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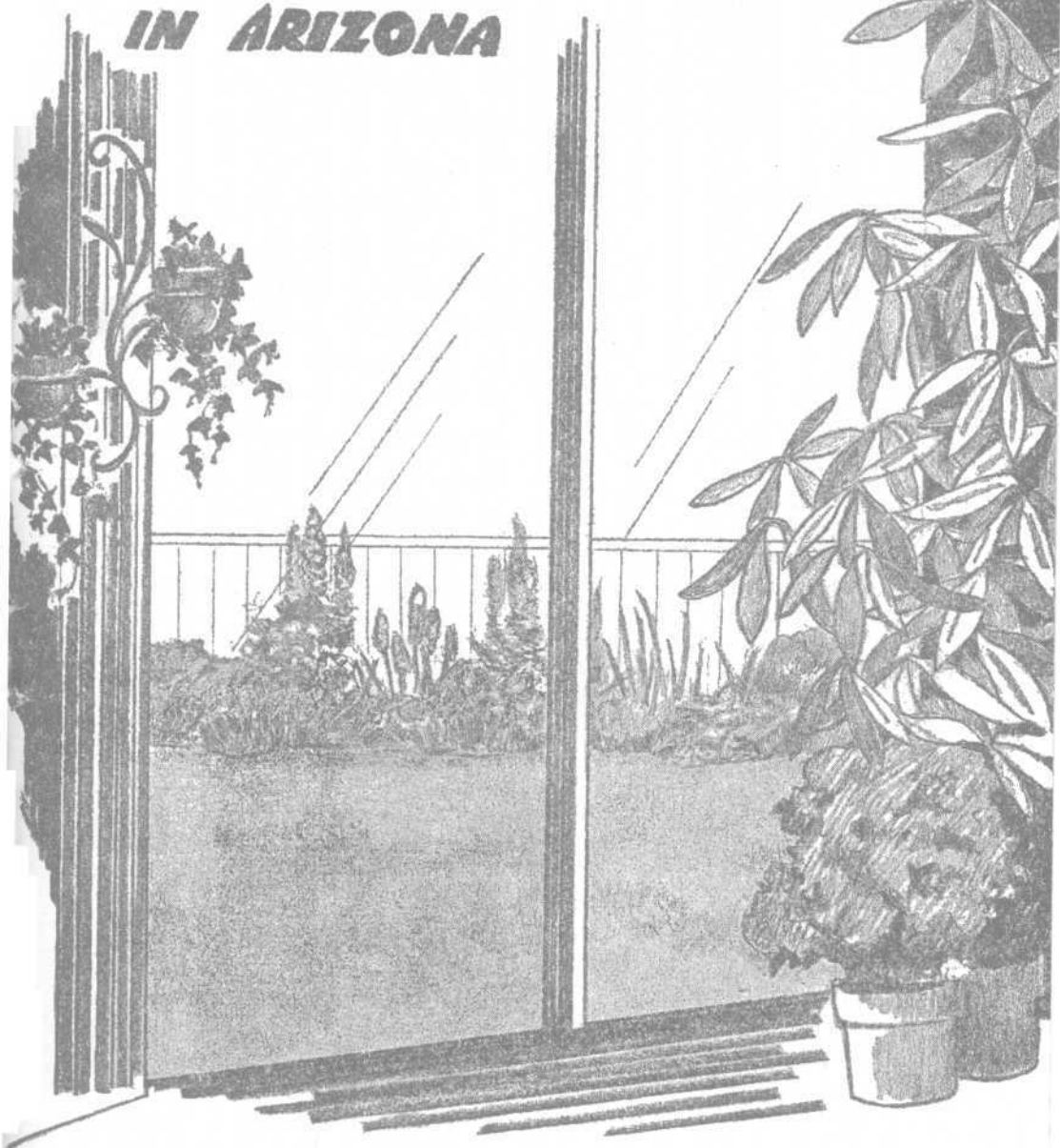
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Indoor Gardening

IN ARIZONA



BULLETIN A-7

THE UNIVERSITY OF ARIZONA

75th Anniversary of Founding

Agricultural Experiment Station

Cooperative Extension Service

Types of Plants

Foliage Plants

Aloes*	Dieffenbachia
Asparagus Fern*	Dracaena
Aspidistra*	Maranta
Boston Fern*	Miniature Palms*
Caladiums	Peperomia
Coleus	Rubber Plants*
Crassulas*	Sansevieria*
Sedum	

Flowering Plants

African Violet	Bulbs
Angel Wing	Cyclamen
Begonias	Geraniums*

Vine Plants

Dwarf Ivy*	Syngonium
Passion Vine	Star Jasmine*
Philodendron*	Wandering Jew

* Usually long life and easy to maintain.

Many of the plants listed have numerous species with variation in foliage and growth habits. Florists can assist the homeowner in selecting plants of a definite growth habit or color to blend with the interior furnishings of the home.

This circular is a revision of and replaces the former Agricultural Experiment Station bulletin No. 274 with the same title.

Cover page illustration from a pencil drawing by Catherine Leary, The University of Arizona.

The University of Arizona
College of Agriculture
Cooperative Extension Service
J. W. Pou, Director

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Indoor Gardening In Arizona

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INDOOR foliage and flowering plants have been a source of enjoyment and beauty for generations.

