



Houseplants: Their Selection, Care and Impact on Our Lives

Ron Smith and Barb Laschkewitsch

Houseplants have been a documented part of human existence since the days of the Egyptian Pharaohs. Nature did not create houseplants; humanity did.

We have taken plants that were thriving in nature and brought them indoors to be a part of our lives, with widely varying degrees of success. The main challenges of growing plants indoors were low humidity, drafty construction, poor or no centralized heating, and poor light conditions.

Modern-day homeowners have the ability for complete climate control in their homes; they can control temperature, humidity, and light. These factors for plant growth, along with water and nutrition, provide those interested in taking plants into their homes with the essentials for successful houseplant growth. The trick is how to manipulate these factors of the home environment to be successful.

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Light

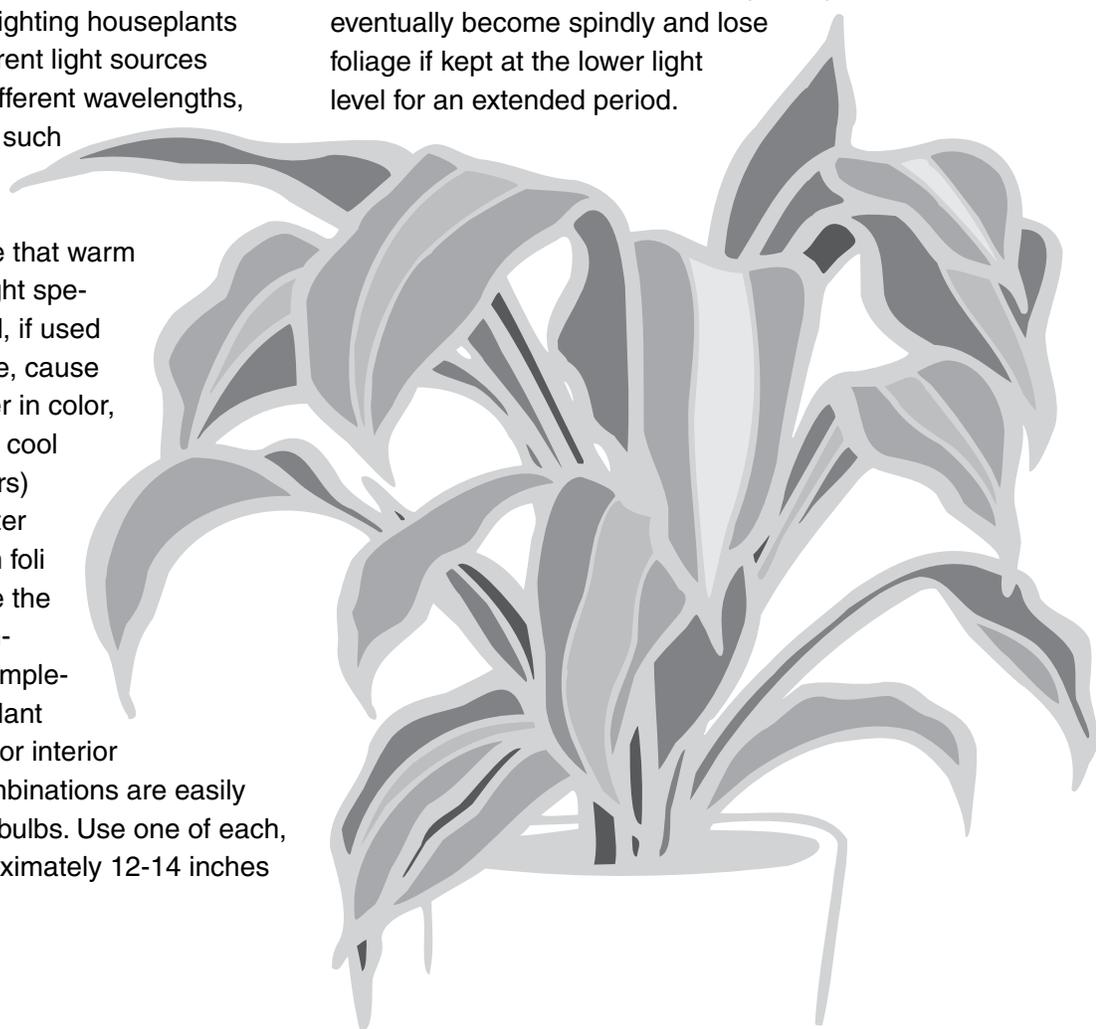
Light affects plants in many ways — some contradictory. For example, light is needed in some instances to stimulate seed germination, while in other cases, darkness or the lack of light, is required. Light duration may also affect plants. More than 12 hours will stimulate some plants to flower, while others need something less than 12 hours. Still others flower (regardless of light duration) as long as other conditions are met. Basically, light duration (how long the plants receive the light), light quality (wavelength spectrum), and light intensity (number of foot-candles or lumens reaching the plants) are factors we manipulate to grow healthy, productive plants.

