



Indoor Plant Culture

Alex X. Niemiera, Professor, School of Plant and Environmental Sciences, Virginia Tech

Purchasing an Interior Plant

Select only those plants that appear to be free of pests. Check the undersides of the foliage and the junction of leaf and stem for signs of insects or disease. Select plants that look sturdy, clean, and well-potted. Choose plants with healthy foliage. Avoid plants with yellow or chlorotic leaves, brown leaf margins, wilted foliage, spots or blotches, or spindly growth. In addition, avoid those with torn leaves. Plants that have new flower and leaf buds along with young growth are usually of superior quality.

Optimal light and watering requirements are usually included on the tag with the plant. Make sure your interior can meet the requirement from natural sunlight. If not, artificial lighting may be required.

Transporting House Plants

The two seasons of the year that the prevailing outdoor conditions can cause damage to the plants are the hot summer and the cold winter months. In the summer, avoid placing plants in a car with the windows shut, because temperatures will rise and destroy the plant in a short period of time. Shade the plant from direct sun while it is in the car; this is especially true for shade-loving plants.

During winter months, wrap plants thoroughly before leaving the store to carry them to your car. A relatively short exposure to frigid temperatures can damage plants. Wrap plants thoroughly with newspaper or paper bags, place in the front of the car, and turn on the heater. The trunk of most cars is too cold to carry plants safely during winter months.

Many foliage plants will be damaged considerably if the temperature drops below 50°F, so maintain as warm a temperature as possible around these plants during transport.

Acclimatization

Research conducted in Florida in the late 1970s revealed an interesting phenomenon. Tropical plants grown in full sun have leaves (so-called sun leaves) that are structurally different from the leaves of plants grown in shade (shade leaves). Sun leaves have fewer chloroplasts, and thus less chlorophyll. Their chloroplasts are located deep inside the leaves and the leaves are thick, small, and large in number. Shade leaves have greater numbers of chloroplasts and thus more chlorophyll, are thin, large, and few in number.

When plants are grown in strong light, they develop sun leaves that are photosynthetically inefficient. If these same plants are placed in low light, they must either change existing sun leaves into shade leaves or drop their sun leaves and grow a new set of shade leaves which are photosynthetically more efficient. To reduce the shock that occurs when a plant with sun leaves is placed in shade, gradually reduce the light levels it is exposed to. This process is called acclimatization.

The gardener should acclimatize plants when placing them outdoors in summer by gradually increasing light intensities, and reverse the process again before plants are brought indoors in the fall. For newly purchased plants grown in high-light conditions, acclimatize them by initially locating them in a high-light (southern exposure) area of your home and gradually moving them to their permanent, darker location over a period of 4 to 8 weeks.

Containers

When repotting becomes necessary, you should acquire a container with drainage holes that is about a third larger than the old container. If the container was previously used, then give it a thorough washing to remove soil and potential contaminants. If you suspect there are plant disease organisms on the pot, then dip it in a solution of 1 part liquid bleach to 9 parts water and rinse thoroughly.

There are many types of containers from which to choose. A good container should be large enough to provide room for the root ball and root growth, have sufficient room above the medium (soil) line for proper watering, provide bottom or side drainage, and be attractive. Containers may be made from ceramics, plastic, fiberglass, wood, aluminum, copper, brass, and other materials.

Clay and Ceramic Containers

Unglazed porous and glazed clay pots with drainage holes are widely used. Unglazed clay pots absorb and lose moisture through their walls. Although easily broken, unglazed clay pots provide excellent aeration for plant roots and are considered by some to be the ideal type of container for a plant.

Ceramic pots are usually glazed on the outside, and sometimes on the inside. If a container does not have drainage holes, then you can place a conventional growing container (with plant and drainage holes) inside the one without holes. Make sure to place some stones or some other structure on the bottom of the hole-less container to keep the conventional container about an inch above the bottom of the hole-less container. This will allow irrigation water to drain from the conventional container. Unless you have a very small plant, avoid using small novelty containers, as they have little room for medium and roots, and are largely ornamental.