Interior decorators have recognized this fact and are developing new ideas in the form of glass shelves, hanging iron brackets, planter boxes, and colorful pots for displaying indoor plants. This new impetus has stimulated interest of families to use plants to enhance the interior decor of their homes.

Indoor plants vary in their ability to withstand adverse conditions associated with low humidity, temperature changes, drafts and improper cultural management. It is, therefore, necessary to recognize the limitations within your own home and select plants capable of adjusting to existing conditions.

Certain shade-loving plants will not endure exposures to full sunlight through a large picture win-

dow. Others may be sensitive to alkaline water, or to drafts if located near an outside door. The selection and locations of indoor plants require a knowledge of growth habits, cultural requirements, and ability to endure adverse conditions.

Light

Light is essential for the manufacture of food by the leaves of plants for later use in developing new leaves and flowers. Plants that do not receive sufficient light stop growing when the food reserves within the plants have been depleted.

Some indoor plants are sensitive to direct sunlight of high intensity and should be placed in diffused light. Avoid dark locations as well as exposures to full sunlight.

Placements of plants near win-

dows and away from direct sunlight or in any area of the room that is well lighted will offer ample light for most indoor plants.

Artificial light supplied from light bulbs of fluorescent tubes may be used to supplement sunlight. Lamps with small planters attached are being used with excellent results, but care should be exercised when using light bulbs as the heat generated can cause scorching if foliage is within 4 to 5 inches.

Temperature

The uniform temperature in homes heated by thermostatically-controlled equipment is detrimental to growth of plants. Food manufactured during the day is normally held in reserve for new growth. Temperatures maintained at a constant 70° or 72° F. day and night will cause respiration (consuming stored food) to progress more rapidly during the night, thus depleting the plant's food reserves. Prolonged periods of high night temperatures will eventually cause the foliage to yellow and the plant to die.

Indoor plants are best suited to temperatures of 70° F. during the day and approximately 55° F. during the night. Low night temperatures will decrease respiration and plants will maintain a balance of stored food for new growth.

Plants placed near glass windows remain cooler than in any other part of the house. Heat is radiated to the cold glass and a more favorable temperature is maintained.

Avoid placing plants in direct line with heating vents. Air currents blown across the plants increase water loss and rate of respiration.

Humidity

The loss of water through leaves of plants and stems is known as transpiration. Controlling this loss of moisture is difficult as the heating units in most homes is not equipped with a humidifier.

During the winter, the average relative humidity in the home varies from 10 to 30 percent. Indoor plants are best adapted to 90 percent humidity, which is generally maintained in greenhouses.

Whenever possible place a pan of water on the furnace to offset the drying effect of the heated air. A mulch of peat moss around the base of low-growing plants moistened at regular intervals increases the humidity near the foliage surface.

Totem poles used to support vine-type plants should be kept moist to encourage development of new roots and also to increase humidity near the foliage surface.

Drafts

Some indoor plants are sensitive to sudden temperature changes such as caused by drafts. Avoid areas near doors, open windows, or in direct line of cooler or heater vents.

Gas Injury

Gas injury is often found in the kitchen where raw gas may escape from burners. Small quantities of gas escaping may not be detected by humans, but still be enough to cause injury or death to plants.

Symptoms of gas injury often are confused with other difficulties since gas causes yellowing of the foliage. Stems may become

hardened and leaves will be distorted. Root tips may show swelling, and the woody portion of the root often shows a black or blue discoloration after being killed.

Soils

Soil for indoor plants requires careful preparation because plants will have to thrive on this media for a number of years. A good potting mixture should be fertile and porous for root aeration and water-holding capacity.

A good soil mixture for indoor plants consists of one-third loam soil (soil from beneath mesquite trees or from a flower garden), one-third organic matter (half peat moss, half well-rotted manure), and one-third sand.

A simple test for determining the correct amount of sand and peat moss is as follows: After the soil, sand, peat moss, and manure have been thoroughly mixed, water the mixture and allow to stand for 24 hours. Squeeze a handful of soil into small ball. If it breaks with

little pressure it contains sufficient sand and peat moss. If it remains hard and does not crumble easily, add equal amounts of sand and peat moss.

Soils showing white alkaline deposits on the surface should not be used for potting plants as most indoor plants thrive in neutral or slightly acid soils.

Succulents and cacti require soils that have thorough and rapid drainage. Such soils consist of half loam soil and half sand.

Watering

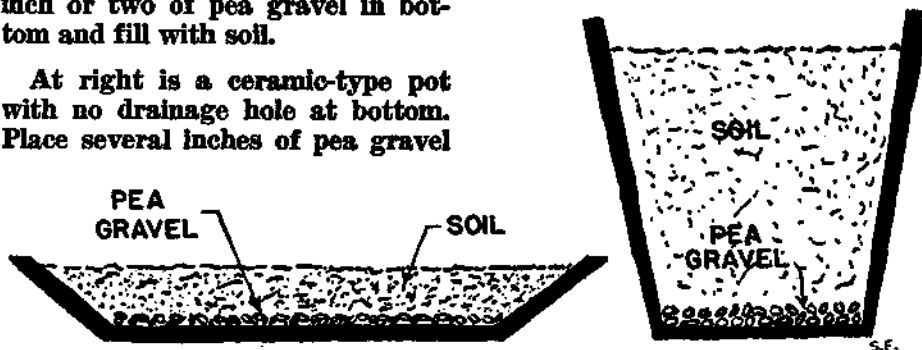
Failure of indoor plants to survive is often from excessive watering and lack of drainage.