Fargo's latitude of 46 degrees, 52 minutes north, makes light a main concern for plant health. It is especially critical between October and March, when the sun is passing through the lowest altitude levels of the year. Very few plants (refer to **Table 1. Low Light Intensity Plants**) will be able to sustain themselves during that period of time without supplemental lighting.

The kind of supplemental lighting houseplants receive is also important. Different light sources produce varying amounts of different wavelengths, each emitting a different color, such as red or warm colors; blue or cool colors. Perhaps we can recall from high school science that warm wavelengths (red end of the light spectrum > 650 nanometers) would, if used predominately as a light source, cause plants to be straggly and lighter in color, with larger, thinner leaves. The cool wavelengths (< 480 nanometers) would cause plants to be shorter and stockier, with darker green foliage, if these wavelengths were the predominant light source. Combined, the two light sources complement each other, resulting in plant growth as normal as possible for interior environments. These ideal combinations are easily achieved by using fluorescent bulbs. Use one of each, one warm and one cool, approximately 12-14 inches above the plants.

Fluorescent bulbs should be changed every year, regardless of how they appear. It has been found that bulbs tend to breakdown over time in both the blue and red spectral ranges with the result being a decrease in the qualitative appearance of the plants. Another point: Plant light intensity is measured in a term known as foot-candles in this publication. A foot-candle is one lumen of light per square foot of area. Light intensity drops rapidly as the distance from the light source increases, known as the inverse-square law. Therefore, a foot-candle is one lumen, projected on one square foot of surface, one foot away; at two feet away, that same lumen is only one-quarter of a foot-candle over the same one square foot area. Suffice it to say, the further away from a light source a plant is, the lower the light intensity becomes, at a rate that few indoor plant lovers realize. Many times, the problem with the plant is that it simply needs to get closer to the light source.

All of the plants listed in the low-light category can be grown at a higher light intensity level. However, those recommended for a higher-light level will eventually become spindly and lose foliage if kept at the lower light level for an extended period.



Temperature and Humidity

In spite of the tropical origin of nearly all houseplants, most will grow satisfactorily at typical home temperature ranges of 65-75 degrees Fahrenheit. Homeowners without a humidifier should attempt to group plants together, and if possible, place them on a tray of pebbles with water to raise the humidity. Many people will mist their plants in an effort to increase the humidity around them, but because of the dry ambient air, it evaporates quickly. In addition, if tap water is used to mist, unsightly water spots often occur on the leaves from the result of dissolved minerals that were in the water.

Lowering the household temperature can extend the beauty of some flowering plants such as poinsettias, mums, Christmas cacti, or hydrangeas. Lower temperatures will also result in lower water consumption, and generally healthier plants.

