UNIVERSITY OF FLORIDA

Florida Cooperative Extension Service

Circular 579
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# Propagation of Landscape Plants'

Dewayne L. Ingram and Thomas H. Yeager'

Most ornamental plants in Florida can be propagated easily by home gardeners. By doing so, the gardener increases the number of plants with desirable characteristics and decreases landscaping costs. Plants can be propagated by asexual or sexual means. Sexual propagation involves starting plants from seed, while asexual propagation refers to multiplication of plants from vegetative plant parts such as shoots, roots, and leaves, or specialized organs such as bulbs and corms. Budding and grafting are also methods of vegetative propagation, but will not be addressed in this publication. Methods of propagating common Florida landscape plants are presented in Table la and Table lb.

## ASEXUAL PROPAGATION

The most important reason for asexual propagation is to grow plants with the same characteristics as the parent plant. Asexual propagation is the only practical means of reproduction when a plant does not produce viable seed, or seeds are difficult to germinate. A group of plants originating from a single plant and reproduced by vegetative means is called a clone. For example, the original Drake elm came from a seed, but has since been increased by vegetative propagation to maintain its desirable characteristics.

### Cuttings

The most common method to propagate plants asexually is from cuttings. Cuttings can be made from stems, roots, leaves, or combinations of plant parts such as stems with leaves (Figure 1). Cuttings should be taken from healthy plants with desirable characteristics, and placed in a warm, humid environment to hasten root development and prevent them from drying.

### Stem cuttings

Stem cuttings can be taken at different stages of vegetative maturity and may consist of just the growing tip of a plant or subterminal stem sections. Some plants root better from softwood cuttings, while others should be propagated from semi-hardwood or hardwood cuttings. Softwood and semi-hardwood cuttings are from the current season's growth, and hardwood cuttings (seldomly taken in Florida) are from the previous season's growth. Softwood cuttings are generally taken from plants in spring or early summer during a growth flush when the tissue is relatively soft and succulent. Semi-hardwood cuttings are taken after a growth flush has matured. Stems of semi-hardwood cuttings will usually "snap" like green beans when broken. Many Florida plants root best as semi-hardwood cuttings.

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Dewayne L. Ingram, former professor; Thomas H. Yeager, professor; Environmental Horticulture Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL 32611.

