Environmental Factors

Light, water, temperature, humidity, ventilation, fertilization, and soil are chief factors affecting plant growth, and any one of these factors in incorrect proportions will prevent proper plant growth indoors.

Light

Light is probably the most essential factor for house plant growth. The growth of plants and the length of time they remain active depend on the amount of light they receive. Light is necessary for all plants because they use this energy source to photosynthesize. When examining light levels for tropicals, consider three aspects of light: (1) intensity, (2) duration, and (3) quality.

Light intensity influences the manufacture of plant food, stem length, leaf color, and flowering. A geranium grown in low light tends to be spindly and the leaves light green in color. A similar plant grown in very bright light would tend to be shorter, better branched, and have larger, dark green leaves. House plants can be classified according to their light needs, such as high, medium and low light requirements. The intensity of light a plant receives indoors depends upon the nearness of the light source to the plant (light intensity decreases rapidly as you move away from the source of light). The direction the windows in your home face will affect the intensity of natural sunlight that plants receive. Southern exposures have the most intense light, eastern and western exposures receive about 60 percent of the intensity of southern exposures, and northern exposures receive 20 percent of a southern exposure. A southern exposure is the warmest, eastern and western are less warm and a northern exposure is the coolest. Other factors which can influence the intensity of light penetrating a window are the presence of curtains, trees outside the window, weather, seasons of the year, shade from other buildings and the cleanliness of the window. Reflective (light colored) surfaces inside the home/office will increase the intensity of light available to plants. Dark surfaces will decrease light intensity.

Day-length or duration of light received by plants is also of some importance, but generally only to those house plants which are photosensitive. Poinsettia, kalanchoe, and Christmas cactus bud and flower only when day-length is short (11 hours of daylight or less). Most flowering house plants are indifferent to day-length.

Low light intensity can be compensated by increasing the time (duration) the plant is exposed to light, as long as the plant is not sensitive to day-length in its flowering response. Increased hours of lighting allow the plant to make sufficient food to survive and/or grow. However, plants require some period of darkness to develop properly and thus should be illuminated for no more than 16 hours. Excessive light is as harmful as too little light. When a plant gets too much direct light, the leaves become pale, sometimes sunburn, turn brown, and die. Therefore, during the summer months, protect plants from too much direct sunlight.

Additional lighting may be supplied by either incandescent or fluorescent lights. Incandescent lights produce a great deal of heat and are not very efficient users of electricity. If artificial lights are to be used as the only source of light for growing plants, the quality of light (wavelength) must be considered. For photosynthesis, plants require mostly blues and reds but for flowering, infrared light is also needed. Incandescent lights produce mostly red, and some infrared light, but are very low in blues. Fluorescent lights vary according to the phosphorus used by the manufacturer. Cool white lights produce mostly blue light and are low in red light. Foliage plants grow well under cool white fluorescent lights and these lights are cool enough to position quite

close to plants. Blooming plants require extra infrared which can be supplied by incandescent lights, or special horticultural type fluorescent lights.

Water

Over- and under-watering account for a large percentage of tropical plant losses. The most common question home gardeners ask is, "How often should I water my plants?" There is not a good answer to this question. Some plants like drier conditions than others. Differences in soil or potting medium and environment influence water needs. Watering as soon as the soil crust dries, results in overwatering.

House plant roots are usually in the bottom two-thirds of the pot, so do not water until the bottom two-thirds starts to dry out slightly. You can't tell this by looking. You have to feel the soil. For a 6-inch pot, stick your index finger about 2 inches into the soil (approximately to the second joint of your finger). If the soil feels damp, don't water. Keep repeating the test until the soil is barely moist at the 2-inch depth. For smaller pots, 1 inch into the soil is the proper depth to measure.

Water the pot until water runs out of the bottom. This serves two purposes. First, it washes out all the excess salts (fertilizer residue). Second, it guarantees that the bottom two-thirds of the pot, which contains most of the roots, receives sufficient water. However, don't let the pot sit in the water that runs out. After a thorough watering, wait until the soil dries at the 2-inch depth before watering again.

When you test for watering, pay attention to the soil. If your finger can't penetrate 2 inches deep, you either need a more porous soil mix, or the plant is becoming root-bound.

Temperature

Most house plants tolerate normal temperature fluctuations. In general, foliage house plants grow best between 70 and 80 degrees Fahrenheit during the day and from 60 to 68 degrees Fahrenheit at night. Most flowering house plants prefer the same daytime range but grow best at nighttime temperatures from 55 to 60 degrees Fahrenheit. The lower night temperature induces physiological recovery from moisture loss, intensifies flower color, and prolongs flower life. Excessively low or high temperatures may cause plant failures, stop growth, or cause spindly appearance and foliage damage or drop. A cooler temperature at night is actually more desirable for plant growth than higher temperatures. A good rule of thumb is to keep the night temperature 10 to 15 degrees lower than the day temperature.