Watering

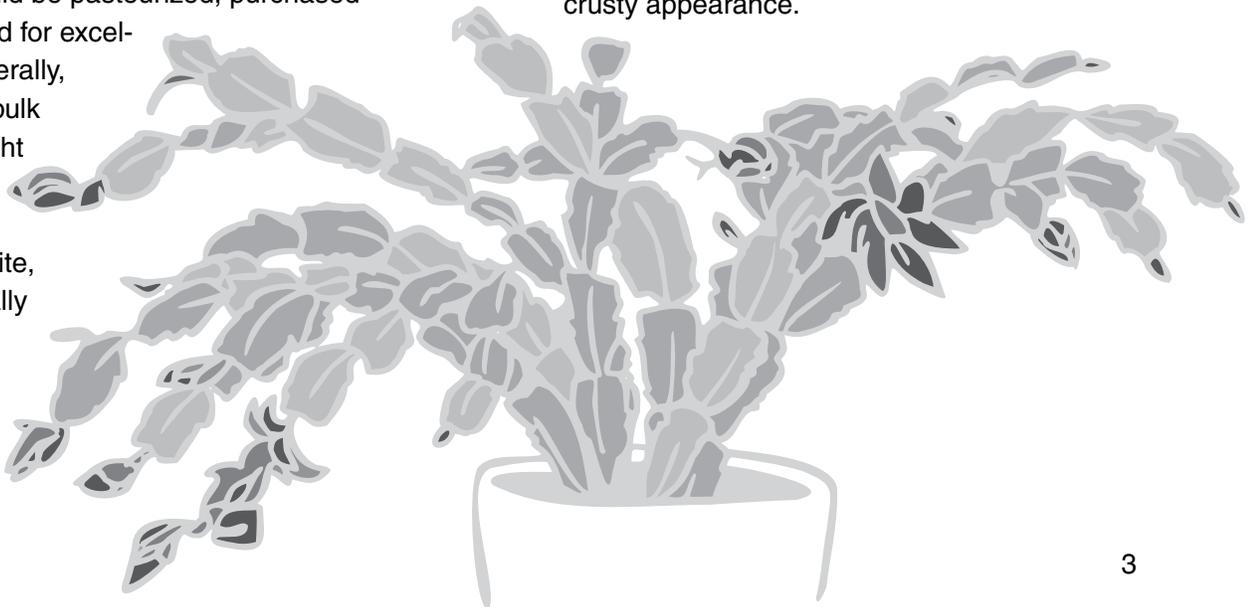
The tendency to overwater is where the bulk of the problems occur with houseplants. Base the watering schedule on the size of the plant and container, the species of the plant, the light and temperature intensity which it is exposed to, and whether or not it is exhibiting active growth. Keeping the soil continuously moist when plants grown at the low end of the temperature range and light intensity, without any physical evidence of active growth, usually results in root rot development.

Watering regimes are tied to the potting soil which the plant is growing in and to the container itself. The soil should be pasteurized, purchased mixes that are rated for excellent drainage. Generally, they will have low bulk densities (low weight per unit) due to the artificial components. Peat, perlite, or vermiculite usually makes up about two-thirds of the mix, with the balance made up of a sandy loam.

While avid do-it-yourself gardeners like to make up such preparations themselves, they are better purchasing one of the popular soil mixes on the market, unless they are going into commercial production.

Water should be at room temperature, especially during the winter. Tap water at 40 F or lower will set any plant of tropical origin back. When watering, do a thorough job of wetting the entire soil rootball mass. This may require repeat watering to totally wet the root mass. After watering, allow the water to drain out of holes in the bottom of the container for 20-30 minutes, then dump it, if the plant is sitting in a saucer. When determining how much to apply, the conventional wisdom has been to allow about 20 percent of the applied water to exit through the drainage holes. This practice continuously leaches or flushes soluble salts from the container, preventing a detrimental buildup. While acceptable for houseplants, this watering practice would not apply to other horticultural plantings.

If a white crust develops around the rim of the container or on the soil surface in spite of the above watering practice, this is an indication of high total dissolved solids (TDS), or salts existing in the water. This may cause problems with certain houseplants, depending on their salt sensitivity. At the very least, this is unsightly, and when it occurs, the soil should be replaced via repotting in the spring or fall. Knowing this is a potential problem, the homeowner should water the plant once a month — completely — with distilled water to leach some of the excess salts out of the root zone and to slow the buildup of the white crusty appearance.