Many plants are placed in containers with no facilities for draining off excess water. Excess water then excludes oxygen from the root zone, and a peculiar odor develops as a result of microorganisms growing in the absence of oxygen. Plants growing under these conditions show signs of yellowing and browning of the foliage.

At left is shown a metal or ceramic-type planter with no means for draining excess water. Place an inch or two of pea gravel in bottom and fill with soil.

At right is a ceramic-type pot with no drainage hole at bottom. Place several inches of pea gravel

in bottom of pot to drain off excess water from rootsystem. Fill remainder of pot with prepared soil.



Take extreme care in preparing a suitable drainage area in these closed containers. Illustrations on pages 5-6 show a typical arrangement of soil and gravel for best drainage.

Watering at definite intervals is not recommended, as atmospheric conditions vary and transpiration may increase or decrease between watering periods. Watering when the soil surface shows a lack of moisture is a more reliable method. Measured amounts of water will often prevent over-watering.

When watering indoor plants, do not pour water on the growing point or the heart of the plant, as some plants are extremely sensitive

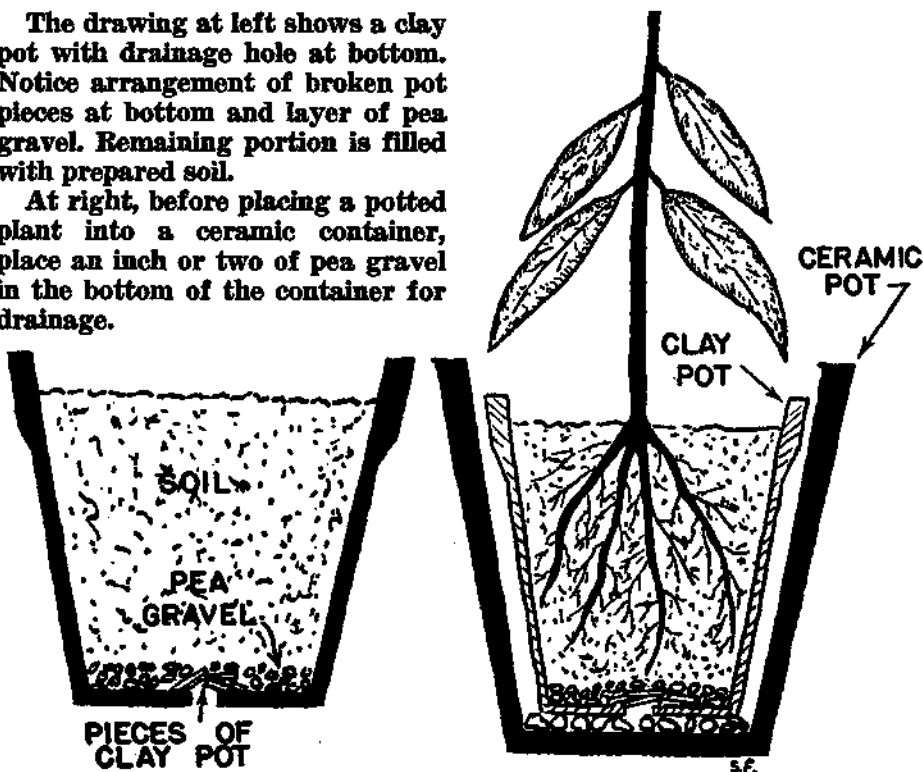
and often rots develop in this area. If water cannot be applied without wetting the crown, submerge the pot in a pan of water and allow the soil to become moistened from the bottom.

Containers with drainage openings on the bottom can be watered with a sufficient amount of water to allow a small quantity to drain out at each watering. This method leaches out a small amount of salt each time the plants are watered.

A suggested amount of water to apply for any given container is one cubic inch of water to each 6 to 8 cubic inches of soil. This amount may be increased slightly if plants still wilt after watering at this rate.

The drawing at left shows a clay pot with drainage hole at bottom. Notice arrangement of broken pot pieces at bottom and layer of pea gravel. Remaining portion is filled with prepared soil.

At right, before placing a potted plant into a ceramic container, place an inch or two of pea gravel in the bottom of the container for drainage.



Examples:

- 3" pot—3 tablespoons of water
- 4" pot— $\frac{1}{4}$ cup water
- 5" pot— $\frac{1}{2}$ cup water
- 6" pot— $\frac{3}{4}$ cup water

Succulents are fleshy-type plants capable of storing water for long periods. They are watered only when the soil surface shows a lack of moisture—when a pinch of the surface soil feels dry.

Foliage and flowering plants generally have a large leaf surface exposed, and transpiration is rapid in a dry atmosphere. Broadleaf plants do not have the water storing ability associated with the succulent plants, and watering at more frequent intervals is necessary.

