Houseplants

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Learning Objectives

1. Be able to visualize different light conditions in the home and how they impact the choice of plants for a specific location.

2. Understand the difference between conditions needed for growth of houseplants and conditions needed for maintenance of houseplants.

3. Identify the key pests of indoor plants and how they are controlled.

4. Be able to determine when an indoor plant should be watered.

5. Understand the process of acclimation in houseplants when they are moved to conditions of changed light intensity.

6. Identify the major methods of houseplant propagation.

7. Be able to decide if a houseplant needs repotting and know how to repot a houseplant.

8. Understand the difference between pot characteristics.
HOUSEPLANTS

History of Houseplants

Plants have been grown in homes for centuries. There is evidence that the Chinese were the first to grow plants in their homes for ornament, over 3000 years ago. Plants in the home have historically been a sign of wealth, and only recently have houseplants become commonplace. Since the 1970's, commerce in the interior plant industry has grown to be a multi-billion dollar industry.

One reason for the delayed popularity of indoor plants has been the widespread belief that plants can "use up" the oxygen in the home environment, that they cause allergies, and that they are very poisonous. It is true that plants in the home respire like any other living thing, but assuming that the plant has enough light to survive, it would take an inordinate number of plants to even create a slight change in oxygen levels indoors. Most indoor plants are reluctant to bloom or produce pollen in the interior environment and are unlikely to cause allergies. The risk of poisoning from indoor plants is really no greater than the risk of poisoning from outdoor plants and is certainly not as great a risk as poisoning from household chemicals. Many houseplants contain toxic substances that must be ingested in large amounts to cause poisoning. These substances can cause irritation, but in normally ingested quantities do not result in death. Common houseplants that are poisonous are listed in Table 1. Some hospitals still do not allow plants in patient rooms because of concerns with chemicals used in production, but allow cut flowers that are raised using the same chemicals.

Houseplants are currently in use in almost every building imaginable. Scientific study indicates that plants in the home and working environment make people happier and more productive. The benefit of interior plants is more than just aesthetic; it is psychological.

Houseplant Needs

Plants in the home have the same needs as plants anywhere: sunlight, air, water and nutrients. For houseplants, the most restrictive of these is sunlight. The sunniest position inside a home will invariably provide less light to plants than the shadiest position outside. Even in the smallest of homes, there is a wide variation in light conditions. Light available to maintain plants is the key to selecting plants that will look good for a long time in the light conditions available. Therefore, plants should be selected according to the light conditions available to grow them.
Table 2 lists common houseplants according to light conditions they require for maintenance.

**Light Requirements:**

*Low*  
10 feet or more away from a window--no direct light. Directly in a north window with obstructions. Dull hallways.

*Medium*  
4-10 feet away from an east, south or west window. Directly in front of an unobstructed north window. Bright indirect light.

*High*  
4 feet or less from unobstructed south, east or west windows. Bright direct light or sunlight.

The requirements listed in Table 2 are for maintenance only. Maintenance means that the plants will not gain size in these light conditions, but that leaves lost can be replaced by new growth. Maintenance is actually more desirable than a lot of growth since the plant will be useful for a longer period of time in the home. Plants that grow too large will eventually need to be replaced or discarded. Plants that are grown indoors for their flowers usually need high light conditions to flower well, although foliage may be maintained in lower light levels.

In conditions of lower than desired light, light can be supplemented or replaced by an artificial light source. The light spectra that are most active in plant growth and development are red, far-red and blue. It is important that light in all of these wavelengths be available. If the light source produces primarily blue light (as in the case with cool white fluorescent tubes) plants will appear stunted, stems will not elongate and leaves will be thick and leathery. If the light source is predominantly red or far-red, as is the case with incandescent light sources, plants will be spindly and leaves will be small and thin. The distance of the light source from plant leaves is very important because intensity drops off rapidly as the light source is moved away from the plant. A suggested light shelf construction is detailed in Figure 1.

Many plants are well adapted to growing in supplemental light, but plants chosen for growth in artificial light sources should be intrinsically small in stature so the light source will not have to be moved often. Some plants that do well in artificial light are listed below:

<table>
<thead>
<tr>
<th>Heartleaf philodendron</th>
<th>barroom plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston fern</td>
<td>compact variegated snake plant</td>
</tr>
<tr>
<td>rabbit’s foot fern</td>
<td>marble queen pothos</td>
</tr>
<tr>
<td>painted drop-tongue</td>
<td>oakleaf grape ivy</td>
</tr>
<tr>
<td>lipstick vine</td>
<td>zebra vine</td>
</tr>
<tr>
<td>flame violet</td>
<td>African violet</td>
</tr>
<tr>
<td>variegated Chinese evergreen</td>
<td>silver queen Chinese evergreen</td>
</tr>
<tr>
<td>Chinese evergreen</td>
<td>pothos</td>
</tr>
<tr>
<td>creeping rubber plant</td>
<td>Venezuela treebine</td>
</tr>
<tr>
<td>spider plant</td>
<td>prayer plant</td>
</tr>
<tr>
<td>dwarf silver nerve fittonia</td>
<td>English ivy</td>
</tr>
</tbody>
</table>
polka dot plant  begonia
earthstar  columnea
peperomia

Watering is essential for all indoor plants since there is no natural rainfall available to them. Not all plants require equal amounts of water. This is a function of the climate the plant is native to, what kind and dimensions of the pot the plant is growing in, humidity, light intensity and size of the plant. **Plants should never be watered on any kind of schedule; instead they should be watered as they need it.** Knowing when a plant needs to be watered is an art, and good decisions about when to water are made only through careful observation and familiarity with plants in the home.