Humidity

Atmospheric humidity is expressed as a percentage of the moisture saturation of air. Two ways to provide increased humidity are by attaching a humidifier to the heating or ventilating system in the home or placing gravel trays (in which an even moisture level is maintained) under the flower pots or containers. This will increase the relative humidity in the vicinity of the containers. As the moisture around the pebbles evaporates, the relative humidity is raised.

Another way to raise humidity is to group plants close together. You can also spray a fine mist on the foliage although this is of doubtful effectiveness for total humidity modification. Do this

early in the day so that the plants will be dry by night. This lessens the chance of disease since cool dampness at night provides an ideal environment for disease infection.

Ventilation

House plants, especially flowering varieties, are very sensitive to drafts or heat from registers. Forced air dries the plants rapidly, overtaxes their limited root systems, and may cause damage or plant loss. House plants are sensitive to natural or blended gas. Some plants refuse to flower, while others drop flower buds and foliage when exposed to gases. Blended gases are more toxic to house plants than natural gases. Tomato plants are extremely sensitive to gas. They will turn yellow before the escaping gas is detected by household members and are sometimes used in greenhouses as indicator plants for excessive ethylene gas resulting from incomplete combustion in gas furnaces.

Fertilization

House plants, like most other plants, need fertilizers containing three major plant food elements: nitrogen (N), phosphoric acid (P), and potassium (K). They are available in many different combinations and under a multitude of brand names. Each brand should be analyzed on the label, indicating specifically how much water-soluble elemental nitrogen, phosphate, or potash is available in every pound of the product. The majority of these fertilizers are about 20-20-20. The first figure indicates available nitrogen; the second, available phosphate; and the third, water-soluble potassium. Commercial fertilizers used for house plants are sold in granular, crystalline, liquid, or tablet forms. Each should be used according to instructions on the package label or even more diluted. Frequency of fertilizer application varies somewhat with the vigor of growth and age of each plant. Some need it every 2 weeks, while others will flower well for several months without needing any supplement. As a general rule, use a fertilizer recommended every 2 weeks from March to September. During the winter months no fertilizer need be added at all because reduced light and temperature result in reduced growth. Fertilizing at this time could be detrimental to some house plants.

When applying fertilizer in a solution, make sure that some runs out of the bottom of the pot. This prevents root burn and the buildup of soluble salts or excess fertilizer and reduces the chance of burning the plant.

Soluble Salts

Reduced growth, brown leaf tips, dropping of lower leaves, small new growth, dead root tips, and wilting are all signs of high soluble salts. These salts will accumulate on top of the soil forming a yellow to white crust. A ring of salt deposits may be formed around the pot at the soil line or around the drainage hole. Salts will also build up on the outside of clay pots.

Soluble salts are minerals dissolved in water. Fertilizer dissolved in water becomes a soluble salt. When water evaporates from the soil the minerals or salts stay behind. As the salts in the soil become more and more concentrated, plants find it harder and harder to take up water. If salts build up to an extremely high level, water can be taken out of the root tips causing them to die.

High soluble salts damage the roots directly, and because the plant is weakened, it is more susceptible to attack from insects and diseases. One of the most common problems associated with high salt levels is root rot.

The best way to prevent soluble salt injury is to stop the salts from building up. Water correctly. When you water, allow some water to drain through and then empty the drip plate. Water equal to one-tenth the volume of the pot should drain through each time you water. Do not allow the pot to sit in water. If you allow the drained water to be absorbed by the soil, the salts that were washed out are taken back into the soil. Salts can be reabsorbed through the drainage hole or directly through a clay pot.

Plants should be leached every four to six months. You should leach a plant before you fertilize so that you don't wash away all the fertilizer you just added. Leaching is done by pouring a lot of water on the soil and letting it drain completely. The amount of water used for leaching should equal twice the volume of the pot. A 6-inch pot will hold 10 cups of water so 20 cups of water are used to leach a plant in a 6-inch pot. Keep the water running through the soil to wash the salts out. If a layer of salts has formed a crust on top of the soil, you should remove the salt crust before you begin to leach. Do not remove more than 1/4 inch of soil. It is best not to add more soil to the top of the pot. If the soluble salt level is extremely high or the pot has no drainage, repot the plant.

The level of salts that will cause injury varies with the type of plant and how it is being grown. A plant grown in the home may be injured by salts at concentrations of 200 ppm. The same plant growing in a greenhouse where the light and drainage are good will grow with salts at 10 times that level, or 2,000 ppm. Some nurseries and plant shops leach plants to remove excess salts before the plant is sold. If you are not sure that has been done, leach a newly purchased plant the first time you water it.