summer.
- If the plant were left indoors, it would eventually regain its energy and start making flowers again. If the plant is moved outdoors in the late spring, it has to drop those leaves that it worked so hard to produce for indoor light and make new leaves to withstand the full sun. That's a lot of energy. Once it's done it may not have enough strength to make flowers before it's time to come inside and start the cycle all over again.

Light

Light is essential for plant growth, flowering, maintaining good leaf color, and basic survival in the interior landscape. Proper light intensity is crucial for maintaining healthy houseplants.

The easiest way to estimate light intensity is with a light meter. A photographic meter or camera with a built in light meter will provide fairly accurate readings in footcandles (fc) or lux (1 lux = roughly 0.09 footcandles). Indoor light is significantly less intense than outdoor light, even in the shade. Outdoors in full summer sun, plants can receive as much as 10,000 fc of light (or as little as 350 fc in the shade). Indoors in homes and offices, light intensity ranges from 30 to 80 fc under electric lights, and up to 200 to 800 fc when the sun shines directly in.

Growth is the key. In general, if plants are growing they are getting adequate light. Plants are sometimes used in the interior strictly as decorative items and put in locations that are not conducive to growth. Under those conditions plants will survive but not thrive. In extreme cases, a plant will die due to lack of light. If you are witnessing normal growth, chances are the plant is in adequate light.

Table 1 includes some examples of houseplants that grow under different light conditions. There is some crossover in these recommendations, as many plants will readily acclimate to different light levels. The closer to optimal levels of light, however, the better the plants will grow and the healthier they will be. Note:

- Plants listed as doing well in low light will often do better in medium light.
- Plants that do well in medium light may be scorched by high light.
- Flowering plants that do well in high light may grow well in medium light but may not flower.

TABLE 1. Plants for different light conditions

LOW LIGHT (25–75 FC)
Aglaonema species (Chinese evergreen) 'Silver Queen,''Emerald Beauty'
Dracaena fragrans (corn plant)
Dracaena deremensis ('Janet Craig')
Epipremnum aureum (pothos, devil's ivy)
Maranta and *Calathea* species (prayer plant, arrowroot, peacock plant)
Philodendron scandens oxycardium (heart-leafed philodendron)
Philodendron wendlanii
MEDIUM LIGHT (75–150 FC)
Anthurium species ('Lady Jane' is a dependable variety)
Chamaedorea elegans (parlor palm)
Cissus rhombifolia (grape ivy) 'Ellen Danica'
Dracaena deremensis ('Warneckii')
Dracaena marginata (dragon tree)
Ficus repens (or *pumila*) (creeping fig)
Ficus benjamina (weeping fig), *F. retusa nitida* (Indian laurel), *F. maclellandii* (alii fig)
Ficus lyrata (fiddleleaf fig), *Ficus elastica* (rubber plant)
Hedera helix (English ivy), *Hedera canariensis* (Algerian ivy)
Howea forsteriana (kentia palm)
Philodendron selloum
Polyscias pinnata ('Balfour,' or Dinner Plate aralia)
Polyscias fruticosa (ming aralia, parsley aralia)
Ravenea rivularis (majesty palm)
Rhapis excelsior (rhapis palm)
Spathiphyllum sp. (peace lily) large variety, including 'Petite,' 'Starlight,''Wallisii,' 'Mauna Loa,')
Syngonium podophyllum (nephthytis, footleaf plant)
HIGH LIGHT (150–1,000 FC)
Hibiscus rosa-sinensis (flowering Chinese hibiscus)
Hoya species (flowering wax plants)
Schefflera arboricola (dwarf schefflera or umbrella plant)
Podocarpus macrophyllus or *gracilior* (Japanese yew)
Strelitzia nicolai (white bird of paradise)—large bright green leaves
Strelitzia reginae (bird of paradise)—large blue-grey leaves, usually sold in flower
Most variegated cultivars of tropical plants

Light influences many aspects of plant growth, especially chlorophyll synthesis, photosynthesis, and **photoperiodism**. Light is radiant energy that can be seen—the visible portion of the electromagnetic wavelength spectrum, which is composed of rays of varying wavelengths and frequency. Visible "white" sunlight is really a blend of red, orange, yellow, green, blue, and violet rays. The different colors have differing effects on plants.

- Blue and violet promote foliar growth.
- Red and far red light affects elongation of various plant parts and flowering.

If there is not sufficient natural light (see box), artificial or supplemental light can be used to grow houseplants. No artificial light source can perfectly match natural sunlight.

- Incandescent lights were once the most common type of light bulb used in homes. However, they cannot be used as the only light source for plants because they do not produce the color spectrum necessary for complete plant growth. Incandescent light is rich in red and yellow wavelengths and can encourage stretched out growth. These bulbs also give off a considerable amount of heat and can cause damage if placed too close to plants.
- Fluorescent light is an excellent source of artificial light, offering higher light efficiency than incandescent bulbs while generating a small amount of heat. Excellent plant growth can be obtained by using fluorescent lamps with one cool white (blue spectrum) and one warm white (red/yellow spectrum) lamp together.
- Specially marketed fluorescent and LED "grow" lights, which are more expensive, have better color spectrum balance but are not necessary for satisfactory growth of most plants.

Some tips about light and plant health (see table 2):

- The further it is from the window, the less light a plant receives.
- A clean plant receives more light; dust buildup on leaves blocks the already low light.
- Most tropical foliage and flowering plants require bright light, not direct sun. Tender leaves are easily scorched by full sun. Do not put interior plants on the porch for a day of sunshine—they may end up with sunburned or dead leaves.

Use supplemental light if necessary. Cool fluorescent bulbs can be used very close to the foliage to improve lighting conditions. Many flowering houseplants will appreciate supplemental lighting.