Decision making should begin with some familiarity of the plant’s needs. Table 2 is divided into sections of plants that need to be kept moist and plants that need to be kept drier. Plants in the list cover a wide range of moisture requirements, with everything from cacti that can tolerate complete dryness to umbrella plant that prefers constantly saturated soil. Table 2 is intended as a guide, and more detailed information about specific plants can be found on care tags and in texts. Plants will signal that they are too dry by turning gray-green and wilting. The will drop leaves, wilt or turn yellow if kept too wet. The best way to water is to check the soil moisture by probing where the roots are to a depth of one inch or more!

Watering systems may be as simple as top watering with a watering can to a capillary system where water is drawn up from a saucer to the soil to complex systems containing a reservoir and wicking system. Whatever the system, watering can be thought of in two basic ways: watering from the top and watering from the bottom. When watering from the top, water should always move through the entire pot so that water exits the drainage hole. In this way, accumulated salts that are toxic to the root system are flushed out of the soil. This waste water should be discarded. In a capillary system, water is taken up from the bottom of the pot or through a wick of some sort and moves upward through the pot where it is used by the plant or evaporated. Plants grown in a capillary system need to be top watered periodically to remove salts that accumulate in the soil. This is best accomplished by thorough watering to solubilize any crystalline accumulation, and watering again one or two hours later to flush the salts out. If water is softened in the home, unsoftened water should be used to water plants to avoid buildup of salts. Salt buildup is easily recognized as a brownish or white crust on the top of the soil.

Houseplants come from all corners of the globe, and plants are available to match every commonly maintained temperature regime in the home. The energy crisis has been beneficial to indoor plants since almost all plants prefer night temperatures that are noticeably cooler than day temperatures. Turning the thermostat down at night in the winter will therefore help interior plants thrive. Similarly, turning the thermostat up in the morning in the summer will create a similar diurnal variation in temperature. There is usually no harm in exposing plants to warmer or cooler than normal temperatures for a short period if the house is empty for a few weeks of vacation. Some plants may even flower in response to cool temperatures experienced when the homeowners are gone for a few weeks in winter. A few plants, like weeping fig, that demand more consistent conditions, will drop leaves in
response to such changes in temperature. Sudden and brief changes in temperature should be avoided if at all possible. In a very drafty location or near a heating or air conditioning duct, temperatures can change drastically in seconds. Leaves may be scorched and fall off if plants are exposed to such extremes in such short periods of time.

Most people overfertilize indoor plants. The goal in growing indoor plants is to keep them at a maintenance level where leaf loss is compensated for by growth, not to grow a large plant in a short period of time. Large amounts of fertilizer are therefore unnecessary for most indoor plants. It is often a good idea to completely eliminate the use of fertilizers in the winter months when light conditions are marginal. In most instances, monthly applications of a dilute liquid fertilizer in the summer months are all that is needed to keep plants healthy. Too much fertilizer can result in buildup of salts or excessive, leggy growth.

Most indoor environments are lacking in humidity, especially in the winter. All plants, except for the cacti and succulents, can benefit from treatments used to raise the humidity in their vicinity. Plants may be placed above a tray filled with pebbles and water to increase humidity in a local area around the plants. It is helpful to group plants together in a room since the evaporation from the plants collectively will raise the humidity in the area. The energy crisis and decreased use of heating and air conditioning in homes will also help increase humidity since both remove water vapor from the air.

Pruning is of minor importance with houseplants, and is usually done only to improve the aesthetic quality of the plant. Damaged leaves or stems may be removed, and leggy plants may be pinched to promote bushier growth. Some plants may be pruned to develop a straight trunk and the appearance of a small tree.

**Giving Plants a Summer Vacation**

In the marginal conditions of most homes, plants eventually become tired-looking whether due to lack of light, low humidity, overwatering, or underwatering. It is always beneficial to move plants outdoors in the summer months to give them a chance to renew tired growth and regain new vigor. **Light conditions in the shadiest spot outside are better than light conditions in the sunniest spot inside!** Indoor plants will usually thrive outdoors in the summer, even if moved under the shade of large trees. Natural rainfall will cleanse dust off leaves and water the plants. High humidity that occurs in areas of New York in the summer will promote new vigor in most indoor plants.

When and how should plants be moved outdoors? Timing is a key element and can result in disaster if ignored. The first warm day of spring is a poor time to move plants outdoors, since late frosts will kill most houseplants. Plants may be moved indoors on chilly nights, but it is best to move plants once, let them acclimate to the outside world, and leave them there until fall. Temperatures do not even have to reach freezing to injure many tropical plants. Some plants experience chilling injury that can result from exposure to temperatures as high as 45°F on some plants. This type of injury is caused by permanent changes in cell membranes and can be observed on bananas that are refrigerated in their skins. Tissue will
turn brown or black and leaves and stems may collapse (water soaked appearance). It is for this reason that the last frost date cannot be reliably used as a timing tool either. It is best to watch night temperatures and plan to put plants out only after night temperatures remain reliably above 60°F. In most of New York, this is early June.

Although increased light will give plants a chance to recuperate from lack of light in the winter, sudden changes in light intensity should be avoided. If plants are shifted directly into direct sunlight after a winter in a dimly lit window, they will be bleached by photodegradation of chlorophyll in the leaves. This bleaching will permanently mar existing leaves and may even kill the plant. Plants should first be placed in a shady position outdoors and gradually be given more light to avoid bleaching. Provisions should be made for watering and fertilization of plants that have been placed outdoors. Houseplants outdoors will use more water and fertilizer than they would indoors because of increased photosynthesis and growth in the higher light conditions outdoors.