Plastic and Fiberglass Containers

Plastic and fiberglass containers are usually quite light and easy to handle. They have become popular in recent years because they are relatively inexpensive and often quite attractive in shape and color. Plastic pots are easy to clean and sterilize for reuse, and, because they are not porous, they need less frequent watering and tend to accumulate fewer salts.

Potting Media

There are many commercially available potting soils, also called potting media, potting mixes, or soil-less substrates. Potting soils are generally composed of organic components such as peat moss or pine bark. However, there is a great amount of variation in potting soil characteristics. A potting soil is composed of solids, air spaces (voids), and water. Potting soils not only differ in organic component composition, but also in the percentages of solids, air, and water. These differences are important to know about since some potting soils are too “heavy,” that is, they hold too much water and not enough air following irrigation. Some are too “light,” that is, they hold too much air and not enough water following irrigation. The ideal container substrate is one that provides an appropriate amount of water and air following irrigation. Most potting soil packaging does not show water and air data, thus, you will have to experiment with different potting soils to find one that meets the needs of your plants. Of course, the type of plant will dictate the type of potting soil you select. If you have a fast-growing plant that requires a lot of water, then you will want a substrate that holds more water. Conversely, if you have a plant that grows better on the dry side or is slow-growing, then you will want a substrate that holds less water.

One often hears or reads the recommendation of putting pot chips, clay pot shards, or gravel in the bottom of a pot to improve drainage. In fact, this practice does not improve drainage. Adding a layer of gravel or shards to the bottom of the pot allows for less potting soil in the container compared to a container without additions. Less potting soil means less water, nutrients, and space for roots. Another common recommendation is to add sand to a potting mix. This practice decreases drainage (unless you put in a very large amount of sand) and air space. Thus, sand is not a recommended potting soil amendment.

Preparing Artificial Mixes

Artificial mixtures can be prepared with a minimum of difficulty. Most mixes contain a combination of organic matter, such as sphagnum peat moss or ground pine bark, and inorganic material, like washed sand, vermiculite, or perlite. Materials commonly used for indoor plants are mixtures consisting of sphagnum peat moss, vermiculite, and perlite.

Sphagnum peat moss is readily available baled or bagged. Such materials as Michigan peat, peat humus, and native peat are usually too decomposed to provide necessary structural and drainage characteristics and should be avoided. Most sphagnum peat moss is acid in reaction, with a pH ranging from 4.0 to 5.0. It usually has a high water-holding capacity and a very low fertility level.

Vermiculite is a sterile, lightweight mica product. When mica is heated to approximately 1800°F, its platelike structure expands. Vermiculite will hold large quantities of air, water, and nutrients needed for plant growth. Its pH is usually in the 6.5 to 7.2 range. Vermiculite is available in four particle sizes. For horticultural mixes, sizes 2 or 3 are generally used. If at all possible, the larger-sized particles should be used, since they give much better soil aeration. Vermiculite is available under a variety of trade names. Vermiculite collapses with time and loses its positive characteristics. Avoid insulation grade vermiculite.

Perlite is a sterile material produced by heating volcanic rock to approximately 1800°F. The result is a very lightweight, porous material that is white. Its principal value in potting soils is aeration. It does not hold water and nutrients as well as vermiculite. The pH is usually between 7.0 and 7.5. Perlite can cause fluoride burn on some foliage plants, usually on the tips of the leaves. The burn progresses from the tip up into the leaf. Fluoride burns can be prevented by adding 1 1/2 times the recommended amount of lime when mixing the medium.

A good formula for an artificial mix (makes 3 bushels of medium) is as follows:

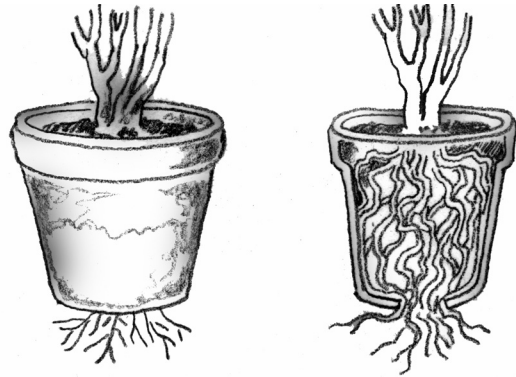
- 1 bushel shredded sphagnum peat moss
- 1 bushel perlite
- 1 bushel vermiculite (do not use construction grade which may contain poisons)
- 1/2 cup finely ground agricultural limestone

Garden soil

Potting mixes with garden loam (mineral soil) should be avoided, as loam is highly variable from shovelful to shovelful. Mineral soil also does not drain well in a container. Mineral soil must be pasteurized in the kitchen oven (not microwave). The process of pasteurizing your own soil can be difficult and smelly.