TABLE 2. Are your plants getting the right light?

Not enough light	Perfect light	Too much light
No growth	New growth	New growth different
Leaves yellowing	Dark green leaves	Pale, near white leaves
Leaves dropping	Few leaves dropping	Leaves dropping
Loss of variegation	Strong variegation	Scorched Leaves
Soil stays wet	Regular water needed	Soil stays dry

Guidelines for estimating light levels

- East window: half shade, morning light is cool. This would be considered a medium light area.
- West window: half sun, afternoon light is warm. This would probably be a high light area. If plants are too close to the window, some scorching may result.
- South window: full sun, most sun for the longest period, usually warmer. This would also be a high light area. South and west windows often provide enough light for tropical plants 2 to 3 feet away from the window.
- North window: full shade, least sun, considered shady, usually the coolest. This is the lowest light window. However, many plants will thrive in a north window.

The case of the disappearing variegation

Variegated houseplants provide color and variety. The key to growing variegated plants is light. The more variegation, the more light the plant needs.

An example is the 'Marble Queen' pothos, a durable, long-lived plant that is commonly used in homes and offices. The variegation is striking—a pure white to cream marbling over a large percentage of each leaf. Normally pothos is considered a low light plant and will grow very well in office conditions with only limited fluorescent light as the sole light source.

However, Marble Queen and other variegated cultivars will lose their variegation over time in low light situations. Eventually, the chlorophyll (which makes the leaves green) will spread into those layers of cells that are lacking and green them up. This is a protection mechanism for survival and growth. Without adequate light, variegation will disappear.

The less chlorophyll in the leaf, the more light is needed to produce the sugars and other components necessary for growth. The more chlorophyll in a leaf, the less light is needed to produce the same amount of sugars and other components necessary for growth.

Water

Water is essential to all life and is necessary for every chemical reaction within the plant. Not enough water causes wilting, leaf yellowing, and leaf drop. Too much water causes the exact same symptoms, due to root rot.

Excess water is the leading cause of houseplant death. Indoors, the **relative humidity** is usually very low. This favors rapid **transpiration** (taking up and releasing water to the atmosphere) from the leaves. However, if the plant's roots are not well developed (especially after transplanting or repotting), they may not be able to supply enough water to the leaves to replace what is lost to transpiration. This can lead to **wilting** and water stress—even though the media in the pot is nice and moist.

The worst thing to do in this case is to keep watering. This plant can't be helped by adding more water to the roots—they're already taking up as much as they can. If there is too much water in the soil, the roots won't be able to breathe (they need air too). Waterlogged roots are susceptible to root rot, which reduces their ability to take up water even more. What can be done to reduce transpiration and water loss from the leaves. Mist the plant to increase the relative humidity around it and buy it time for the roots to grow.

The easiest way to water plants in containers is to carry plants to a sink, laundry tub, or bathtub. If plants are potted using the "double-pot" method (more on this later in the chapter), they can easily be watered correctly where they are without worrying about overwatering or water leaking onto the floor or furniture. Wherever they are watered, follow these tips:

- Use tepid (lukewarm) water.
- Gently pour water around the total circumference of the pot until the water drains through freely.
- Don't let plants sit in water.
- Let the plants dry out well (a few exceptions) between watering—use your fingers (dig deep) to check the soil moisture or use a soil moisture meter.
- Use wicking systems or some other bottom-watering system for sensitive plants that require uniform moisture.

Many factors affect the amount of water a plant uses:

- **Soil type.** Heavier soils hold more water longer. In general, soil mixes should be light, highly organic, and very well drained.
- **Pot size.** The more soil in the pot, the more water it will hold. Larger plants in larger pots may need more water, but less frequently.
- **Air temperature.** Warmer temperatures mean more water lost through transpiration through the leaves and evaporation from the surface of the soil. In winter, many plants need more frequent watering, not because they're growing, but because they are losing so much moisture to our dry, heated air through transpiration and evaporation.
- **Soil temperature.** Cool soil temperatures can lead to poor water uptake by the roots. Always check soil moisture before watering. If a plant is wilting, but the soil is moist, adding more water will just compound the problem.
- **Airflow.** Air movement around the plant will directly affect the amount of moisture lost through the leaves as well as how much moisture is lost through evaporation from the soil. Airflow is important for the health of the plant because air is an important source of nutrients (carbon and oxygen), but too much air movement can lead to excess water loss.
- **Light.** Higher light levels result in more water used.
- **Leaf shape and texture.** Thicker leaves, or leaves with a thick, waxy coating, indicate a plant that holds water. Thinner leaves usually lose water more rapidly.

Know your plants and their environment.

Not only does every plant differ in the amount of water it uses, a given plant will need different amounts of water depending on the season. Some plants may only need water once every 6 to 8 weeks; others may need it every week.

Water quality will affect the health of a plant. Tap water is fine in most cases, but water quality will vary considerably from home to home.

- Fluoride and chlorine are commonly added to public water supplies and may cause tip burn in some plants, notably *Chlorophytum comosum* (spider plant) and many of the *Dracaenas*. Excess boron can also cause tip burn.
- Sodium can cause tip burn in some species of foliage plants. In homes with softened water, water plants from a non-softened tap if possible.
- Some water is high in minerals such as calcium and magnesium. These necessary elements are not harmful, but they may build up as a white, salt residue on pots.
- Purified water from a humidifier is fine for watering interior plants. This water contains no nutrients, however, so be sure to fertilize on a regular basis with a complete nutrient mix.
- Rainwater is not recommended for interior use. Runoff from roofs and gutters may contain chemical contaminants, and there is always the risk of bringing in pests—whether fungal, bacterial, or insect.