All processes must be reversed to bring plants back indoors in the fall. Plants should gradually be introduced to shadier positions and fertilization and heavy watering should be discontinued to harden plants for another bleak winter indoors. In addition it is important to get rid of any insect baggage the plants may have picked up in their vacation outdoors. Check plants thoroughly and treat infestations as necessary. Even if you feel the plants are free of insects, quarantine them in a separate location in the house for a few weeks so any overlooked infestations do not spread.

Propagating Houseplants

Houseplants may be propagated by a number of methods. The simplest way to propagate many plants is simply by tip cuttings of young stems. Many houseplants will even form roots when placed in water. Others will root directly in moist potting soil. Other parts of plants can be used for cuttings. Leaf pieces of rex begonias, streptocarpus, and gloxinias can root and produce a multitude of small plantlets. Entire leaves of African violets root easily. Plants that do not have apparent stems can be propagated by division of the entire clump or plant which actually contains many small growing points. Bromeliads, ferns, and some palms may be increased in this manner. Seeds are not commonly used to propagate house plants, but pink polka-dot plant and asparagus fern can be easily grown from seeds. Bulbs can be used to propagate a small number of indoors plants as well. Certain plants are difficult to propagate by any of the above methods and can be layered to produce a new plant. Layering is illustrated in Figure 2.

Designing with Houseplants

One of the reasons for the increased popularity of indoor plants is the value they have as additions to interior decor. Unlike other furnishings, plants are living things and their best aesthetic use may not always match up with the location and conditions they need to survive. A palm may look nice in the basement recreation room, but without light, it will not survive.
Fortunately, plants can be a part of areas of the home, like the basement, that are marginal for growth. The key to keeping plants in such areas is rotation. Plants can be shifted to a part of the house where they receive good light to recover from a tour of duty in a dimly lit corner. This is simply an extension of the ideas that plants benefit from a yearly summer vacation outdoors. Rotation also means the actual physical rotation of a plant that receives light from one direction to ensure that growth is well distributed on the plant.

Nearly all houseplants are grown primarily for their attractive foliage. The vast array of foliage types and colors can be used effectively to contrast with each other and create interest even in a grouping of three or four small plants. If flowers are desired in the home, seasonal plants like poinsettias, azaleas, forced spring flowering bulbs, cyclamen and chrysanthemums can be used to provide some color and seasonal variation in the indoor plant grouping. These plants are usually purchased and used for a period of four to six weeks after which they are discarded.

Pots should be selected using the following criteria:

1. Clean, (sterilized if recycling)
2. No more than 2” larger than the previous pot
3. Composition

People select pots for various reasons. Clay pots will drain more readily than plastic or glazed. Clay is porous so a certain degree of air exchange will happen. However, clay pots will crack and chip and should be stored indoors during the winter. Plastic pots will generally retain more moisture than clay. They can be easier to handle, as they are lighter in weight and do not crack as easily as clay. If glazed pots are used, it would be best to select those with pre-drilled drainage holes. If this is not the case, plastic liners are recommended.

**Repotting**

Plants grown for maintenance should not need frequent repotting. If top growth is not encouraged to excess, root growth will not quickly exhaust pot space. Many plants can grow in a surprisingly small volume of soil provided that water and nutrients are adequate to maintain the plant. Overpotting a plant in a volume of soil too large for its needs can lead to waterlogging of the roots since the plant will not be able to use the water available in the large volume of soil. If plants become too large and are out of scale with their pots, it is best to use a decorator pot or basket to improve the appearance of the plant rather than overpotting it into a pot that is much too large for its needs.

A sterile soil media should be used when repotting plants to avoid problems with fungal root diseases. Garden soil should never be used since it contains disease organisms and is too heavy for use in pots. The media used should be as light as possible but should also hold a large amount of water. Media based on peat, perlite and vermiculite mixtures are best for
repotting. The plant should be removed from the pot, and if dead with brown roots present on the surface of the soil ball, they should be pared off with a sharp knife. If all roots are healthy it is best to slash or loosen the roots (Figure 3) to encourage growth of new roots into the new soil. Place a small amount of moistened media in the bottom of the new pot and position the plant in the new pot so the top of the soil ball appears 1 or 2 inches below the pot rim. Fill in soil all around the root ball, gently tamping it in with your fingers to eliminate air pockets. Water the plant thoroughly after repotting and avoid further watering until the soil begins to dry at the top. Be certain to select a pot only 2" larger than the previous pot it was growing in.

Houseplant Problems

Because houseplants are grown in a controlled environment, there is a relatively small group of insects and virtually no diseases that cause harm to them. By the same token, insect infestations can reach extremely large populations in a short time because there is no biological or mechanical control of insects in the artificial indoor environment. The few insects that can infest houseplants are therefore quite serious, especially if infestations are not controlled early. Diseases are not important in most situations since there is rarely a film of water on plant leaves and indoor humidity is low.

Good control of insect problems begins with quarantine of plants that enter the home. A plant that appears pest-free may have a small population of microscopic mites or insect eggs that will explode into a heavy infestation when placed in the home. Plants can be kept in quarantine for one to two weeks to ensure that insect problems will not arise.