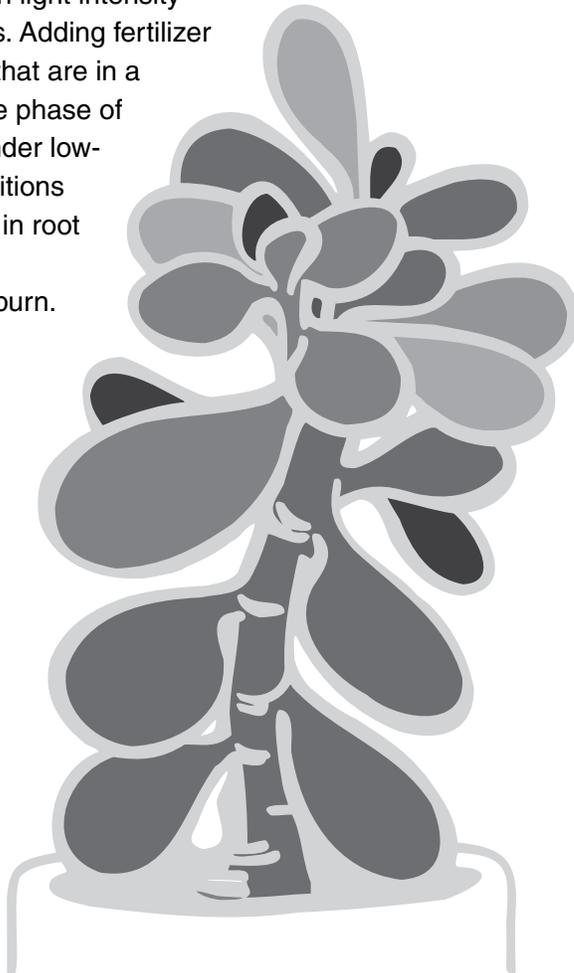


Fertilizing

Houseplants should be fertilized when they are in active growth phases, and then only with dilute solutions of water-soluble material. Fertilizer spikes are a poor investment money-wise and for the plant itself. The spikes deliver nutrients to a concentrated area of the root zone which often results in damage. Additionally, on a per nutrient basis, the cost is higher than other fertilizer materials. Many commercially available potting soil mixes have trace amounts of a starter fertilizer within their components. Such information should be on the bag, and if so, there is no need to fertilize at the time of repotting, or fertilizer injury is likely to occur.

When considering fertilizers, look for a water-soluble material with a ratio of 1-1-1 (N-P-K) such as a 10-10-10 or something close to it, and use half the amount recommended on the label. This is to prevent an overdose resulting in toxicity to the plant. Plant container volumes are difficult to figure exactly and proportion out the right amount of fertilizer.

Plants growing under low-light situations also need much lower fertilizer inputs than those growing under high light intensity conditions. Adding fertilizer to plants that are in a non-active phase of growth under low-light conditions will result in root rot and/or fertilizer burn.