Transporting plants in cold weather

When bringing indoor plants home after purchasing them or moving them from place to place, do not expose them to temperatures less than 50˚F—even for a short while. Use paper or plastic wraps for protection. If the temperature is below freezing, DO NOT attempt to move plants in and out without substantial protection (wrapped and boxed) and keep the time outside to the bare minimum. It takes just a few minutes at freezing temperatures to fatally damage a tropical plant. Remember to remove the wrapping promptly when the plant is back in a protected environment.

Temperature

Air and soil temperature are important factors in the health of all plants. Airflow, air temperature, and air quality can all affect how well a plant thrives inside. One of the most common problems in homes and offices is placing plants in front of heating and cooling vents. The direct flow of hot air, especially, can be very detrimental to the health of a foliage plant. Constant airflow from a heat vent can cause excessive drying of the foliage and result in significant stress, which can slowly kill the plant. Likewise, if a plant is in the direct path of a door that is frequently opened in the winter, significant damage can result from chilling injury (see box).

Air temperature has a direct impact on how well plants grow in the interior environment. In general, most tropical foliage plants appreciate a comfortable 60 to 75˚F, a range that people tend to prefer as well. If the temperature gets below 50˚F, many indoor plants will suffer chilling injury characterized by leaf discoloration and wilting. Depending on severity of the damage, the plant may or may not survive.

Soil temperature affects plant health indirectly. Roots that are chilled or damaged will have a hard time taking up water and nutrients from the soil. This will cause wilting and eventual nutrient deficiency symptoms in the leaves.

Air

Air quality can also affect plants. The most notable example is ethylene exposure. Ethylene is a gas naturally produced by ripening fruits and foliage plants in a closed environment.

An example of ethylene damage is a poinsettia wrapped in plastic. If the plastic wrap stays on for several hours or days, the plant will start to produce ethylene as a stress response. The ethylene, in turn, will cause the poinsettia to drop its leaves to protect itself from further damage. Combustion engines also produce ethylene—exposure may occur during shipping, but the plants may not show symptoms until a few days after arrival. Fortunately, most plants will recover with time.

Soil and nutrients

The part of houseplants you can't see—their roots—is critically important to how they adapt to any house. The environment within the confines of the container must provide air, water, and nutrients to the developing roots. The soil and the container are also the base of the plant, providing physical support for the upper portion. This is especially important with larger plants.

Most of our foliage plants for interior use are shipped here from warmer climates. Growers maximize growth in the warmth and sunshine by using slow-release fertilizer in the soil mix and fertilizing with a liquid fertilizer on a regular basis. A new plant probably has enough nutrients in the soil to last 6 months under normal interior conditions. In a home, there are measures to take to manage the soil environment of houseplants to maximize their health and growth.

Soil mixes

A light soil mix works best for most houseplants. The lighter the mix, the more air is available for root growth. Many premixed soils, including soil-less mixtures, are excellent for houseplants. They contain peat moss, compost, perlite, vermiculite, and usually a timed-release fertilizer. For tips on making potting soil, see the box.

Mixes that contain soil will say so on the label under "ingredients." Soil is a good thing to have in a houseplant mix as long as it is sterilized. Soil provides good water-holding capacity and nutrients, and has good **cation exchange capacity**—the ability to hold and release nutrients to the roots as needed. The downside to soil is that it is heavy. In some cases, that may be a plus. With a top-heavy plant, a mixture containing soil will give more weight to the pot and keep the plant from tipping over. Soil alone, however, is not good for houseplants. It needs to be mixed with other components—like peat moss and perlite—that will help improve drainage.

Commercial soil-less mixtures are also excellent for houseplants. They contain enough organic matter to substitute for the water-holding and cation exchange capacity that soil would normally provide and they are much lighter weight. One of the downsides of soil-less mixes is that due to their high organic matter, they tend to lose volume over time. The level of the soil in the pot will slowly get lower due to settling (compaction) and degradation of the organic matter by microorganisms. That's easy enough to fix; just repot the plants when the level gets too low.

Do-it-yourself potting soil

BASIC SOIL MIX

- 1 part peat moss
- 1 part vermiculite (or perlite)
- 1 part sterilized soil (you can sterilize garden soil in your oven for 45 minutes at 160 to 180°F)

HIGHLY DRAINED SOIL MIX

- 1 part peat moss
- 2 parts perlite
- 1 part sterilized soil or compost

HIGH ORGANIC MATTER SOIL MIX

- 2 parts peat moss
- 1 part compost
- 1 part sterilized soil
- 1 part perlite

OPTIONAL INGREDIENTS

- Slow-release fertilizer
- Horticultural charcoal – absorbs odors
- Sharp sand—only used with top-heavy plants that require little water, such as cacti and succulents. Use in a 1 to 1 mixture with peat moss or compost.

Components of soil and soil-less mixes are highly variable. Read the label. Many of the potting soils really are soil-less. Many contain a higher proportion of one component over the other.

- For a very well drained mixture, increase the amount of perlite.
- To increase the water-holding capacity, add more peat moss.

When mixing potting mixtures, try to work outside. Peat is very dry and its dust can be messy. Perlite and vermiculite dust are potentially harmful to your health, so a dust mask should be worn when emptying the bags into the mixing container. Many premixed potting mixes have a wetting agent that makes them easier to water the first time. Homemade potting mixes may be very dry and difficult to moisten. Try pre-wetting the peat moss with hot water before mixing in the other components. When transplanting always use media that is slightly damp—not soaking wet and NEVER dry.