Mites are a very serious pest of a wide range of houseplants. Mites suck out plant juices and cause a pinpoint stippling of leaves. In heavy infestations, a light webbing is produced on the plant. To detect mites, look at backs of leaves with a hand lens or shake a leaf over a piece of paper and look at any specks on the paper to determine if they are mites. Control of mites and other insects is limited indoors to mechanical control and the use of a few very safe insecticidal sprays. Horticultural oil works well on mites, as does insecticidal soap. Thorough coverage is important, and weekly follow-up sprays should be used if any further mite activity is noted. Small plants may even be dipped in a bucket of insecticidal soap or oil solution.

Scale insects are a common pest of many houseplants and are very damaging to orchids, weeping figs and ferns. They are notorious for producing large amounts of honeydew that can rain down on furnishings and floors in the vicinity of infested plants. Scale insects are best controlled with insecticidal oil, and repeat sprays are usually necessary. These insects may also sometimes infest roots, and root infestations can be the source of chronic infestations of the stems and leaves. In such situations it is a good idea to repot the plant, removing much of the soil around the roots and submersing the entire plant in oil solution before moving the plant back to the pot and fresh soil.
Mealybugs are common pests of a number of plants, especially palms, succulents, and gesneriads. They are closely related to scale insects, and are controlled with oil or soap. In very light infestations, mealybugs may be killed by touching a drop of rubbing alcohol to each insect. Like scale insects, mealybugs may also infest roots and in chronic infestations, harborage in the roots may be to blame. Since mealybugs, scale insects, and mites are stationery on the plant and do not fly, they can all be treated by simply giving plants a forceful shower with plain water periodically. If done regularly, this treatment can prevent the establishment of an infestation of any of these pests.

Whitefly is an occasional pest of some indoor plants and is prevalent on poinsettias and hibiscus. It is commonly brought into the home on seasonal plants that contain a light infestation. It can be controlled with repeated applications of insecticidal soap.

Fungus gnats do not usually damage plants but their presence in the home is alarming to many people. They are tiny flies that feed on decaying organic matter found in pots. They are especially prevalent in moist areas, so decreasing frequency of water is often helpful in reducing populations. There is a Bacillus thuringiensis selection that can be used for control of fungus gnats.

Because of the artificial and often stressful conditions found indoors, houseplants are subject to a number of physiological disorders. The most common is tip burn, which can seriously detract from the ornamental value of palms, ferns, and any houseplants that are monocots. Symptoms are death and browning of the tips of leaves. This may be caused by a number of factors including low humidity; lack of water, overabundance of water, salt accumulation, or exposure to temperature extremes. Fluoride found in domestic water and in perlite may cause tip burn toxicity symptoms in very sensitive plants like Easter lily and freesia. Tip burn can be remedied by removing burned portions of leaves and improving watering practices, humidity, and making sure plants are not subjected to temperature fluctuations or high soil salt content.

**Special Interest Houseplants**

Certain groups of houseplants attract groups of devoted hobbyists, some of which grow plants in the group of interest exclusively. African violets, together with other gesneriads have historically had a devoted following of indoor gardeners. Cacti and other succulent plants native to arid regions of the world also attract their own group of aficionados. Orchids have, since Victorian times, generated a mystique of their own. Bromeliads are another group of plants that have become very popular.

These special interest houseplants are not grown primarily for their foliage or durability in the home like a barroom plant or a Norfolk Island Pine, but are instead grown for special features they possess including interesting plant shapes, flowers, and growth habits.

The gesneriads are a large family of plants native primarily to the tropics of the world. The most well known members of this group are African violets, gloxinias, and streptocarpus.
Lipstick vine, columnnea, sinningia, flame violet, and achimenes are other popular gesneriads. Many gesneriads have fuzzy leaves and brilliant flowers. They are notoriously light and temperature sensitive, and the plant’s ability to flower and its growth can be modified even by a shift in night temperatures of 5°F from 70 to 65°F. Gesneriads may not bloom well if light is deficient but are easily scorched by direct light. Filtered sunlight from a south or southeast facing window is ideal for most gesneriads. All gesneriads need relatively high humidities to do well. Cold water on the leaves may severely damage the leaves of nearly all gesneriads, so watering from the bottom is recommended as long as the soil is periodically leached by top watering with room temperature water. Many gesneriads are available in trailing, variegated, or miniature forms suited to baskets, miniature pots, and other treatments. Gesneriads have a very fine, fibrous root system that demands an extremely loose, airy soil media. The soil should be relatively rich to produce the best plants with abundant flowers. Fertilization is important and most gesneriads respond to monthly applications of liquid fertilizer. Because of the delicate nature of the gesneriad root system and the succulence of the foliage, close attention must be paid to watering. Plants should stay as evenly moist as is possible, and soil should never be either saturated or dry at the surface. Cacti and succulent plants are relatively easy to grow indoors and are very tolerant of dry indoor air conditions. They are demanding of sunlight, and do not encounter any degree of shade in their native arid regions. They are well adapted to infrequent but thorough waterings that mimic desert thunderstorms that drop large amounts of rain in a short time. They require a soil that is very porous that can give added support to the top heavy succulent stems of the plant. Cacti and succulents have varying degrees of hardiness. Some cacti can withstand temperatures as low as -40°F, but others are injured by light frost. Although cacti and succulents enjoy a summer vacation in the sun, it is safest to bring all of them back indoors before freezing temperatures are encountered. Most cacti and succulents bloom in the winter in response to shorter days, cooler temperatures, and increased soil moisture.