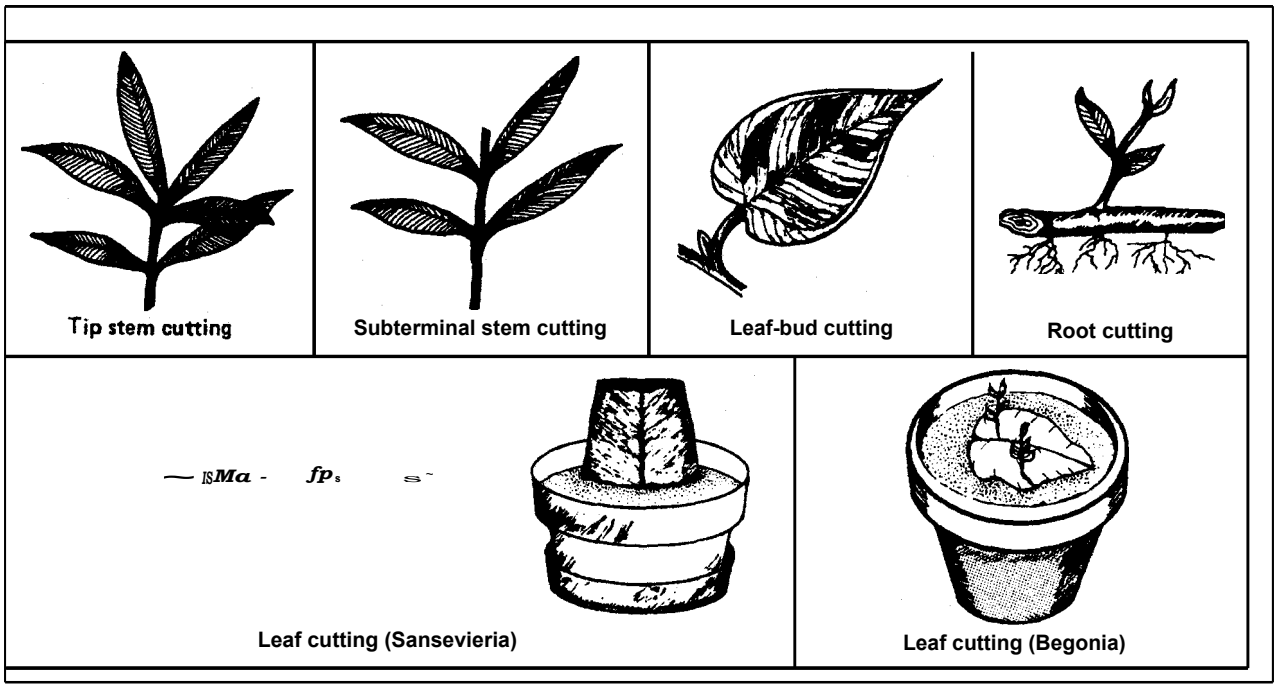


**Figure 1.** Types of cuttings.

Stem cuttings are removed using a clean, sharp knife or pruner. Cuttings 4 to 6 inches (10 to 15 cm) in length are appropriate for most plants. Leaves are removed from the bottom 1 inch (2.5 cm) of stem cuttings, and then the cuttings are stuck upright in a propagation medium. Insert the cuttings just deep enough-usually 1/2 to 1 inch (1.2 to 2.5 cm)-into the propagation medium to hold them upright.

A mixture of equal volumes of peat moss and coarse perlite is a suitable rooting medium for most plants, but combinations of other materials such as shredded sphagnum, vermiculite, and sand have also proven satisfactory. The medium should drain freely and be free of disease organisms and weed seed. Packaged media can be purchased, or small quantities can be sterilized by placing a 2-inch (5 cm) layer of moist medium on a tray in an oven at 220°F (104°C) for 1 hour. The odor from heated moist media may be offensive.

Root-promoting chemicals (hormones) can be applied to the basal 1/2 inch (1.2 cm) of cuttings before sticking them in a medium to enhance rooting of some plants. Root promoting chemicals are primarily composed of auxins: IBA (indolebutyric acid) and/or NAA (napthaleneacetic acid). Although it is possible to obtain these chemicals and prepare your own, it is more practical to purchase the commercially prepared talc formulations. These commercial preparations are available at most garden centers in various concentrations, suited for easy-, moderate-, or difficult-to-root plants. Some talc formulations of auxins also contain a fungicide to aid in preventing disease during rooting.

### Leaf Cuttings

Leaf cuttings may be comprised of only the leaf blade or the leaf blade and petiole (leaf stem). Begonias and sansevierias are commonly propagated by leaf cuttings. Leaf cuttings of some plants, such as the Rex begonia, are wounded by cutting the underside of the main veins before placing the leaf surface flat and in firm contact with the propagation medium. Sometimes it is helpful to pin these leaves to the moist medium with small stakes or toothpicks. Leaf cuttings of many plants can be stuck upright in the propagation medium. When subterminal sections of leaves are used, make sure the basal end of the cutting is inserted into the propagation medium. Roots and new shoots will start at the base of the leaf or at points where the veins were cut.

### Leaf-bud Cuttings

Leaf-bud cuttings include the leaf blade, the petiole, and a 1/2- to 1-inch (1.2 to 2 5 cm) segment of the stem. Axillary buds located at the union of the petiole and stem produce new shoots under warm,

humid conditions. This method is often used for plants in short supply that have long internodes. Every node (joint) on the stem can be a cutting.