Containers

The type of container used and the way containers are used is important. The key to successful potting and good root growth is to provide good drainage, and the type of container will affect the drainage of the soil mixture. When choosing a container, understand that the excess water must drain away from the roots so they do not sit in water for any length of time. For many plant species, even a few hours sitting in water is long enough for root death. In an established plant, the majority of the roots are at the bottom of the pot. So, even with a tray system and the drained water fills the 1-inch tray, the roots in the bottom 1-inch of the pot are in an **anaerobic** situation as long as that water is there. No oxygen means root death.

There are two basic types of pots: grow pots and decorative containers.

- Grow pots are containers that are suitable for growing plants. Most foliage plant growers use plastic because it is inexpensive and retains moisture well.
- Decorative containers are used to hold the grow pot. Their function may not just be decoration; these containers provide waterproofing to keep any draining water from ruining furniture or carpet.

Materials for containers

Clay can be used as a grow pot or as a decorative container if it is glazed. Clay pots are heavy, which make them perfect for plants that tend to get top-heavy. Unglazed clay is also very porous, which means it makes a good grow pot for those types of plants that like a dry soil environment, such as cacti and succulents.

Plastic pots are excellent grow pots that help to maintain moisture in the soil mix. Plastic is lightweight, inexpensive, recyclable, and easy to replace if there is a problem with root diseases.

- If root diseases have been a problem, do not reuse the plastic pots. Typical methods of cleaning pots using soap, hot water, and even bleach are not always effective in killing certain soil-borne pathogens.
- Some plastic containers make perfect decorative containers. Retail plant rental companies use many types of rigid plastic waterproof containers for decorative and waterproofing purposes.
- Plastic decorative containers come in a wide variety of colors and styles and tend to be inexpensive.

Ceramic pots with no drainage holes are excellent for decorative containers. There are many beautiful ceramic containers that add to the décor and still provide that much needed waterproofing. Ceramic pots with drainage holes—and a tray underneath to protect furniture from excess water—work well as stand-alone grow pots.

Metal pots make fine decorative containers, but avoid using them as grow pots even if they have drainage holes. Because of the chemical reactions of soil, water, and metal, it is possible to get nutrient toxicities in houseplants. This frequently happens when copper pots are used as grow pots.

Potting techniques

Before repotting a plant, gather all of the supplies in a place where a bit of a mess can be made. The new pot should be only 1 to 2 inches bigger than the previous pot. So, if you have a plant in an 8-inch pot, select a 10-inch pot for repotting. If the plant is put in a larger pot, it will spend all of its energy making roots to fill that space and the foliage will suffer.

Standard potting procedure

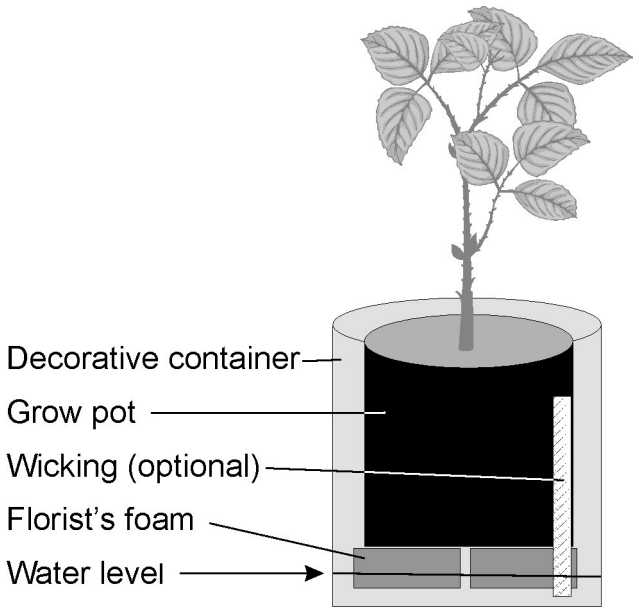
1. Cover the drainage holes with something that will allow water to drain through, yet keep soil mix from flowing out the holes: paper coffee filters, clay shards (from broken clay pots), small pieces of florist foam, or small pieces of styrofoam. Do NOT put rocks or other "drainage" materials on the bottom of the pot. Contrary to popular belief, the use of rocks actually decreases the drainage of the soil mix. It is best to have a well-drained soil mix uniform all the way from the top to the bottom of the pot.
2. Pre-moisten the soil mix and place a layer in the bottom of the pot—estimate the depth needed by the size of the plant's root ball. The plant should stay at the same depth it was in the previous pot—no deeper.
3. Set the roots into the pot and align the plant. Make sure it will not be too deep or too shallow when the pot is filled. The soil mix should be ½ to 1 inch from the lip of the grow pot.
4. Using a scoop or small pot, pour soil mix around the base of the roots, gently pressing the soil in place. The key is to make sure there are no air pockets around the roots without compressing the soil too much. Continue to fill with soil mix until reaching the level the plant was previously potted at, about ½ to 1 inch below the lip of the pot.
5. Water the plant slowly and thoroughly. Make sure that water has drained freely from the drainage holes before moving the plant to its final home.

Double-potting method

The double-potting method allows plants to be grown in containers without drainage holes (see figure 1).

1. Using the standard potting method, repot the plant into an appropriate grow pot with good drainage.
2. Choose a decorative, waterproof container that the grow pot fits in. There should be at least 1 inch on the sides and 3 inches at the top when you set the grow pot into the decorative container.
3. Cut florist's foam (the spongy green foam that florists use for flower arrangements) to a 2-inch thickness and place several pieces on the bottom of the decorative container. With small pots the florist's foam might be 1 inch or even ½ inch.
4. Place the grow pot on top of the florist's foam. This allows any water to go into the waterproof decorative container and be absorbed by the foam.