Orchids are surprisingly adaptable to home environments if a few conditions can be met. Orchids are most demanding of high humidity than any other indoor plant and cannot tolerate dry indoor air very well. Orchids are either epiphytic, meaning they grow without soil in trees, or terrestrial, meaning they grow in loose, airy litter on the ground. There are no orchids that grow well in heavy soil that is at all lacking in organic matter, so all orchids are commonly grown in a bark media of varying degrees of particle sizes. Large particles are used for epiphytic types and smaller particles are used for terrestrial types. The most common orchids growing in homes are Cattleya, Phalaenopsis, and Paphiopedilum. Minor orchids that can be grown indoors include Brassovola and Anoectochilus, amongst others. Cattleyas have large, showy blooms and require intense light indoors and prefer some natural overhead light. Phalaenopsis, or moth orchids, have flat rounded blooms and require intermediate light conditions found in south facing windows in the winter but need to be shifted to lower light in the summer. This can be done without moving the plants by filtering light with sheer curtains from June to September. Paphiopedilum or lady slipper orchids need filtered light throughout the year and often do well in the same conditions as African violets. Cattleyas need to dry out noticeably between waterings, as do Brassovolas, whereas Phalaenopsis orchids need more frequent watering, especially in summer. Paphiopedilums need a consistent amount of moisture in the bark in which they are growing.
Most orchids initiate flowers in fall in response to increased light intensity and cooler night temperatures. The important exception is Paphiopedilum, which may initiate flowers either in response to cool temperatures or warm temperatures, depending on the species. The ideal situation for growing orchids for consist heavy flowering is a room that can be kept cool in the fall with a south facing window and a deciduous tree outdoors that provides filtering of the light available in the summer and increased light when the tree loses its leaves in fall. Most orchids can be shifted outside for the summer under the shade of a tree. They can be hung in the low branches of the tree or fastened to branches, but should not be placed on the ground since long periods of water saturation of the media will result. Orchids give signals when they need repotting. The presence of many roots outside the pot indicates that epiphytic types need to be repotted, and a rootbound condition of terrestrial orchids indicates the same. Orchids do not need large pots, and it is very difficult to manage watering of large pots to match the orchids’ need for brief frequent periods of bark saturation. Many times repotting is needed not because space is lacking but because the bark media has broken down and rotted. When this is the case, the media is too compact and stays moist for too long between waterings. In such cases, the orchid may simply need to be repotted in the same pot with fresh media.

Bromeliads, like many of the orchids, are epiphytes. They can grow in regular potting soil, but prefer a much smaller volume of soil as compared to other houseplants. The soil should be allowed to dry to a depth of one or 2 inches between waterings since bromeliads are intolerant of waterlogged conditions and are extremely drought tolerant. It is more important that the vase or cup-like center of the plant have some water in it at all times. This is true only of bromeliads that have a cup-like center “urn”. Bromeliads of flowering size can be encouraged to bloom by the application of ethylene gas to the plant. This is easily done by placing the plant in a transparent plastic bag with a ripe apple for a few weeks.

**Forcing Bulbs for Color Indoors**

Many of the bulbs that are sold in the fall for color in spring flower gardens can be forced into bloom in pots so they can be enjoyed indoors starting as early as January. Of the commonly available bulbs, crocus, hyacinth, grape hyacinth, and daffodils are the easiest to force, and tulips are slightly more demanding.

An assortment of pots, bulbs, and soil is all that is needed to start forcing bulbs. Bulbs should be planted close to the surface of the soil and should be watered thoroughly. Tulips should be planted with the flat side of the bulb facing outward, since the first leaf, or "wrapper leaf" is produced on this side. All of these bulbs need a rooting period with soil temperatures near 55°F for 4 to 6 weeks followed by a cooling period of 6 to 12 weeks near 35°F. Following the chilling treatment, the bulb can very quickly produce leaves and flowering shoots. The longer the chilling period, the faster the plants will develop into flowering plants indoors. It is advisable to start many pots of bulbs at the same time, root them, and store them in a refrigerator or outdoors in a pit covered with loose mulching material to satisfy the cooling requirement. Pots may be pulled out as needed, watered thoroughly, placed in a sunny area, and usually will be in full bloom in 4 to 6 weeks. The
soil for forcing bulbs is not critical since the bulb contains everything necessary to produce a high quality flowering plant. The soil serves more importantly as structural support for the top heavy bulbs and their flowers. A soil that is slightly heavier than standard potting soil and is sterile is ideal for forcing bulbs. For the same reason, fertilization is not necessary.

Bulb flowers will last much longer in the warm, dry indoor environment if they are stored in the refrigerator overnight when they are not being enjoyed. Cool night temperatures will even stimulate the production of more flowers in some species like crocus. With the exception of tulips, bulbs can be transferred to the garden after being forced where they can grow on to provide years of enjoyment.

Amaryllis bulbs may be encouraged to bloom again if the bulbs are set in good garden soil for the summer, dug after the first frost and stored at 55°F in a dry location for 6 weeks. After this time, the roots will begin to shrivel noticeably, and the bulbs should be shifted to warm storage at 70°F for another six weeks. They may then be forced at 70°F. The cool period and the dryness stimulate flower production, and the warm period stimulates simultaneous leaf production.
Suggested construction of an artificial light shelf for houseplan
Figure 2  Air layering a houseplant.

Score trunk with a knife.

Wrap in moist sphagnum and plastic

Remove top when roots have formed.

Repot the top plant; stump will sprout.
Preparation of the rootball of a houseplant prior to repotting.

Potbound plant with circling roots.

Removal of circling roots and loosening of outer root ball.
Table 1. Common Houseplants that are toxic or poisonous. Those that are toxic will cause injury only if ingested in large quantities, and those that are poisonous can cause extreme injury, even when taken in small quantities. Poisonous houseplants are marked with an asterisk.