### Root Cuttings

Root cuttings are usually taken from young plants in early spring or late winter, before they start growing. Healthy roots have ample food (carbohydrates) stored to support shoot development at this time. Root cuttings are typically 2 to 7 inches (5 to 18 cm) in length depending upon root diameter. Large roots can be cut shorter than small roots and still have an adequate food supply for root and shoot initiation and growth. Small, delicate root cuttings (1/8 to 1/4 inch or 3.2 to 6.4 mm in diameter) should be positioned horizontally in the propagation medium and covered with 1/2 inch (12 mm) of medium. Larger root cuttings (1/4 to 1/2 inches or 6.4 to 12.8 mm in diameter) can be planted vertically with the end of the cutting originally nearest the plant crown positioned upward. Optimum temperatures for most root cuttings range from 55°F to 65°F (13°C to 18°C). Root cuttings may be transplanted after shoots have emerged and sufficient new secondary roots have developed. The principal disadvantage of this method is the amount of work involved in obtaining the root cuttings.

### Hardening Rooted Cuttings

Hardening rooted cuttings refers to the development of plant resistance to environmental stress after rooting has occurred. For example, cuttings that have been rooted in a humid environment with moderate temperatures would be shocked if they were put directly in a dry, hot environment in full sun. There must be a transitional period to allow new roots and leaves to adjust gradually to environmental change.

The rooting period will vary from 2 to 16 weeks, depending upon plant species and the environment. The first step in hardening is to decrease the humidity by increasing the interval between mistings, and/or increasing the ventilation if in an enclosed rooting structure. After a gradual decrease in moisture, the light intensity can be increased gradually by moving the plants into areas receiving increasing amounts of direct sunlight. Plants that have been adequately hardened are more likely to survive when transplanted into larger containers or the landscape.

### Layering

Layering is a relatively easy method of propagation by which new plants are formed while attached to the parent plant. The new plant receives nutrients and water from the parent plant until roots develop. This method of asexual propagation yields a large plant in a relatively short time, and is an excellent way to produce a small number of plants in the home landscape, or to propagate plants that are difficult to increase by other methods. Layering outdoors is best performed during spring and summer months, although it can be done during any season of the year. Spring and summer layers are usually rooted and ready for transplanting in the fall or winter.

Healthy, maturing branches that are growing vigorously and have been exposed to light should be chosen for layering since these usually have more food reserve (carbohydrates) and therefore root faster. Branches from pencil size to about 3/4 inch (2 cm) in diameter are best for layering. It may be possible to select wood for layering that would normally be pruned when shaping the plant. The various types of layering are air, tip, trench, mound, and serpentine. Air and tip layering are the most popular methods.

### Air Layering

Air layering is commonly used for the propagation of fiddle-leaf figs, rubber plants, crotons, hibiscus, calliandra, oleanders, pandanus, camellias, azaleas, and magnolias. The first step in air layering is to remove leaves and twigs on the selected limb for 3 to 4 inches (8 to 10 cm) above and below the point where the air layer is to be made. The air layer is usually made at least 12 to 15 inches (30 to 38 cm) below the tip of the branch. The branch is wounded to induce rooting.

One method consists of removing a 1/2 to 1-inch (1 to 3 cm) ring of bark and, with a knife, scraping clean the wood underneath. This ensures complete removal of the cambium layer--a layer of cells between the bark and the wood. If the cambium layer is not removed completely, new bark may develop instead of roots.