Mixes for specific plants

Most foliage and flowering plants can be successfully grown in the media mixes previously highlighted, with some modifications in certain cases. Specific nutrient needs can be readily met with soluble or slow-release fertilizers as recommended on the product packages. Plants such as African violets, cacti and succulents, orchids, etc., that are more sensitive to specific pro-

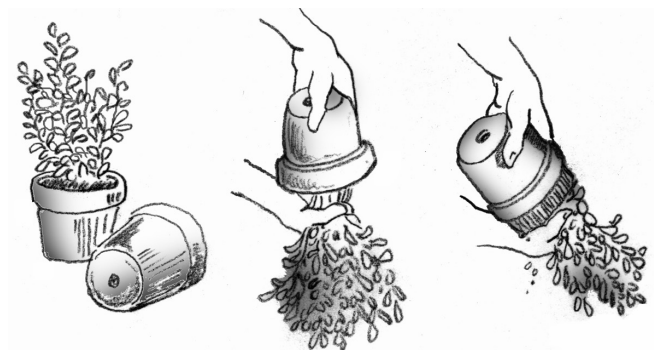


portions of media components, can easily be grown in commercial mixes specially prepared for these plants.

Repotting

Actively growing indoor plants need repotting from time to time. How often a plant needs to be repotted depends upon how fast it is growing. In general, foliage plants require repotting when their roots have filled the pot and are growing out the bottom holes.

Most plants requiring repotting can be easily removed from their container if it is held upside-down while



knocking the lip of the container sharply on the edge of a table. Hold your hand over the medium, straddling the main plant stem between the fore and middle fingers.

If the plant has become root-bound, you should tease

out/unwind or cut the large roots that circle the root ball. If the old potting soil surface has accumulated salts (appears white), the top layer should be removed.

To repot, select a new container that is about a third larger than the old pot. Add enough soil to the bottom of the pot so that the root ball will be slightly above the desired height (about two inches below the top of the container). Watering the soil will cause the soil to settle and the root ball will be at the desired height. Center the root ball in the middle of the new pot. Fill soil around the sides between the root ball and pot. Add soil to just above the original level on the root ball (again, the soil will settle when irrigated). Gently firm the soil with your fingers. After watering and settling,



the soil level should be sufficiently below the top of the pot (about one to two inches). This gap allows one to water to be applied without spilling over the sides of the container.

Care and Grooming

Keeping plants clean and neat through regular grooming improves the appearance of plants and reduces the incidence of insects and disease problems. Remove all spent flowers, dying leaves, and dead branches. Keep leaves dust-free by washing plants with warm water and mild true soap – avoid detergent, which can cause damage to leaves and buds. Cover the pot to prevent soap from entering the soil. If tips of leaves become brown and dry, trim them off neatly with sharp scissors.

Humidity can be increased by placing plants on trays lined with pebbles and filled with water to within one half inch of the base of the pot. If you heat with wood, keep a pot of water on the stove.

Training includes a number of minor care activities that distinguish the beginner from the more experienced indoor plant grower. For example, pinching is the removal of one inch or less of the stem tip and leaf growth, just above a node, to stimulate new growth below the tip and encourage lateral branching. Pinching can be a one-time or continuous activity, depending on the need and the desires of the plant owner. Frequent

pinching will keep a plant compact, but well filled-out.

Pruning includes removal of plant material other than terminal shoot tips. Sometimes an entire branch or section of a plant should be removed for the sake of appearance. Disbudding is the removal of certain flower buds either to obtain larger blooms from a few choice buds or to prevent flowering of a very young plant (or recently rooted cutting) that should not bear the physical drain of flowering early.