FIGURE 1. Double potting



Wicking

Wicking is useful for watering plants. It is particularly helpful with plants that are sensitive to moisture changes and like a uniformly moist soil. Most flowering houseplants—such as African violets, hibiscus, azalea, gardenia, jasmine, peace lilies, ferns, and ivies—appreciate this.

It is easy to accomplish this using the double-potting method even after the plant is potted. The key is finding the right wicking material. The best material to use is capillary matting, a synthetic fabric used in the greenhouse industry for bottom watering. Some garden centers carry this, but more than likely you will have to order it from a horticultural supply catalog.

To add wicking to a pot:

1. Cut a wick that is 1 inch wide and long enough to touch the bottom of your decorative container while extending ⅔ up your grow pot. You can use the height of your grow pot as an approximate length to cut the strip.
2. For a 6- or 8-inch pot, use one wick. For a 10- or 12-inch pot, use two wicks. For a 14- or 16-inch pot, use three wicks.
3. Using a pencil, a chopstick, or a screwdriver as a "stick," fold 1 inch of the wick over the end of your stick and push it up through a drainage hole until the top of the wick is about ⅔ of the way up the pot. **Note:** Don't extend the wick to the top of the pot. If the wick is exposed even a little, it will dry the soil out instead of making it moist.
4. Once the wick is in place, the end should reach the bottom of the container. It's okay if it's longer and lies across the bottom.
5. Water the pot from the bottom by filling the decorative container to just below the bottom of the grow pot. The wick(s) will move water up into the grow pot as the soil dries. **Note:** If the soil appears to be dry after one or more wicks are in place, there may not be enough wicks for that volume of soil. It may also be good idea to water the pot from the top once or twice a year to flush excess fertilizer or mineral salts out of the soil.

Nutrients and fertilizers

After a plant has acclimated to its new interior location, consider starting a fertilizer program in the spring of the following year. Most foliage plants do not need additional fertilizer during the winter months, and most new plants will have a slow-release fertilizer incorporated into the soil mix that will last 3 to 6 months. So, hold off on fertilizing for a few months—until the plant is starting to show signs of new growth.

Plants obtain nutrients from the air, water, and soil. With a soil-less mixtures it is very important to fertilize foliage or flowering houseplants regularly to support healthy growth of roots, leaves, and stems. Although soil will provide more nutrients than an artificial or soil-less mixture, plants still need to be fertilized when using mixes containing soil. Each plant and each potting medium will require a different regime of fertilization.

Most foliage plants will do well with a basic 10-10-10 fertilizer once every 2 weeks during the growing season of March through October. Vigorously growing plants may need fertilization once a week. Slow growing plants should be fertilized once a month, or with less fertilizer. For more information on fertilizers, see chapter 2, Soils.

Special fertilizers

Flowering plants demand a different type of fertilizer to properly support their reproductive development. As an example, orchids are typically given two types of fertilizer during the year. One is a high nitrogen fertilizer to support vegetative growth. The second type contains a lower percentage of nitrogen and a higher percentage of potassium to support floral development. Since many orchids are **epiphytes** and live well on a very loose medium such as fir bark or rock wool, they will need frequent fertilization with a low rate of fertilizer. Excellent instructions for proper fertilization are on fertilizer labels.

Salt buildup and toxicity

Over-fertilization is a common problem in houseplants and can be detrimental if not handled properly. Fertilizers are basically salts of various chemicals. In addition, many of the minerals found in tap water—such as magnesium and calcium—are in salt form. "Salt" is simply a chemical term that identifies two elements that have bonded together. We think of table salt, which is sodium + chloride (NaCl), but there are many other salts naturally found in water and definitely in fertilizer. Salts build up in the soil and on the pots when present in high concentrations.

Think of the damage road salt does to the grass and trees on the side of the yard. The same thing can happen in houseplants if over-fertilized. Salt buildup damages the soil structure and it can cause a severe stress response in plants due to its effects on water and nutrient uptake. Sometimes nutrient toxicities can occur if plants are over-fertilized.

Symptoms of salt damage include leaf tip burn, leaf margin burn, and leaf drop. In severe cases the plant may wilt, and any new growth may look distorted or show browning on the tips of the new leaves.

Leaching

By watering properly until the solution drains through the bottom every time, most salt buildup can be alleviated. A thorough **leaching** with lukewarm water can decrease the incidence of salt buildup (see box).

While salt buildup on the pot isn't harmful, it's not very attractive either. Salt buildup can be washed off the surface of plastic pots, but salt accumulation in the thick, porous walls of clay pots will need to be soaked out slowly.

What you should be concerned about is that if the salt has appeared on the edges of the pot, imagine what the concentration must be in the soil. If the problem is severe and there is significant salt buildup on the pot, consider repotting the plant and replacing both the pot and the soil.

Pests

Houseplants are prone to the same types of pests as their outdoor counterparts. Root rots are commonplace when plants are improperly watered. A house cat is a pest when it chews on the leaves—which can be a concern as many houseplants are toxic. By and large, insects are the most common pest problem with houseplants.

Despite the fact that they reside indoors, houseplants are susceptible to a number of insect pests. The lack of natural rains to wash critters from leaves and a dry, warm climate year-round can create an ideal breeding environment for insects. Even the most cared-for houseplants are sometimes attacked. Signs that pests are present include sticky leaves (or a sticky surface under the plant), stippling on the leaves, distorted and misshapen growth, and/or critters moving or sitting on the plant.