Flushing Salts From Soil

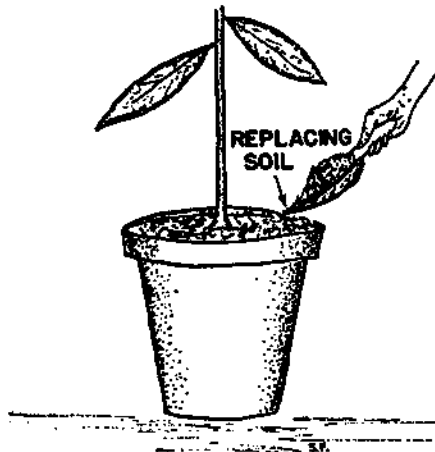
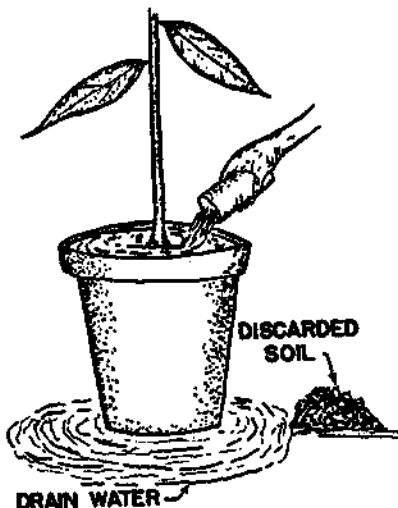
Areas having highly alkaline water will benefit from the use of distilled water as a leaching agent to remove excessive salts that accumulate in the soil of the plant containers. This leaching is used only on containers with drainage holes.

The first step in leaching salts from the soil is to remove the surface soil $\frac{1}{2}$ inch to 1 inch deep. Salt is often found on the soil surface where it accumulates as water evaporates. This can be removed by scraping the surface and discarding this material.

Second, apply distilled water to the surface until the container is completely filled. It may be necessary to repeat the water applications several times in order to saturate the soil and for the water

to drain through pot. The distilled water flushes out the accumulated salts and creates a more favorable soil condition.

Tap water low in salts can be used instead of distilled water. Af-



Remove salty soil at top. Fill pot with distilled water or tap water low in salts. Continue filling until water drains out bottom of pot (about three fillings.) Use new soil to replace that which was removed.

ter flushing has been completed, fill the container with soil to replace that which had been scraped away.

Fertilizing

Fertilization of indoor plants is essential to maintain proper growth and leaf color. Plants growing in the confines of small containers rapidly use up soil nutrients. It is never desirable to allow plants to show signs of yellowing or retardation of growth before fertilizing.

Applications of fertilizer at intervals of 1 to 3 months in proper amounts should be sufficient to maintain healthy, vigorous growth.

Excellent results have been obtained by using a small quantity of fertilizer mixed with water and applied at each watering. Most fertilizer sold for indoor plants can be diluted in a weak form and used for each watering.

Use mixed fertilizers containing organic matter rather than concentrated mineral types. Packaged fertilizer, tablets, and liquid fertilizers formulated for indoor plants are sold at nurseries or florist shops. They usually specify how much and how often to apply to a given size of pot.

Tea leaves and coffee grounds are often utilized for their fertilizing and mulching effect; however, the amount of nutrients received from such treatments is insignificant compared to mixed fertilizers.

Solutions made from barnyard manure are desirable but are often objectionable because of odor. To make such a solution, place one-half shovelful of manure in a large bucket filled with water and allow to stand overnight. Apply the so-

lution to the soil at intervals of one to three months.

Over-fertilization can injure roots and also have an adverse effect on the above-ground portion of the plant. Follow the directions on the package carefully regarding the amounts of fertilizer to apply for a given size pot.

Cleansing the Foliage

Leaves of plants contain many small openings called stomata which act as pores. When these openings become plugged, the plant will not function properly.

Plants with large leaves can be washed to remove dust from upper and lower leaf surfaces. Use a soft rag and clean water. Wipe the surface gently and rinse the rag often. Use a soft rag to wipe dry.

Fine foliage plants cannot be washed without slight injury to leaves, and a light spraying with water will remove dust and lint without disturbing the leaves. Using a hose with the water turned on slowly, place your finger over the opening to force a fine spray of water over the entire foliage. Spray-washing (often called syringing) should be done out-of-doors.

Plant Troubles

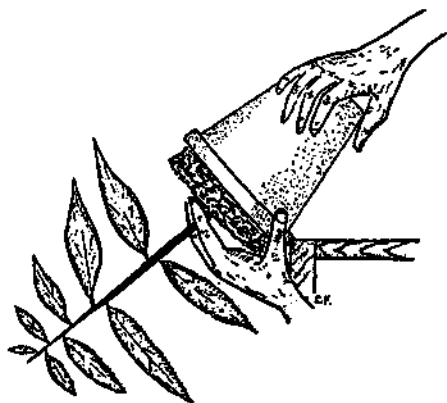
Death of indoor plants often results from poor management rather than the direct effect of a specific disease. Poor drainage, overwatering, improper temperature, over-fertilizing, drafts, over-crowding, and wrong location contribute to eventual death of the plant.

"Damping-off" is a fungus disease which often attacks tender young stems near the soil line. Proper drainage and watering should prevent the spread of this disease, but in severe cases chemical control is advisable.

Nematodes infecting the plant roots interfere with water movement and wilting of foliage occurs even in the presence of abundant soil moisture. Use of virgin soil is a good assurance against nematode infestations. Or treat moist soil in an oven at 160°F. from 1 to 2 hours to destroy nematodes and many other harmful organisms present in soils.