<table>
<thead>
<tr>
<th>All philodendrons</th>
<th>Arrowhead vine</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Chinese evergreens</td>
<td>Painted drop-tongue</td>
</tr>
<tr>
<td>Pothos</td>
<td>Swiss cheese plant</td>
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<td>White anthurium</td>
<td>Dwarf schefflera</td>
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<td>Creeping rubber plant</td>
<td>Weeping fig</td>
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<td>Indian laurel</td>
<td>*Sago palm</td>
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<td>Japanese spindle tree</td>
<td>Flamingo lily</td>
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<tr>
<td>False aralia</td>
<td>Ivy tree</td>
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<td>English ivy</td>
<td>All aralias</td>
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<td>Kaffir lily</td>
<td>Dumb cane (dieffenbachia)</td>
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<td>Showy rubber tree</td>
<td>Fiddleleaf fig</td>
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<td>Starfish cactus</td>
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<td>Candelabra cactus</td>
<td>Crown of thorns</td>
</tr>
<tr>
<td>Pencil cactus</td>
<td>Rosary vine</td>
</tr>
<tr>
<td>Redbird cactus</td>
<td>Paper flower</td>
</tr>
<tr>
<td>*Coralberry</td>
<td>Buddhist pine</td>
</tr>
<tr>
<td>*Common oleander</td>
<td>Japanese pittosporum</td>
</tr>
<tr>
<td>Schefflera</td>
<td>*Garden croton</td>
</tr>
<tr>
<td>Moses in the cradle</td>
<td>*Amaryllis</td>
</tr>
</tbody>
</table>
Table 2. Commonly grown houseplants, their light needs, and their relative water requirements.

**PLANTS THAT TOLERATE LOW LIGHT**
Plants Needing Relatively Moist Conditions

<table>
<thead>
<tr>
<th>Plant</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspidistra elatior</td>
<td>barroom plant</td>
</tr>
<tr>
<td>Asplenium nidus</td>
<td>bird's nest fern</td>
</tr>
<tr>
<td>Crytomium falcatum 'Rochfordianum'</td>
<td>Rochford holly fern</td>
</tr>
<tr>
<td>Dracaena reflexa</td>
<td>Malaysian dracaena</td>
</tr>
<tr>
<td>Dracaena thaliiodes</td>
<td>lance dracaena</td>
</tr>
<tr>
<td>Philedendron scandens oxycardium</td>
<td>heartleaf philodendron</td>
</tr>
<tr>
<td>Syngonium podophyllum</td>
<td>arrowhead vine</td>
</tr>
</tbody>
</table>

Plants Needing Relatively Dry Conditions

<table>
<thead>
<tr>
<th>Plant</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aglaonema modestum</td>
<td>Chinese evergreen</td>
</tr>
<tr>
<td>Aglaonema commutatum maculatum 'Silver Queen'</td>
<td>silver queen Chinese evergreen</td>
</tr>
<tr>
<td>Aglaonema crispum</td>
<td>painted drop-tongue</td>
</tr>
<tr>
<td>Epipremnum 'Marble Queen'</td>
<td>marble queen pothos</td>
</tr>
<tr>
<td>Epipremnum aureum</td>
<td>pothos or devil's ivy</td>
</tr>
<tr>
<td>Sansevieria trifasciata laurentii 'Compacta'</td>
<td>compact variegated snake plant</td>
</tr>
<tr>
<td>Sansevieria trifasciata</td>
<td>snake plant</td>
</tr>
<tr>
<td>Sansevieria trifasciata 'Hahnii'</td>
<td>birdsnest sansevieria</td>
</tr>
<tr>
<td>Sansevieria trifasciata 'Silver Hahnii'</td>
<td>silver birdsnest sansevieria</td>
</tr>
</tbody>
</table>

**PLANTS THAT WILL TOLERATE MEDIUM LIGHT**
Plants Needing Relatively Moist Conditions

<table>
<thead>
<tr>
<th>Plant</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aechmea fasciata</td>
<td>urn plant</td>
</tr>
<tr>
<td>Aeschynanthus marmoratus</td>
<td>zebra vine</td>
</tr>
<tr>
<td>Aeschynanthus radicans</td>
<td>lipstick vine</td>
</tr>
<tr>
<td>Amomum compactum</td>
<td>cardamon</td>
</tr>
<tr>
<td>Anthurium andraeanum</td>
<td>flamingo lily</td>
</tr>
<tr>
<td>Araucaria heterophylla</td>
<td>Norfolk Island pine</td>
</tr>
<tr>
<td>Begonia cvs.</td>
<td>begonia</td>
</tr>
<tr>
<td>Brassaea actinophylla</td>
<td>schefflera</td>
</tr>
<tr>
<td>Calathea makoyana</td>
<td>peacock plant</td>
</tr>
<tr>
<td>Chamaedora elegans 'Bella'</td>
<td>parlor palm</td>
</tr>
<tr>
<td>Chlorophytm comosum 'Variegatum'</td>
<td>spider plant</td>
</tr>
<tr>
<td>Chrysalidocarpus lutescens</td>
<td>areca palm</td>
</tr>
<tr>
<td>Cissus 'Ellen Danicea'</td>
<td>oakleaf grape ivy</td>
</tr>
<tr>
<td>Cissus rhombifolia</td>
<td>Venezuela treebine</td>
</tr>
</tbody>
</table>