Leaching houseplants

1. Take the plant to the sink.
2. Water, water, and water some more.
3. Water again.
4. Let drain thoroughly.

Common houseplant pests

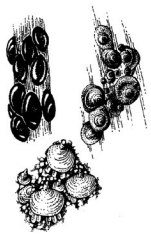
Fungus gnats

Fungus gnats are annoying insects that resemble fruit flies. Eggs are laid in moist potting soil and hatch into larvae that eat organic matter in the soil. Detect them by placing thin slices of potato in the soil for a day. The clear to white, maggot-like larvae will congregate on the underside of the potato slices. *Bacillus thuringiensis* (Bt) products applied as a soil drench will control fungus gnats. Sticky yellow cards (whitefly traps) can be used to capture the adults. If the population isn't too great, these traps can keep the insects from spreading to other plants. Fungus gnats prefer moist conditions, so allowing plants to dry out between watering will also help control them.

Mealybugs

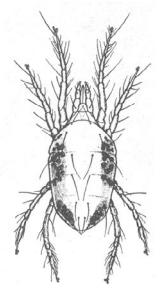
These appear as white cottony masses on the undersides of leaves and at the growing points. The cottony mass is an indication of an already established female with eggs and can be hard to control. Pyrethrins (pyrethrum), rotenone, or insecticidal soap will kill the crawler stage of this insect; applications must be made every 7 days over a 3-week period to kill successive generations. Rubbing alcohol on a cotton swab can be used to wipe off adults, but this is time-consuming and not very effective against a serious infestation. A granular systemic insecticide applied to the soil will work with these sucking-type insects, but if pets or children are present, remember that any insecticide applied to the soil will leach into the tray below. Neem, a natural chemical control available under many brand names, has also been recommended for control of sucking type insects. Although organic in nature, neem is a powerful insecticide and should be used with caution.

Scales



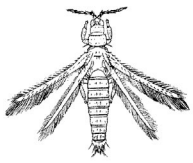
Scales are similar to mealy bugs and often equally as difficult to control. Scale infestations often go unnoticed until the plant becomes shiny due to **honeydew** excreted from established females. This is a large and diverse group, with many species that may occur on houseplants. The scale insect is covered with a hard shell, often dark in color, which is often mistaken for part of the plant. Scales commonly attack *Ficus* species, cycads, and palms. Use the same control measures as for mealybugs.

Spider mites



These tiny little mites often go unnoticed until webs form. If webs are visible on the plants, they have a large infestation of spider mites. Take a white piece of paper and hold it under an infested leaf while tapping the leaf. Spider mites will show up as crawling specks on the paper. To control spider mites, increase the humidity and keep the plants clean. Spider mites hate humidity. Wipe off the plant's leaves on both sides with a damp rag weekly and mites won't become established as readily. If possible, wash plant in tepid water in sink or tub. Even with a serious infestation, weekly showers for 4 weeks will kill most of the mites. Most insecticides are ineffective against mites—choose insecticidal soap or miticides (acaricides).

Thrips



Thrips are cream to brown-colored, tiny, elongated winged or crawling insects. You may not notice them in plants until the leaves begin to look flecked or the new growth is damaged. Many species of thrips hide in protected parts of the plants, making them less visible and more difficult to control than some other pests. Pesticides are often not effective because they do not penetrate into areas of the plant where the thrips are. Rotenone, pyrethrins, or insecticidal soap can be used to control these, but repeat applications will be necessary. Many thrips are resistant to

insecticides currently available on the market. Keep the plants clean and thrips will be less of a problem.

Whiteflies

These tiny winged white insects (in the adult stage) readily fly when disturbed. They, and their sedentary immatures, suck the sap of the plants—generally from the undersides of leaves—and can do significant damage when found in great numbers. For interior plants and limited infestations, sticky yellow cards (whitefly traps) help suppress the adult population. Cleaning the underside of leaves will help remove immatures. An interior-labeled insecticide containing pyrethrum can be effective when applied in successive applications over a period of several weeks.

Inspection

Inspection is an important part of obtaining and keeping healthy plants. Whether someone is buying a plant, receiving a plant from a friend, or bringing a plant in from outdoors, it is very important that the plant be examined critically. Ask these questions while inspecting the plant:

- Is it showing signs of new growth?
- Does the new growth look normal?
- Is there any mottling or spotting on the leaves?
- Are there white specks on the leaves?
- Is there any webbing on the leaves or between the petioles and the stems?
- Are there any signs of insects on the new growth, on the stems, or on the undersides of the leaves?

Sometimes it is difficult to see pests directly, but the signs of their presence are usually noticeable.

Cleaning

Cleaning is the best defense against pests after inspection. Many houseplant insects can be managed if the plants are cleaned on a regular basis. There are various ways to clean plants, and no chemicals, soaps, sprays, or oils are needed.

Cleaning method 1: Take two soft cotton cloths (diapers, dish towels, etc.) and gently wipe the underside and top of each leaf at the same time. For most plants a dry cloth works well. If needed, or if there is an insect problem, use a slightly damp cloth.

- For large-leafed plants like bird-of-paradise, this cleaning method is easy. Start at the base of the leaf with a cloth on top and a cloth on bottom and bring your hands up and out, following the leaf to the tip.
- For a ficus, with many hundreds of small leaves, it is more of a challenge. Use the same wiping motion, but instead of cleaning each individual leaf, gently stroke many leaves at once. This removes the dust from the tops of the leaves and discourages any pests that may be present on the underside of the leaves at the same time.

Cleaning method 2: Take the plant to the sink or shower and give it a gentle bath with lukewarm water. Once the plant is rinsed, let it drain for a while and then wipe it off with a clean, cotton cloth.

Clean on a regular basis—with the frequency determined by how dusty the plants get and whether or not there is a specific insect problem. Generally, a good cleaning once a month will be fine. Larger plants may only get cleaned once every 3 to 6 months. If the plant has spider mites, it will take a good shower every week for 4 to 5 weeks to get rid of them.