Shifting Plants to Larger Containers

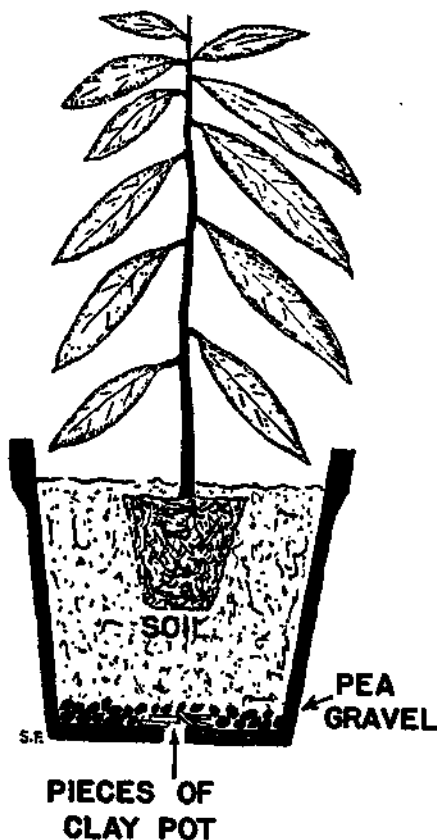
Whenever roots fill the pot, a condition known as "root bound" may occur. Root-bound plants often



Plants can be removed from containers by tapping the pot on the edge of a bench. If plant is extremely large or if it cannot be removed by tapping, break the pot with light blows of a hammer.

block the drainage hole in the pot thus preventing the drainage of excess water. It will then be time to shift the plant to a larger container.

The plant can be removed from the pot by inverting it and tapping the edge on a bench. If the plants cannot be removed by this method, or if such an attempt is likely to damage the plant, break the sides of the pot with a hammer. Avoid hard blows as these may injure the roots.



Shifting a plant to a larger container. Remove plant from small container and place in prepared container.

Prior to removing the plant from the container, prepare the larger pot for drainage, and add a small amount of soil over the pea gravel. Place the plant in the larger pot, and fill in with soil and firm gently. Leave space on top for watering.

Insects

Indoor plants are not subject to insect attacks generally associated with plants growing out-of-doors. Plants growing in shaded areas within an enclosed porch or patio are subject to infestation of red spider, aphids, mealy bugs, scale and chewing insects. Some of these insects are found indoors, and they should be eradicated early.

Localized infestations can be removed by brushing the insects with malathion diluted according to the directions on the bottle. For severe infestations, it may be necessary to spray the entire plant. (Spraying should be done outside the home.)

Periodic inspection of the foliage will disclose the initial infestation and simplify control.

Propagation of Indoor Plants

Certain indoor plants are easily propagated from stem or leaf cuttings, while others require controlled facilities which are not available to the average person.

The gardening enthusiast derives a great deal of pleasure in propagating plants. The knowledge of certain basic principles of plant propagation will enable anyone to get excellent results.

Plants propagated from cuttings will have the same characteristics as the plants from which they were taken. There are a few exceptions to this rule but the majority of plants do come true to type from cuttings.

You cannot, however, depend on true-to-type reproduction in plants grown from seed. Except with certain well-established varieties, such as garden flowers, the color, size and growth habits may vary widely when reproduction is by seed.

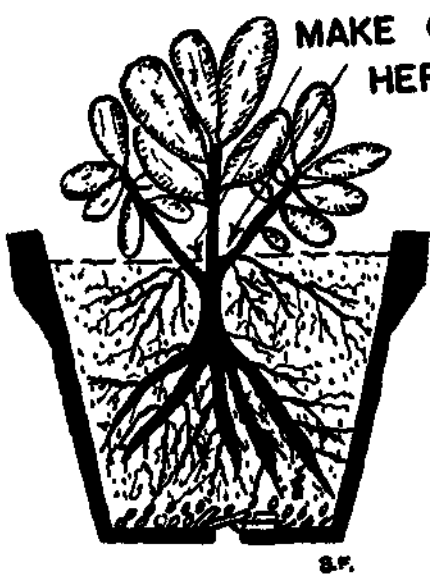
New varieties are obtained through cross breeding. In many instances, a desired plant can be perpetuated by vegetative propagation.

Indoor plants propagated by leaf or stem cuttings are:

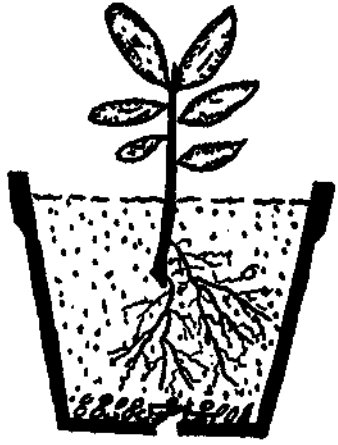
- Crassulas**—stem or leaf
- Bryophyllum**—stem or leaf
- Kalanchoe**—stem or leaf
- Coleus**—stem
- Peperomia**—stem
- Rubber plant**—stem or leaf
- African violet**—stem and leaf
- Sansevieria**—stem and leaf
- Begonia**—stem
- Philodendron**—stem
- Wandering Jew**—stem
- Artillery Plant**—stem
- Aloe**—leaf
- Ivy**—stem
- Dieffenbachia**—stem
- Dracaena**—stem
- Geraniums**—stem