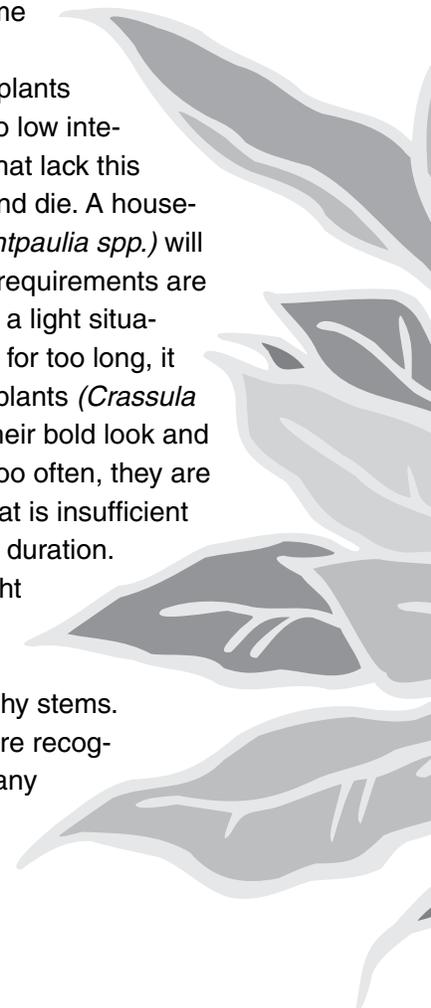


Acclimatization

Just about any houseplant that is brought into a home environment from a nursery, garden center, florist, or greenhouse business, will very likely need a period of acclimatization. This is a process where the plant makes an adjustment to the new environment. Such an adjustment is mostly for a change in light intensity and/or duration, with the interior environment of the home being low in both situations. Plant reaction is usually a drop of some foliage over a two-week to two-month time period. The plant eventually reaches a stabilization state where, if there is sufficient light for maintenance, leaf drop will either cease or continue until the plant is completely defoliated, then re-leaf with foliage acclimatized to the lower light conditions.

Keep in mind that summer sun can develop 10,000 to 13,000 foot-candles of intensity or more. If the houseplants came from a greenhouse operation where such intensity could be realized on a regular basis, a move into a home where the foot-candle readings are 200-250 foot-candles, an obvious acclimatization would become apparent.

Obviously, not all houseplants have equal ability to adapt to low interior light conditions. Those that lack this ability will simply defoliate and die. A houseplant like African violet (*Saintpaulia spp.*) will usually not flower until light requirements are met, and if kept in too low a light situation (25-50 foot-candles) for too long, it will eventually die. Jade plants (*Crassula argentea*) are grown for their bold look and dark foliage. Unfortunately too often, they are placed in an environment that is insufficient in light quality, intensity, and duration. In the case of Jades, low-light problems manifest themselves with spindly growth, undersized leaves, and mushy stems. By the time the symptoms are recognized, it is too late to make any corrections, and the plant must usually be dumped.



Resting Period

Nearly every houseplant needs a resting or dormant period. Keep in mind that if they are tropical in origin, they go through a natural rest period. During the rainy cycle, exuberant growth takes place. Then when the dry cycle arrives, growth ceases. During the short-day months of winter, it is essential to reduce both watering and fertilizing frequency to approximate the dry cycle in nature. Placing the plants in a cooler location may also help them through this rest period.