Houseplants 16
Columnea spp.
Corydline terminalis minima
Cyperus alternifolia
Davallia fejeensis
Dizygotheca elegantissima
Dracaena marginata
Dracaena sanderana
Dracaena surculosa
Dracaena fragrans massangeana
Dracaena deremensis 'Warneckii'
Dracaena deremensis 'Janet Craig'
Espiscia cupreata viridifolia
Euonymus japonica
Fatshedera lizei
Fatsia japonica
Ficus pumila
Fittonia verschaffeltii argyronoeus 'Minima'
Fittonia verschaffeltii
Hedera helix cvs.
Howea forsterana
Hypoestes phyllostachya
Maranta leuconeura
Maranta leuconeura erythoneura
Monstera deliciosa
Nephrolepis exaltata bostoniensis
Nephrolepis exalta 'Fluffy Ruffles'
Nidularium fulgens
Oxalis deppei
Paphiopedilum spp.
Pellonia pulchra
Philodendron selloum
Philodendron wendlandii
Philodendron bipennifolium
Philodendron 'Anderson Red'
Phoenix roebelenii
Pilea cadieri
Pilea nunnularifolia
Pilea 'Moon Valley'
Platycerium bifurcatum
Polypodium aureum
Polycias balfouriana marginata
Polycias guilfoylei victoriae
Saintpaulia hybrida
Saxifraga stolonifera
Schefflera arboricola
Soleirolia soleirolii

Houseplants

columnne
baby tiplant
umbrella plant
rabbit's foot fern
false aralia
red-edged dracaena
Belgian Evergreen
gold dust dracaena
corn plant
Warneck dracaena
Janet Craig dracaena
flame violet
Japanese spindle tree
ivy tree
Japanese fatsia
creeping rubber plant
dwarf silver nerve fittonia
red nerve fittonia
English ivy
sentry plant
polka dot plant
prayer plant
red-veined prayer plant
Swiss cheese plant
Boston fern
fluffy ruffles fern
blushing bromeliad
good-luck plant
lady's slipper
satin pellionia
selloum philodendron
Wendland philodendron
fiddle leaf philodendron
Anderson red philodendron
pygmy date palm
aluminum plant
creeping Charlie
Moon Valley pilea
stag horn fern
hare's foot fern
variegated balfour aralia
geranium leaf aralia
African violet
strawberry begonia
dwarf schefflera
baby's tears
Spathiphyllum 'Clevelandi'
Streptocarpus x hybridus
Tolmiea menziesii
Vriesia splendens

white anthurium
cape primrose
piggyback plant
flaming sword

(Plants That Will Tolerate Medium Light- Continued)
Plants Needing Relatively Dry Conditions

Asparagus densiflorus
Asparagus setaceus
Brassaia actinophylla
Ceropogia woodii
Chamaecereus sylvestri
Cissus antarctica
Cycas revoluta
Ficus benjamina
Ficus retusa nitida
Cissus rotundifolia
Clivia amoena
Crassula argentea
Cryptanthus spp.
Dieffenbachia amoena
Euphorbia tirucalli
Euphorbia milii
Euphorbia lactea
Ficus elastica 'Decora'
Ficus lyrata
Ficus nebkudu
Gasteria spp.
Haworthia subfasciata
Haworthia cymbiformis
Hoya carnosa
Pandanus baptistii
Pedilanthus tithymaloides
Peperomia spp.
Pilea depressa
Plectranthus australis
Portulacaria afra
Rhipsalidopsis gaertneri
Rhipsalis spp.
Schlumbergera bridgesii
Schlumbergera truncata
Stapelia spp.
Tradescantia fluminensis 'Variegata'
Tillandsia spp.

Sprenger asparagus
asparagus fern
schefflera
rosary vine
peanut cactus
kangaroo vine
sago palm
weeping fig
Indian laurel
Arabian wax cissus
Kaffir lily
jade plant
sky plant
dumb cane
pencil cactus
crown of thorns
candelabra cactus
showy rubber tree
fiddleleaf fig
Zulu fig tree
cow-tongue cactus
little zebra plant
window plant
wax plant
blue screwpine
redbird cactus
Radiator Plant
baby tears
Swedish ivy
Pilea depressa
elephant bush
Easter cactus
Wickerware Cactus
Christmas cactus
Thanksgiving cactus
starfish cactus
variegated wandering Jew
sky plant
PLANTS THAT REQUIRE HIGH LIGHT LEVELS
Plants Needing Relatively Moist Conditions

Acalypha wilkesiana  
Acalypha hispida  
Achimenes hybrids  
Ancoctochilus setaceus  
Ardisia crenata  
Bougainvillea glabra  
Caryota mitis  
Citrus mitis  
Crossanadra infundibuliformis  
Epiphyllum oxypetalum  
Gynura aurantiaca 'Purple Passion'  
Kalanchoe blossfeldiana  
Phalaenopsis spp.  
Podocarpus macrophyllus  
Polyscias fruticosa 'Elegans'  
Polyscias fruticosa  
Rhapis excelsa  
Rhoeo spathacea  
Sinningia speciosa  
copperleaf  
chenille plant  
achimenes  
jewel orchid  
coralberry  
paper flower  
fishtail palm  
calmondin orange  
firecracker flower  
orchid cactus  
purple passion vine  
kalanchoe  
moth orchid  
Buddist pine  
parsley aralia  
m\ing aralia  
bamboo palm  
Moses in the cradle  
gloxinia