Propagation by Division

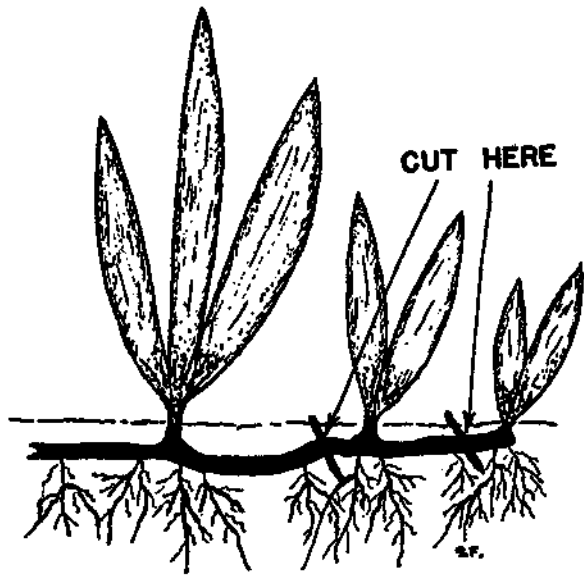
One of the simplest methods of propagating plants is by the method of division. A number of indoor plants lend themselves to this method of obtaining plants with roots already developed on the new plant.



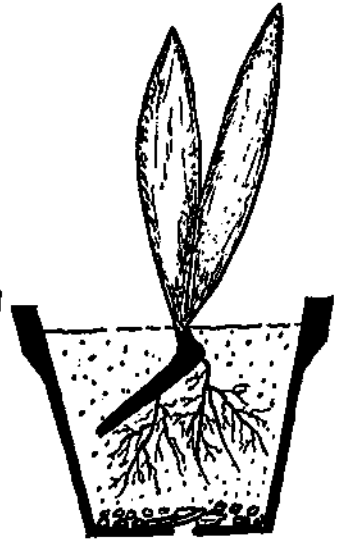
S.F.



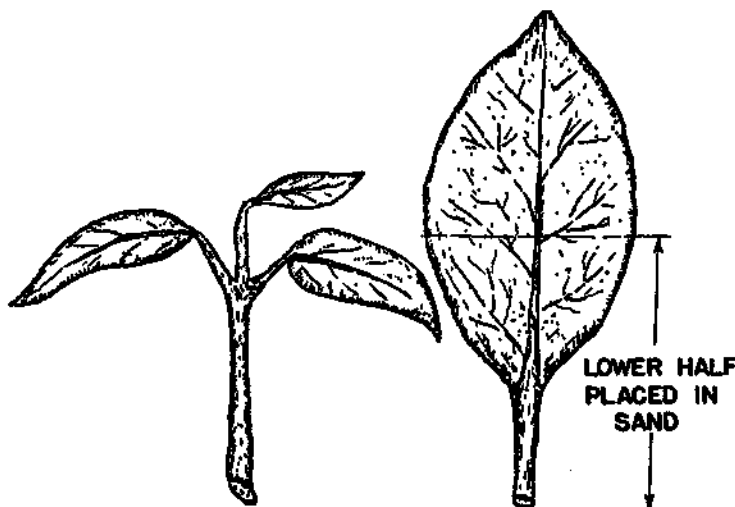
Propagating plants by means of division. Make cuts below ground level to obtain as many roots as possible. (Hen-and-chickens plant).



S.F.



Method of dividing plants that develop underground stems. (Sansevieria)



(Left) Stem cutting of an indoor plant. Leave 2 or 3 small leaves near top and remove all others. Cutting should be 3 to 4 inches long.

(Right) Leaf cutting. Leave petiole as long as possible. Place cutting in sand half the length of the leaf.

Succulents develop new plants at the base of the parent plant which can be removed when they have grown a few roots. These can be removed easily with a sharp knife by cutting the young plant off near the base of the parent stem. The Hen-and-Chickens plant is a typical example.

Sansevieria, *Iris*, and other plants which develop underground stems (rhizomes) are easily divided into new plants. First, remove such plants from the container and wash away the soil from the root system. Using a sharp knife, cut the stems into individual plants which will have roots already attached.

Use of clean sand, careful watering, and the use of healthy plant material will reward the propagator with vigorous, new plants.

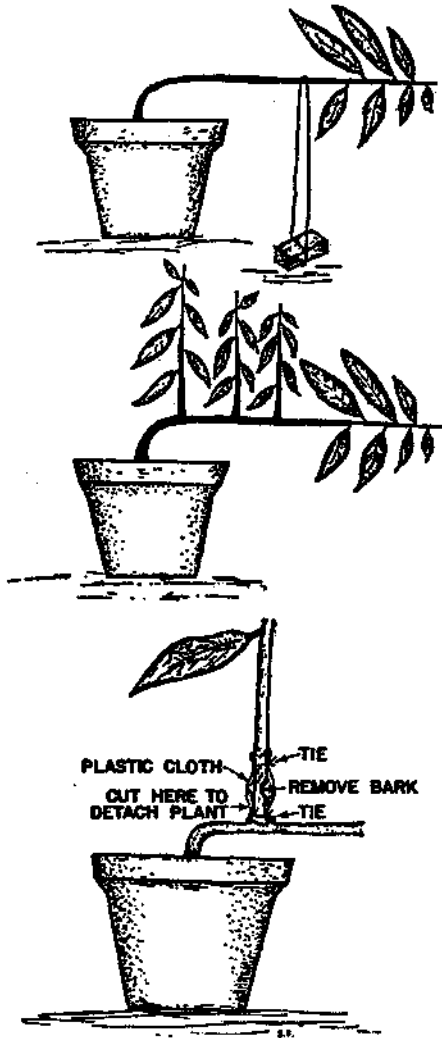
Methods of Making Cuttings

Stem cuttings of indoor plants are taken from the growth near the tips of the growing points. In some instances materials may be taken from any part from the growing point to the base of the plant.