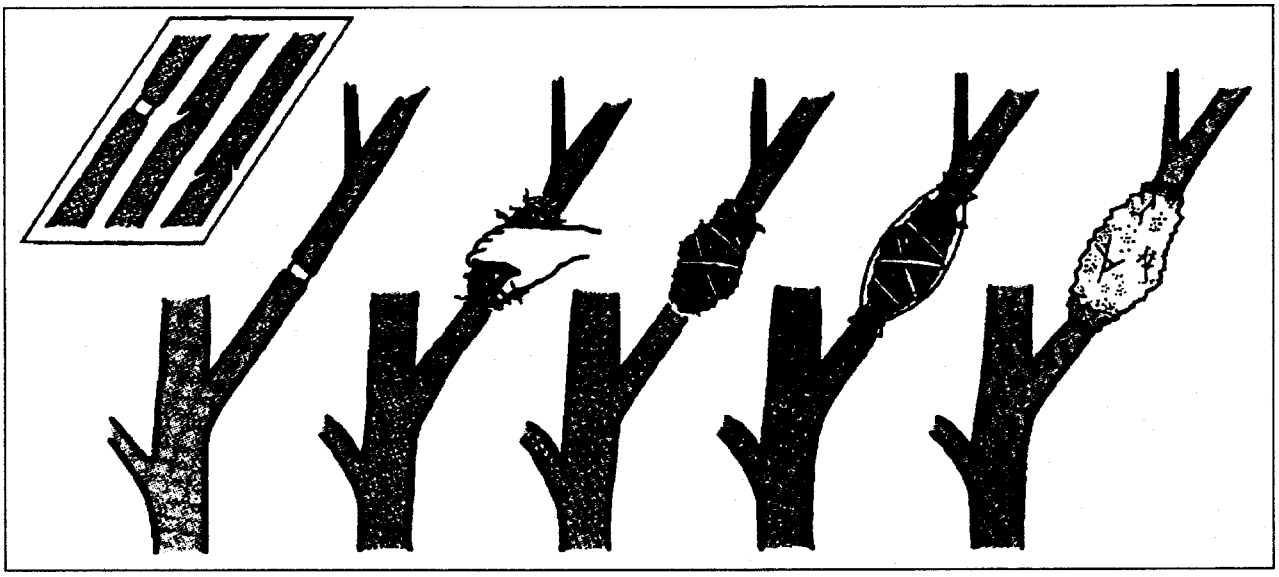

**Figure 2.** Air Layering, progressive steps in making an air layer (from left).

A second method of wounding involves making either a long slanting cut upward about one-fourth to one-half the way through the twig (Figure 2) or two small cuts on opposite sides of large branches or on branches having brittle wood. One cut should be slightly higher on the branch than the other and the cuts should not be too deep or the branch may break. The incision should be kept open by inserting a small chip of wood or toothpick to prevent the cut from healing over.

A rooting hormone can be applied around and just above the wound on difficult-to-root plants to hasten rooting, but hormones are unnecessary for most air layering. The wounded area should be bound with a handful of moist sphagnum moss. Squeeze excess moisture from the moss before placing it completely around the stem at the wound. Tie the moss firmly in place with strong twine or fabric. Wrap the sphagnum ball with clear polyethylene film and tie securely with plastic covered wire or strong rubber bands above and below the ball to prevent the moss from drying. The ball should then be covered with aluminum foil or freezer paper to prevent excessive heat build up under the plastic.

When a mass of roots has developed in the sphagnum ball (1 month to a year, depending upon plant species and time of year), the layered branch can be removed from the parent plant. When roots are visible through the plastic, the layer is ready for removal. It is best to allow the new plant to develop a larger root system in a container or protected holding area before planting it in open areas where high light intensities and dry conditions usually prevail. Layers removed during the growing season should be potted in containers and hardened much like the rooted cutting discussed previously. Layers harvested in winter can usually be transplanted directly into the landscape if adequate care is provided.

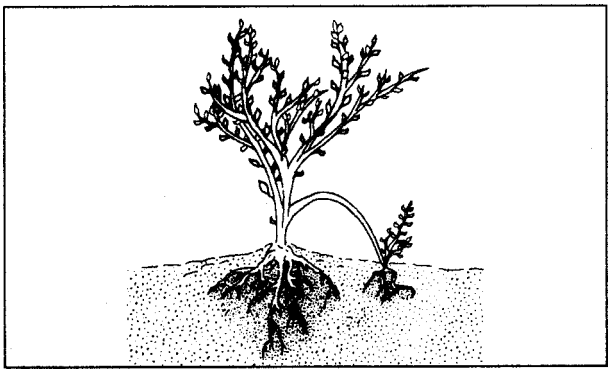

**Figure 3.** Tip Layering, an easy method of propagating plants around the home.

### Tip Layering

Tip layering is a proven means of propagating climbing roses, jasmine, abelia, oleander, and pyracantha (Figure 3). Most plants with a trailing or viny growth habit can be propagated by this method. A low branch, or one that can be bent easily to the ground, is chosen. The bark is injured (in the manner previously described for air layering) about 1/2 to 1