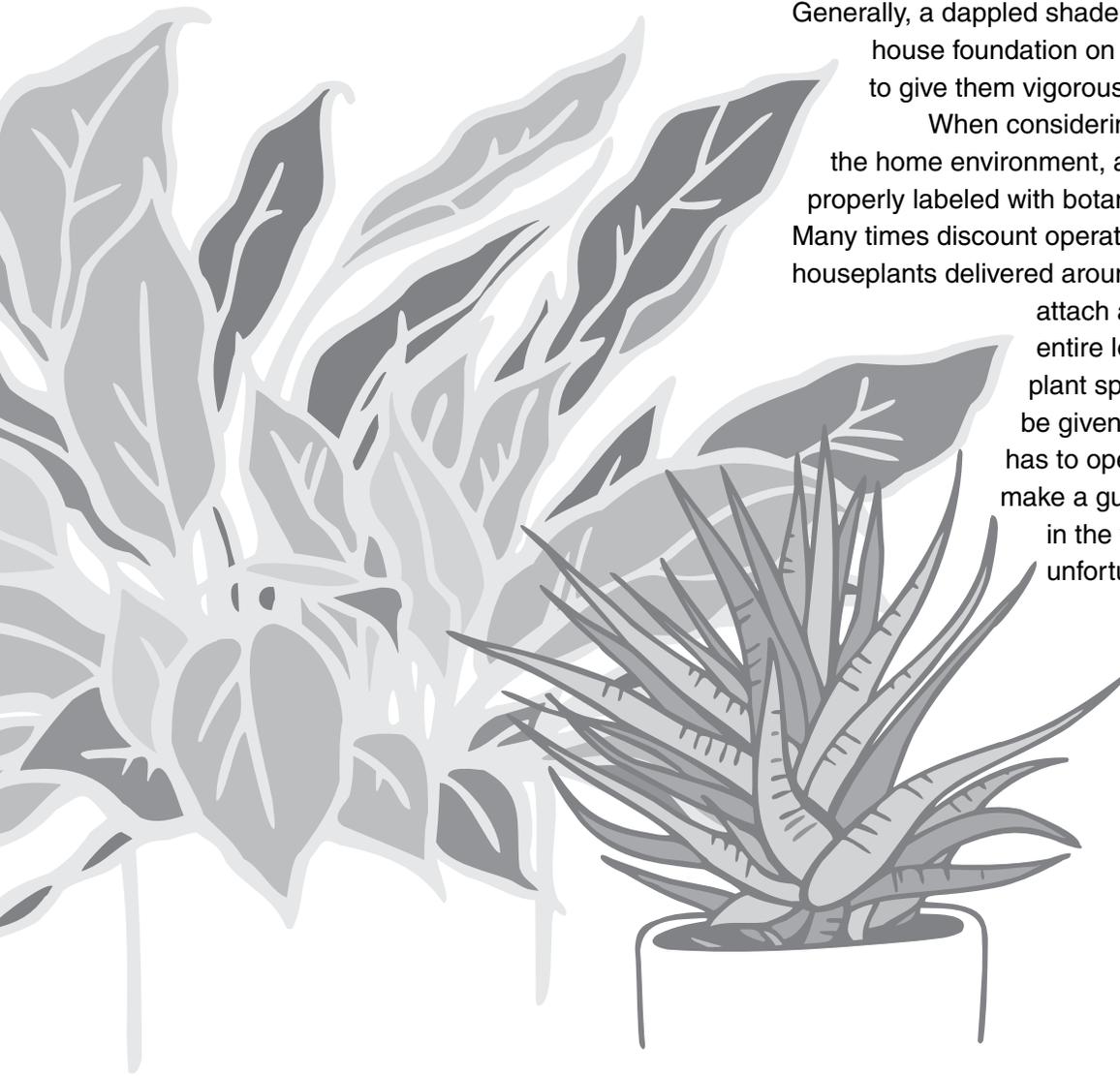
Every rule has an exception: during the holiday seasons of winter, many flowering houseplants are given as gifts. As long as they are producing blooms, they should be well-watered. Once the blooms have faded and no new flowers are developing, initiate the resting period. Obvious examples of this would be mums, hydrangeas, poinsettias, gerbera daisies, Easter lilies, and amaryllis.

Putting It All Together

Temperature, water, light, and nutrients; all must be in proper balance to have a healthy houseplant. For some people, it seems to come together naturally; for others, following a prescription of do's and don'ts still result in failure. Start out with simple, easy-to-grow species (see **Table 2**) to gain confidence, and build from there. Plants under low light intensity do not need as much water or fertilizer as those under higher light intensity; the same with temperature. Lower temperatures (<65 F) mean lower inputs of water and fertilizer than higher temperatures (>75 F). Problems come about usually, when attempts are made to force plants to grow under low-light situations by over-watering and fertilizing.

Many houseplants benefit from being placed outdoors during the frost-free months of summer. Be sure to go through a reverse acclimatization in doing so. A plant kept at low light conditions will become severely damaged (sunburned) if suddenly moved outdoors into full sun for several hours a day. Generally, a dappled shade or placing them near the house foundation on the north side will suffice to give them vigorous growth during this period.

When considering a plant purchase for the home environment, avoid one that is not properly labeled with botanical and common names. Many times discount operations get a truckload of houseplants delivered around major holidays and attach a bargain price to the entire lot. Without knowing the plant species, proper care cannot be given, so the new plant owner has to operate at a disadvantage, make a guess as to what is needed in the way of care — often unfortunately, in error.



Houseplant Maladies

Salt accumulation damage, sunburn, insect infestations, diseases, and environmental problems all have the potential to plague the homeowner interested in growing houseplants. By properly identifying the cause of the malady, the problem can usually be easily corrected.

For example, consumers often complain about plant leaf tips turning brown and drying up, with the rest of the leaf remaining healthy, and the plant in general appearing alright. This problem is very common on cast-iron plant (*Aspidistra elatior*), spider plant (*Chlorophytum comosum*), and some cultivars of dracaena or corn plant (*Dracaena deremensis*). This could be the reaction of plant tissue to chlorine, sodium, or fluoride in either the water source or the potting soil mix; or, simply to dry winter air. This condition is not toxic to the plants but can be unsightly. Using distilled water or allowing tap water to sit for 24 hours to let some of the chemicals evaporate may help.