A typical stem cutting is approximately 3 to 4 inches long with 2 or 3 leaves left near the top.

It is extremely important to limit the number of leaves on each cutting to 2 or 3, and these are usually located near the growing point. Extra leaves transpire more water than the cutting can take in.

In making leaf cuttings, use mature leaves (attained full size) with a portion of the petiole (leaf stem) remaining. *Sansevieria* leaves are cut into small sections 4 to 5 inches long.



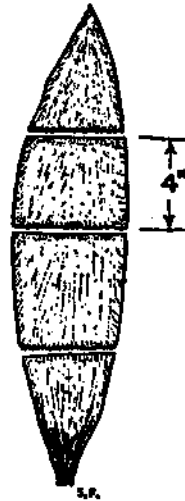
(Top) Rubber plant bent laterally to force new growth along main trunk. Tie trunk to hold it in position.

(Center) New plants will develop along main trunk. When plants are 9 to 10 inches long they can be air layered.

(Bottom) Remove a portion of bark around each of the new plants



The above container is used in making stem cuttings of indoor plants. Fruit lugs or clay pots filled with clean sand make inexpensive propagating structures. Place the cuttings 2 to 3 inches deep in the sand.



←
Leaf cutting of Sansevieria. Cut leaf into pieces 4 inches long. Allow to air-dry 3 days before placing in sand to root.

developing on the main trunk. Place moistened peat moss around the cut area and wrap with pliofilm. Moisten the moss with an eye-dropper at definite intervals. When roots develop, detach the rooted plants at the base of the main trunk.

Layering Plants

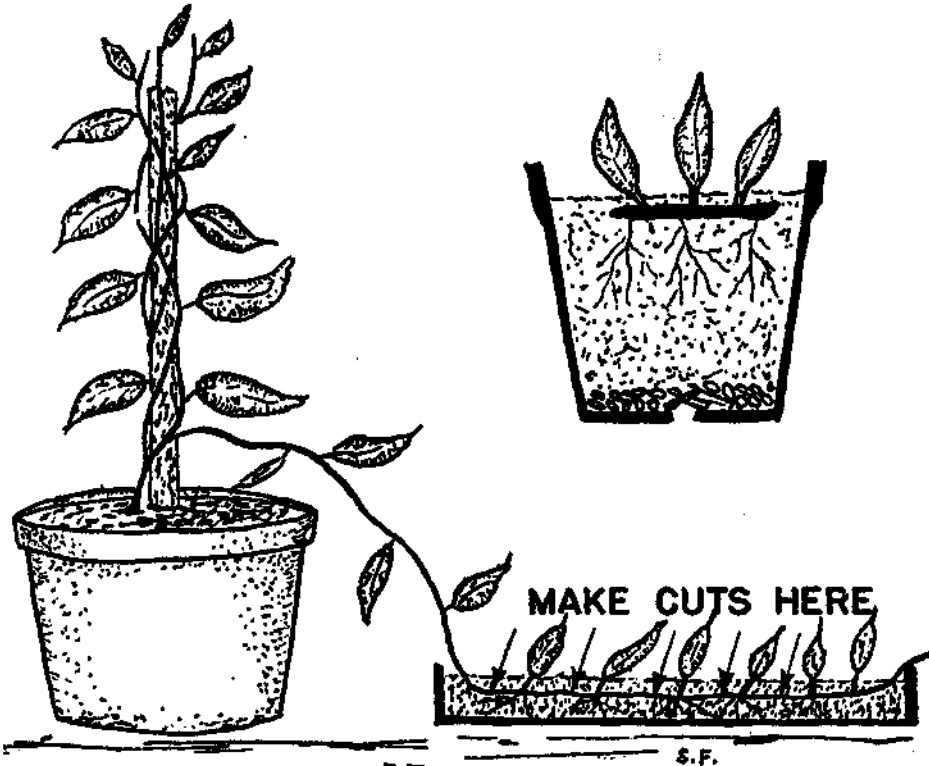
Plants can be made to root while still attached to the parent plant and later be detached and placed in individual containers. Vines, such as Ivy and philodendron, are easily propagated by this method which is known as layering.

Bury a portion of the vine an inch or so deep in the sand with leaves remaining above ground. When rooted, cut vine into small sections and place in pots containing soil.

Rubber plants often shed leaves near the base of the stem making them appear woody and unsightly. New plants can be obtained by the air-layering method which has been in common use for centuries.

Bend the main stem horizontally and hold it in place by tying to some object. New plants will develop along the main stem and these can be layered when they are 9 to 10 inches tall.

Remove a small portion of bark 3 to 4 inches above the main stem



Method of layering vine-type plants. A small box filled with clean sand placed near the potted plant will hold the vine until it has root-

ed. The buried stem can then be cut into individual plants when rooting is completed. Cut portions of the vine can be placed in small pots.

to stimulate the development of roots. Place a handful of wet sphagnum moss around the cut area, and then wrap with pliofilm or other plastic material. Tie the film wrap at each end and moisten the moss occasionally with an eye-dropper.

A period of 5 to 8 weeks is required to develop sufficient roots to support the new plant. Use a pair of sharp pruners to remove the new plant. The cut is generally made below the area of the root zone.

Set the rooted plants in containers after removal from the parent plant.