Inspect your plants before bringing them inside and clean them regularly, and you will have fewer insect problems.

Pest management

Cleaning will always be the preferred method for controlling insects on interior plants. Removing heavily infested stems or other plant parts will make control easier on the remainder of the plant (assuming the plant can tolerate such pruning). Unless the plant is particularly valuable, it may be best to dispose of heavily infested plant—rather than trying to treat them—before the pests spread to other houseplants.

Insecticides are effective but can be potentially harmful to the environment, pets, and children. In addition most insecticides—even the organic ones—tend to smell bad.

Insecticide sprays (aerosols or hand pump sprayers) made just for houseplants can be used for houseplant insect management. Successful control depends on thoroughness and persistence. Insecticides must be applied over the entire plant, including the undersides of leaves, repeatedly (weekly for a month or more) to get good control.

Granular insecticides applied to the soil of infested houseplants have limited effectiveness and their use is discouraged because of toxicity concerns.

When using an insecticide of any type, **always read the label**.

- Any chemical used inside the home must be approved for interior use.
- It is critical to properly identify the pest in order to choose the correct pesticide.
- Always treat chemicals with respect. Be careful.
- Be aware that some insecticides (including insecticidal soap) may be **phytotoxic** to some plants.

Always keep a phone number for the local Poison Control Center handy. Every poison center should have a database to look up any plant. Have the common and scientific name ready.

Poisonous houseplants

Most adults know not to chew on unidentified plant material, but children and pets can be less cautious.

If a child ingests a portion of a houseplant, the best advice you can give is to take the child and the plant to a doctor immediately (see box).

- If the child is showing any signs of discomfort, take him/her to the emergency room.
- If the child is having trouble breathing or having a seizure, call 911 immediately.
- For proper treatment they will need to know the name of the plant.

What to do if a child or pet has ingested part of a poisonous plant

1. Remove any part of the plant from the child's mouth.
2. Rinse the mouth out completely.
3. Save the plant part in a plastic bag to take to the doctor.
4. Check for irritation, swelling, or discoloration.
5. Call the Poison Control Center.

If a pet has ingested a plant, take the pet and the plant to the veterinarian immediately. For a list of common houseplants that are partly or wholly toxic, see table 3. Table 4 lists houseplants that are generally considered safe.

TABLE 3. Toxic houseplants

Note: This is not a complete list and includes some landscape plants that are sometimes used indoors.

Plant and plant part	Details
Crocus bulbs	Only the bulb is toxic
Hyacinth bulbs	Only the bulb is toxic
Daffodil bulbs	Only the bulb is toxic
Azalea (*Rhododendron* sp.)	All parts are toxic
Caladium (*Caladium* sp.)	All parts are toxic
Castor bean (*Ricinus communis*)	The seeds are highly toxic; one seed is enough to kill a small child
Dieffenbachia	All parts are toxic; can cause severe irritation and swelling and could be fatal if the air passages close from tongue swelling
English ivy (*Hedera* sp.)	Leaves and berries are toxic
Mistletoe (*Phoradendron flavescens*)	The berries are highly toxic, the leaves slightly toxic
Philodendron species	All parts can cause irritation and swelling
Potato (*Solanum tuberosum*)	Sprouts and vines are toxic
Pothos (*Epipremnum aureum*)	All parts are toxic
Wandering Jew (*Zebrina pundula*)	Leaves are toxic

TABLE 4. Nontoxic houseplants

Note: Anyone could have an allergic reaction to a specific plant. Many plants with milky sap, such as the ficus species and poinsettia, may cause a rash or other skin irritation.

Common name	Scientific name
African violet	*Saintpaulia* spp.
Air plant, bromeliads	*Aechmea, Billbergia, Guzmania, Tillandsia* etc.
Aluminum plant	*Pilea cadierei*
Begonia (except sand begonia)	*Begonia* spp.
Boston fern	*Nephrolepis exaltata*
Cacti (most)	various
Chinese evergreen	*Aglaonema* spp.
Corn plant	*Dracaena fragrans*
Echeveria	*Echeveria* spp.
False aralia	*Plerandra (*formerly *Scheffera or Dizygotheca elagantissima)*
Fig (weeping or other)	*Ficus benjamina*
Gardenia	*Gardenia jasminoides*
Gloxinia	*Sinningia* spp.
Grape ivy	*Cissus rhombifolia*
Hibiscus	*Hibiscus rosa-sinensis*
Jade plant	*Crassula argentea*
Kalanchoe	*Kalanchoe* spp.
Norfolk Island pine	*Araucaria heterophylla*
Palms (all)	*Chrysalidocarpus, Howea, Rhapis, Phoenix*
Peperomia	*Peperomia obtusifolia*
Piggyback plant	*Tolmiea menziesii*
Poinsettia	*Euphorbia pulcherrima*
Rubber plant	*Ficus elastica*
Schleffera	*Schefflera acitnophylla, S. arboricola*
Snake plant	*Sansevieria* spp.
Spider plant	*Chlorphytum comosum*
Swedish ivy	*Plectranthus australis*
Zebra plant	*Aphelandra squarrosa*

Propagating houseplants

Many houseplants can be easily propagated and shared with friends or contributed to plant sales. Pothos, philodendron, and many of the ivies are commonly pruned and placed in water to form roots. Plants that crawl across the ground or up trees in their natural environment are generally the easiest to root. Vegetative cuttings are also a good way to maintain the attractiveness of your indoor plants. Plants that are too tall can be air layered or cut back before they hit the ceiling.