For controlling other plant disorders, follow preventative measures on a routine basis; check plants before bringing them into your home, isolate any new plants from the others for a while to be sure they are free of contamination. Keep things clean — the growing area, the plants themselves, the containers, and any equipment such as knives, cultivators, or trowels.

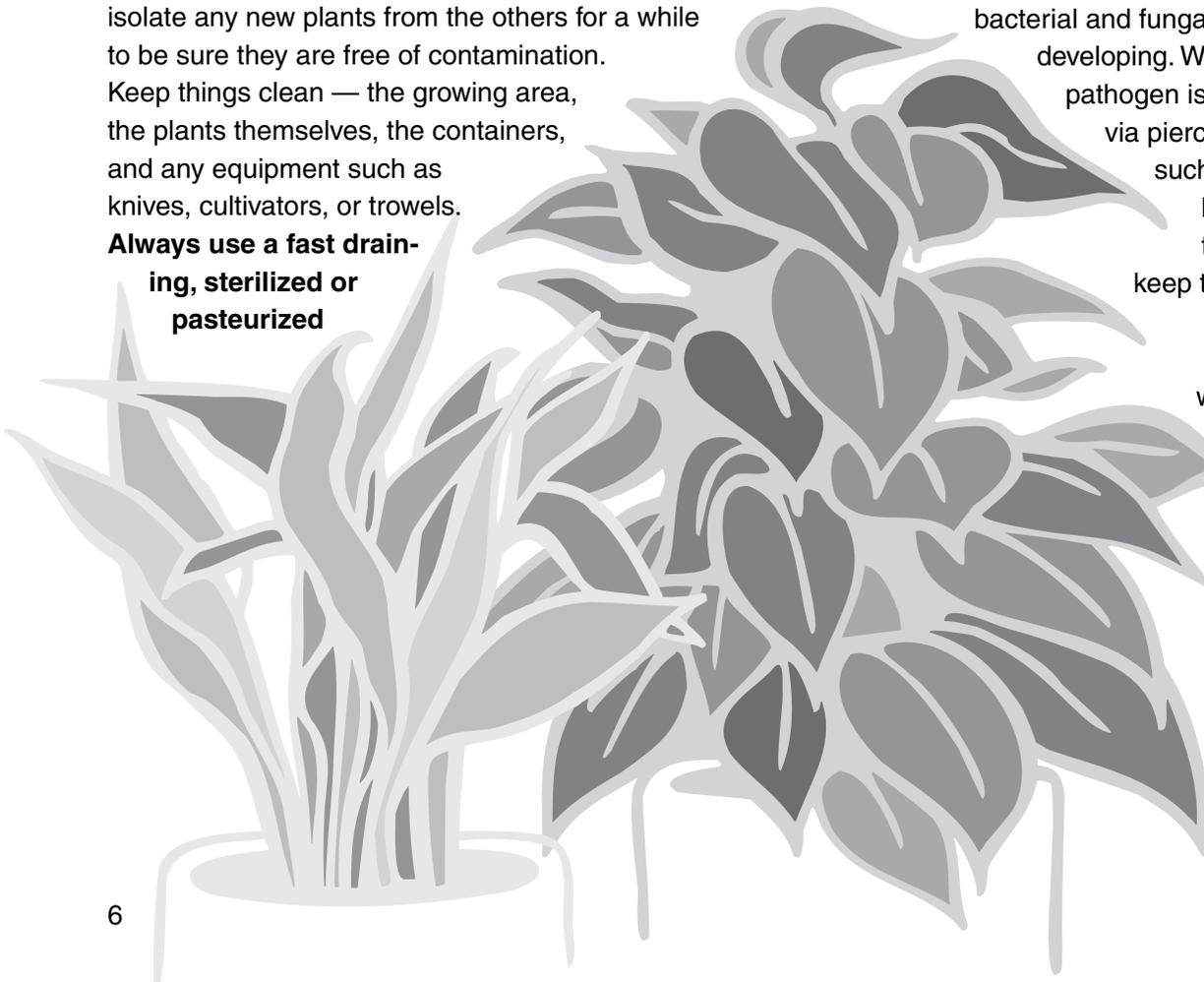
Always use a fast draining, sterilized or pasteurized

potting medium! While some of the houseplants in this circular originate from the tropics, growing them in poorly drained soil will create a weakened plant which is very susceptible to root rot.