Trellising is an attractive way to display vines such as ivies and hoyas, as well as philodendron and syngonium.

Watering and Fertilizing

Most plants should not be watered until the soil feels somewhat dry. There are commercially available water meters to determine the soil moisture content of container and garden-grown plants. However, the old tried and true method of sticking your finger into the soil is the most reliable. With experience you can lift a container and judge its water content and thus its need for water. Apply enough water to thoroughly saturate the potting soil. In most cases, the soil is saturated when water drains from the bottom of the pot. Placing a saucer under the container eliminates water damaging the surface where the container sits. In some cases, such as a root-bound plant, water will drain from a container before the potting soil is saturated. In this case, fill the saucer with water and allow it to be absorbed into the container. Make sure to empty the saucer once water is no longer being absorbed.

An indoor plant's need for fertilizer is related to its growth rate. A plant that produces a lot of leaves and stems will need more fertilizer than a slower-growing plant. There are two main methods of fertilizing a container-grown plant. One can buy a soluble fertilizer, either in liquid or dry form, and apply at the recommended rate. For slow-growing plants, reduce the recommended fertilizer amount and frequency by about one-half. For fast-growing plants, apply the recommended amount at the recommended frequency.

The second method of fertilizing is the use of slow-release (controlled-release) fertilizers. Slow-release fertilizers supply small amounts of nutrients over an extended period of time. In most cases, nutrients of slow-release fertilizers are in small beads (prills) that should be applied uniformly to the surface of the potting soil. Follow the manufacturer's recommendations

for the amount and frequency of application. Adjustment to the recommended rate can be made for slow-growing plants as previously suggested for the soluble fertilizer. The length of time a slow-release fertilizer supplies nutrients depends on the product; some products can last for 9 months. Some potting soils contain slow-release fertilizers, which satisfies a plant's nutritional requirements for several months. Most potting soils supply little trace (minor) elements such as iron, manganese, zinc, and copper; therefore, it is important to use a fertilizer that contains these trace elements.

Fertilizers are salts and if you do not water thoroughly, salts can become concentrated in a potting soil. High soil-salt concentrations are toxic to roots and can kill a plant. So, regardless of your fertilization method (soluble or slow-release), thorough irrigation is necessary to keep salts from building up in the soil. To further avoid salt toxicity and to be on the safe side, one can always use less fertilizer than the recommended rate.

Putting Houseplants Outside for the Summer

When the weather warms in the spring, houseplants can be put outside. Don't be too anxious to move your houseplants outdoors, as even a good chill can knock the leaves off tender plants. To avoid cold temperature damage, find out the minimum temperature your particular indoor plants can tolerate. Make sure the outdoor light conditions are compatible with those of your plants. Plants can get "sunburned" if you move them

from an average indoor light exposure to a full sun exposure of the outdoors. Avoid windy locations, since such exposure can tear leaves and accelerate water loss and increase watering frequency.

Houseplants that have been outside all summer should be allowed to make a fairly slow transition to indoor conditions. Quick changes in environment can result in yellow foliage and leaf drop. To avoid injury, bring plants indoors before temperatures dip below 55°F, do not wait for frost warnings. Check for insect pests before you move the plants; it is easier to get rid of pests while plants are still outside. Rinse the plants' leaves, and soak pots in water for 15 to 20 minutes to drown most soil-dwelling pests.

Quarantining New Plants

Some plants are characteristic hosts for problematic pests. For example, palms are especially prone to mites, and Hindu rope (hoya) plants are especially prone to mealy bugs. One can easily miss an incipient infestation on a recently purchased plant. Thus, any new plant that is known to be especially prone to a difficult to control pest should be quarantined for at least a few weeks to make sure your plant is not infested. To quarantine a plant, place it in a room without plants that is not adjacent to a room with plants (pests can be transported by drafts). This separation will allow you to determine if you have a pest problem without infesting the rest of your indoor plants. You will also need to make sure that you do not unknowingly transfer a pest by handling your new plant and then handling your resident plants.

This publication was originally authored by Diane Relf, Horticulture Extension Specialist (ret.), and Elizabeth Ball, Program Support Technician, Virginia Tech.