Many other houseplants are not easily propagated in the home environment:

- Palms should not be divided since they don't handle the stress very well. Instead of two plants, you may end up with two dead plants. Palms can't be propagated by stem or leaf cuttings either. In the commercial industry, palms are propagated by seed, which is a slow process.
- Orchids are also more challenging to propagate, but many of the species can be divided in the spring. Some will form tiny plantlets on flowering stalks; these plantlets can be potted and grown. Breeders grow orchids from seed, which is a very time-consuming and meticulous process.
- *Ficus* species can be challenging to propagate, as is true with most woody species. In general, soft tissue is easier to root than woody tissue. In commercial production, most *Ficus* species are propagated by tissue culture.

Some houseplants can be propagated readily in the home with a little know-how and care. Table 5 is a list of some of our more common houseplants and the preferred method of propagation. These are all asexual—or vegetative—techniques that produce plants identical to the "mother" plant. With the right technique and a little practice you can have great success with growing new plants. For details on specific propagation methods, see chapter 19, Plant Propagation.

TABLE 5. Primary propagation methods

Division	*Chlorophytum, Maranta, Saintpaulia, Sansevieria,* ferns
Stem cuttings	*Aglaonema, Epipremnum, Hedera, Cissus, Dracaena, Dieffenbachia, Philodendron*
Leaf cuttings	*Streptocarpus, Saintpaulia, Sansevieria*
Air layering	*Dieffenbachia, Dracaena, Ficus*

Conclusion

Houseplants bring life and beauty to our indoor spaces. Unlike other interior design elements, they are living organisms that have specific requirements to grow and thrive. The proper supply of light, air, water, and nutrients are just as important for the indoor plants as for outdoor gardens.

While you can usually depend on a rain shower to water your garden, houseplants depend on you for all of their care. Knowing what they require to be healthy over time is the most important step of growing houseplants.

Resources

Wisconsin Horticulture publications are available at hort.extension.wisc.edu.

FAQs

How often should I water my houseplants?

This will depend on the type of plant. The best advice is to check the soil and add water to the pot when the top ½ inch of soil is dry. This will happen more frequently in the summer, when temperatures are warm and light levels are high.

I watered my plant, but it's still wilting. What's wrong?

The most common cause of houseplant death is overwatering. If the plant's roots are damaged or diseased they will not be able to absorb water from the soil and transfer it to the leaves, leading to wilting. Allow the soil to dry out and water sparingly until the plant recovers. If the roots are too badly rotted or damaged there may be no cure.

What should I feed my houseplant? How often?

Water-soluble solutions are usually the most effective and allow you to fertilize at a low rate when you water. In general, you want to feed your plants when they are actively growing (usually during spring and summer), not when they are resting (during fall and winter).

My houseplant is dropping a lot of leaves. Will it be okay?

There are a number of reasons why plants drop leaves—all of them are signs of stress. Has the plant been recently moved? Is it near a draft from leaky doors or windows? Is the soil too dry or too wet? Typically, drought stressed plants will lose old leaves first and the leaves of overwatered plants will turn yellow and old and young leaves will both fall off.

My houseplant is dripping a lot of sticky sap. What's wrong?

This is a common symptom of some insect pests. Check the leaves and stems for scale, mealybugs, or whiteflies.

Houseplants, practice exam questions

1. **Some of the benefits houseplants provide include:**
   a. Decrease VOCs in indoor air
   b. Increase oxygen in indoor air
   c. Increase contentment and enhancement of environment
   d. All of the above
2. **Selecting houseplants should involve inspecting the plants for**
   a. Signs of insects or diseases
   b. Healthy roots
   c. Suitability for the conditions it will be grown in
   d. All of the above
3. **When a new houseplant is acquired it should be acclimatized by:**
   a. Watering daily for the first week
   b. Choosing a location based on the plant's specific light and temperature needs
   c. Spraying with a shine product
   d. Washing weekly with hot water
4. **The best light for any houseplants is:**
   a. In the blue spectrum
   b. In the red spectrum
   c. The appropriate low, medium, or high level for the species
   d. Provided by fluorescent lamps, with one cool white and one warm white lamp together
5. **The most important factors that affect the amount of water a plant uses are:**
   a. Soil type, pot size, and air temperature
   b. Soil type, pot size, and watering regimen
   c. Pot size, air temperature, and insect infestation
   d. Pot color, soil temperature, and leaf texture
6. **Growing mixtures for all houseplants should:**
   a. Contain at least 50% garden soil
   b. Have good drainage
   c. Have a high proportion of peat moss
   d. Contain quick-release fertilizer
7. **Containers for houseplants should**
   a. Be decorative
   b. Be made of metal
   c. Allow for drainage
   d. Never be reused
8. **The double-potting method is most useful for:**
   a. Containers that already have drainage holes
   b. Containers that do not have drainage holes
   c. Large and top heavy plants
   d. Species that do best when the soil dries out between waterings
9. **Houseplants should be fertilized:**
   a. Shortly after acquisition
   b. With a high nitrogen product
   c. When a white crust develops on the pot
   d. Once every two weeks during the growing season of March through October
10. **Some common insect pests of houseplants include:**
    a. Fungus gnats, mealybugs, and spider mites
    b. Spiders
    c. Caterpillars
    d. Nematodes
11. **The preferred method for managing insect pests on houseplants is:**
    a. Spraying insecticides regularly
    b. Cleaning the plants regularly
    c. Using granular insecticides applied to the soil
    d. Pruning off affected plant parts
12. **If a child or pet ingests part of a houseplant you should:**
    a. Advise taking the child/animal to the doctor/vet if they are having trouble breathing
    b. Call poison control immediately
    c. Determine the common and scientific name of the plant
    d. All of the above

Answer key
1. (d) 2. (d) 3. (b) 4. (c) 5. (a) 6. (b) 7. (c) 8. (b) 9. (d) 10. (a) 11. (b) 12. (d)