If insects or related pests make an appearance (aphids, mealybugs, scale, white fly, and mites most common), isolate the plant immediately, and begin control measures. Insects usually make their appearance on houseplants when a new one is purchased or given as a gift, or when the plants come in from summering outdoors. Many times, if caught early enough, these pests can be removed via mechanical means such as scraping them off with a fingernail or dull knife, or a Q-tip dipped into rubbing alcohol. Otherwise, there are ample contact or systemic insecticides and miticides available at retail garden center outlets that will aid in gaining control.

Diseases come in the form of bacterial damage, fungal spores, and viruses. Again, proper cultural practices will go a long way in preventing these parasitic problems. Using sterile or pasteurized soil, providing adequate light and air movement, along with not overwatering, will go a long way to prevent

bacterial and fungal problems from developing. With viruses, the pathogen is usually transmitted via piercing-sucking insects, such as aphids and leafhoppers. Controlling those pests will keep this problem from developing. A virus-infected plant will usually exhibit one or more of the following symptoms: mottled foliage, distorted leaves, and dwarfed growth. A virus-infected plant will have to be dumped, as there is no effective control.



Conclusion

Healthy houseplants can add value to our lives by improving indoor air quality as well as aesthetics to the interior of our homes. They provide psychological satisfaction to the caregiver in getting something to bloom, produce new growth, provide fond memories of a friend or loved one, and in many cases, the chance to propagate new plants from the original.

If problems are experienced in growing houseplants, seek out the answers by asking: Is the problem culturally-based? Am I overwatering or over-fertilizing? Is the light too low? Is the plant attempting to go into dormancy for the winter months? Or is it going through an acclimatizing process? If it cannot be attributed to any of these cultural shortcomings, then look for the biological causes mentioned herein.

Table 1. Low-Light Intensity Plants

Scientific Name	Common Name
<i>Aglaonema commutatum</i>	Chinese Evergreen
<i>Asplenium nidus</i>	Birds-Nest Fern
<i>Brassaia arboricola</i>	Umbrella Tree
<i>Chamaedorea elegans</i>	Parlor Palm
<i>Dracaena fragrans</i> cultivars	Corn Plant
<i>Epipremnum aureum</i>	Pothos
<i>Sansevieria trifasciata</i> cultivars	Snake Plant

Table 2. Houseplants for Beginners – The Easily-Grown Selection

Scientific Name	Common Name
<i>Aloe variegata</i>	Tiger Aloe*
<i>Aspidistra elatior</i>	Cast Iron Plant
<i>Chlorophytum comosum</i>	Spider Plant
<i>Coleus blumei</i> cultivars	Coleus
<i>Hedera helix</i>	English Ivy
<i>Kalanchoe daigremontiana</i>	Mother of Thousands*
<i>Podocarpus macrophyllus</i>	Southern Yew
<i>Sedum spp.</i>	Sedum

*Prefer a warm, dry location

Related Publications from the NDSU Extension Service

1. **Home Propagation Techniques** (Electronically available on-line)
2. PP-744 Revised, **House Plants – Proper Care and Problem Solving**
3. H-1123, **Interior Plantscaping With Large Houseplants**

Suggested References on Houseplants

1. **Indoor Plants** by George B. Briggs, Clyde L. Calvin. John Wiley & Sons. ISBN #0-471-03298-0
2. **Interior Plantscaping – Building Design for Interior Foliage Plants** by Richard L. Gaines, AIA. Architectural Record, A McGraw-Hill Publication. ISBN #0-07-022678-4
3. **The Houseplant Expert** by Dr. D.G. Hessayon. Expert Books, a division of Transworld Transworld Publishers. ISBN #0-903505-5





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