Plants Needing Relatively Dry Conditions

Aeonium haworthia  
Aloe barbadensis  
Beaucarnea recurvata  
Billbergia spp.  
Brassia caudata  
Brassovola nodosa  
Cattleya spp.  
Cephalocereus chrysacanthus  
Codiaeum variegatum  
Cyanotis kewensis  
Cymbidium spp.  
Gibasis geniculata  
Hatiora salicornioides  
Justicia brandegeana  
Kalanchoe tomentosa  
Kalanchoe daigremontiana  
Kalanchoe beharensis  
Lithops spp.  
Mamillaria bocasana  
Mamillaria elongata  

pinwheel  
medicinal aloe  
ponytail  
vase plant  
spider orchid  
lady-of-the-night  
cattleya orchid  
golden old-man  
garden croton  
teddy bear vine  
cymbidium orchid  
Tahitian bridal veil  
drunkard's dream  
shrimp plant  
panda plant  
devil's backbone  
feiltbush  
living stones  
powder puff cactus  
golden-star cactus
Nerium oleander
Oncidium varicosum
Opuntia microdasys
Pittosporum tobira
Sedum morganianum
Strelitzia reginae
Tradescantia blossfeldiana
Yucca elephantipes
Zebrina pendula

common oleander
dancing lady orchid
bunny ears
Japanese pittosporum
burro’s tail
bird of paradise
flowering inch plant
spineless yucca
silvery wandering Jew
Review Questions:

1. Name the best ways to determine whether or not a houseplant needs to be watered.

2. Why would someone want to layer a houseplant?

3. Why are fungal diseases usually not a problem in caring for interior plants?

4. Why is it important to top water all plants periodically so that a quantity of water exits from the bottom of the pot?

5. Explain why an indoor gardener would use:
   
   a. a clay pot
   b. a plastic pot
   c. a decorator pot

6. Explain the difference between growing indoor plants and maintaining indoor plants.

7. Why is it advantageous to put plants outdoors for the summer?

8. Name the three categories of light and give examples of plants that fit each.
Bibliography


3. American Orchid Society. 6000 S. Olive Avenue, West Palm Beach, FL 33405.


8. Cactus and Succulent Society of America, Inc. 2631 Fairgreen Avenue, Arcadia, CA 91006.


18. Indoor Gardening Society of America, Inc. Robert D. Morrison, Membership Secretary, 5305 S.W. Hamilton Street, Portland, OR 97221.


22. Palm Society, Inc. Box 368, Lawrence, KS 66044.

23. Peperomia Society. 5240 West 20th Street, Vero Beach, FL 32960.


## Related Resources

### Houseplants

<table>
<thead>
<tr>
<th>Title</th>
<th>Item Code</th>
</tr>
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<tbody>
<tr>
<td>The Selection, Care and Use of Plants in the Home</td>
<td>141IB117</td>
</tr>
<tr>
<td>Pest Management Around the Home Parts 1 &amp; 2</td>
<td>139S74</td>
</tr>
</tbody>
</table>

**Not specifically on houseplants, but a good reference**

Using Plants to Bridge the Generations: Horticulture and Intergenerational Learning as Therapy | 141L10

These titles are available for review and sale at The Resource Center's online bookstore: [www.cce.cornell.edu/store](http://www.cce.cornell.edu/store)

You may also order titles or a catalog by:
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Fax: 607-255-9946
E-Mail: resctr@cornell.edu

Or write:
The Resource Center
Cornell University
PO Box 3884
Ithaca, NY 14852-3884

These titles are also usually available through your local Cooperative Extension association office.
Cornell Website information on **Houseplants**

All Cornell website information on gardening is accessible through the Cornell Gardening Resources Website [www.gardening.cornell.edu](http://www.gardening.cornell.edu)

The following are specific sections of the Cornell Gardening Resources Website as of Dec. 15, 2004. New web pages are added regularly. Please check [www.gardening.cornell.edu](http://www.gardening.cornell.edu) periodically for updates and new information.

[http://www.gardening.cornell.edu/houseplants/index.html](http://www.gardening.cornell.edu/houseplants/index.html)

[http://plantclinic.cornell.edu/greenhouse/index.htm](http://plantclinic.cornell.edu/greenhouse/index.htm)

[http://www.cce.cornell.edu/suffolk/grownet/indoor-plants/propagation.htm](http://www.cce.cornell.edu/suffolk/grownet/indoor-plants/propagation.htm)

**Cornell Visual Presentation Resources in Houseplants**

Master Gardeners may borrow resources from the Department of Horticulture’s Home Grounds and Community Horticulture Resource Library in Ithaca, NY. MG’s should discuss it with their county MG Coordinator and reserve a resource through that staff person. Resources in this library are slides, powerpoint CD-ROM’s and videos. They are generally used by Master Gardeners to make presentations to community groups as part of the county CCE’s educational mission. The number preceding each resource is its library code number in Ithaca.

HOUSE PLANTS / INTERIOR PLANTS

39. **How To Make A Terrarium** Slide Set (37 slides & script) A. Gianfagna & B.J. Syrocki, SUNY Brockport

51. **How to Become a House Plant Expert in 20 Minutes** Slide Set (90 slides, script & cassette) Ortho book series: House Plants Indoors/Outdoors

54. **Miscellaneous Collection of House Plants** Slide Set (54 slides) C.C. Fisher, Cornell University

56. **Enjoyment of Indoor Plants** Slide Set (124 slides & script) R. Weir III, CCE/Nassau Co.

64. **Cacti and Other Succulents** Slide Set (74 slides & script) D. Rakow, CCE/Broome County


V-36 **Bonsai** Video (22 min.) Brooklyn Botanic Garden