Some plants are placed in water to root. Coleus, Wandering Jew, philodendron, African violets, and others root easily if the water is changed often. Cuttings placed in water often have brittle, succulent roots which break off easily if not handled properly in the potting process.

Placing Cuttings in Rooting Media

Clean, washed sand is an ideal rooting media for cuttings. A small lug box or clay pot with a drainage hole can be used to hold the sand. Place the ends of the cuttings approximately 2 inches deep in the moist sand, firm it gently around each cutting, and water until sand is completely saturated. Water whenever the top inch of sand becomes dry.

Place the propagating box or pot in an area where early morning sunlight is available and there is shade the remainder of the day. A plastic cloth placed over the top of the container increases humidity which is desirable for rapid rooting.

Rapidity of rooting is dependent upon variety, climatic conditions,

and vigor of the plant from which the cuttings were taken. Development of roots will begin from 2 to 6 weeks after cuttings are placed in the rooting media.

When the cuttings have rooted, they can be planted in small pots until they attain larger size for use in other containers.

Propagation by Seed

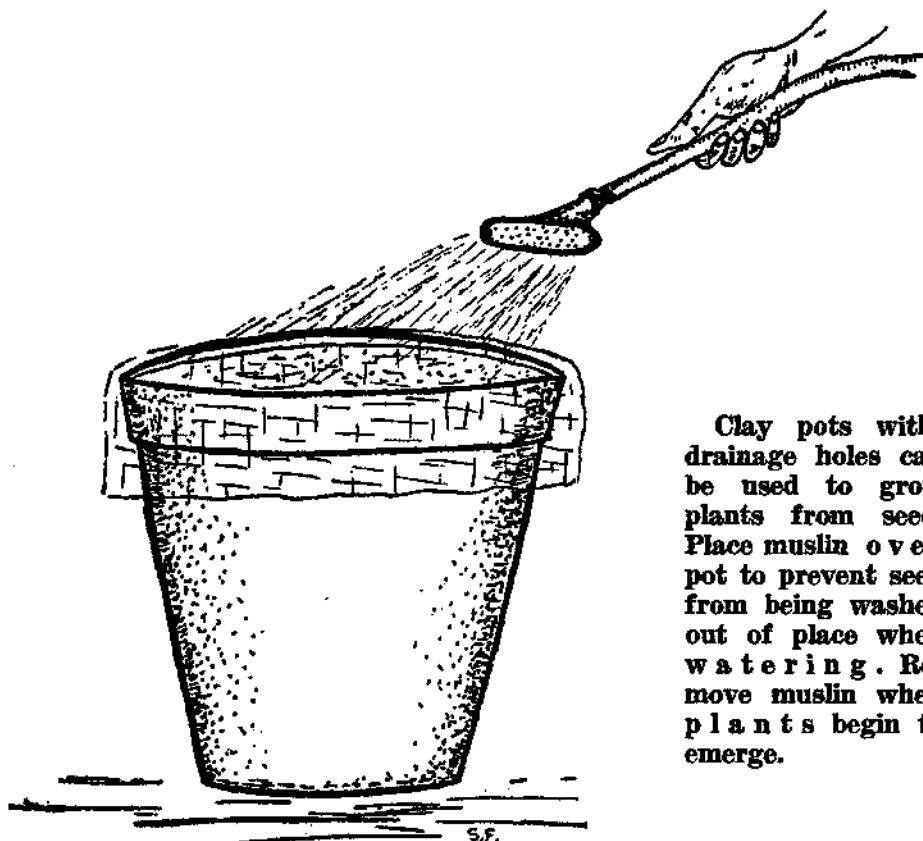
A limited group of indoor plants can be propagated from seed. Cacti, succulents, coleus, flowers and many other plants can be propagated from seed.

Variation in color, foliage shape, and general growth habits may occur in certain species of plants. This variation may produce plants either superior or inferior to the parent.

Washed sand can be used to grow new plants as this media is sterile, and has good drainage and aeration which are necessary for growing most plants. Plants grown in sand should be removed shortly after the true leaves appear, or they will become stunted and yellow due to the lack of nutrients in the sand.

Clay pots with drainage holes, or small wooden flats can be used to grow the young plants. Fill the containers to within one inch of the top with sand, level the surface, and firm the sand with a small block of wood. Seed lightly to avoid overcrowding and shading. Cover the seed with sand very lightly if seed is small (one-eighth inch). For larger seed, cover approximately one-quarter inch.

A glass pane placed over the pot or flat will prevent excessive evaporation and also hasten germination. Morning sunlight is beneficial,



Clay pots with drainage holes can be used to grow plants from seed. Place muslin over pot to prevent seed from being washed out of place when watering. Remove muslin when plants begin to emerge.

but never allow the containers to remain in sunlight during the afternoon.

Keep the containers in a warm, well-lighted location under a covered porch or any other area protected from sudden temperature change. Water frequently with a fine mist spray. Or place a small piece of muslin over the top of the containers to prevent the seed from being washed away during watering.

When the plants reach the true leaf stage, they can be transplanted to containers which have the soil

mixture recommended for indoor plants. Loosen the sand around the root zone of the seedlings with a dull knife or stick before attempting removal. This will prevent the breakage of roots during transplanting.

Transfer the seedlings to other containers immediately so the exposed roots will not dry out.

Acknowledgment

The author expresses appreciation to H. F. Tate, Extension Horticulturist, and to members of the Agricultural Experiment Station for their helpful suggestions in preparing this bulletin.