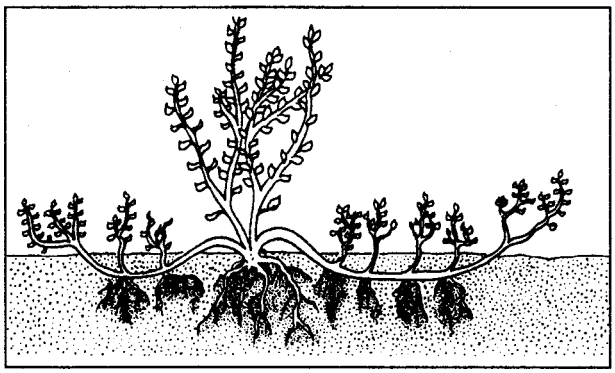

**Figure 4.** Trench Layering, this method is well adapted to the propagation of certain fruit and berry plants.

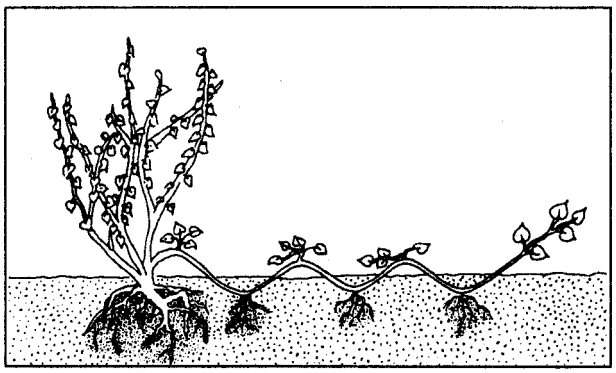

**Figure 5.** Serpentine Layering, alternate nodes along the branch are rooted, a method of securing a large number of plants from one branch.

inch (1.2 to 2.5 cm) along the stem and 4 to 5 inches (10.2 to 12.7 cm) back from the tip, and the injured area is anchored 2 to 3 inches (5 to 8 cm) in the soil. It is extremely important to keep the soil moist.

Spring is the best time to tip layer, since the injured portion will develop roots during warm summer months. Spring layers can be cut from the parent and planted in late fall or left until the following spring. The layered portion should be checked for roots before removal from the parent plant.

## Trench and Serpentine Layering

Trench and serpentine layering methods are similar to tip layering, except that a longer branch is placed in a trench and covered with soil. These methods produce several new plants from each layered branch (Figure 4). Trench layering is useful on plants whose buds will break and start to grow under the soil surface. Willows, viburnum, and dogwood can be trench layered. The entire branch, except the tip, is placed in a trench and covered with soil. Serpentine layering involves burying every other bud, leaving the alternate bud above ground (Figure 5). This method requires plants with pliable or vining stems such as grapes, trumpet creeper, and confederate jasmine.

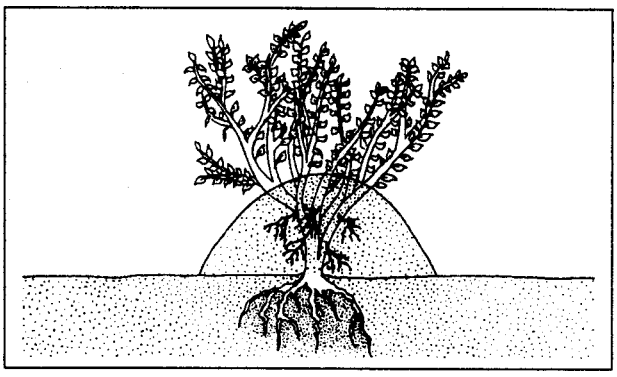

**Figure** 6. Mound Layering, showing roots forming in the soil mounded around the wounded stems.

## Mound Layering

Mound layering can be used to propagate many of the heavy-stemmed or closely-branched plants such as Japanese magnolia, croton, flowering quince, calliandra, and tibouchina. Mound layering (Figure 6) is started in spring. The plant is cut back severely prior to spring growth; new shoots that emerge are wounded (as described for air layering) and soil is mounded around the base of the plant. Soil should be mounded up in several stages to a maximum of about 1 1/2 feet (46 cm). Adding peat or sphagnum moss to the mounded soil helps when removing the rooted branches. It takes about one growing season to produce shoots that have rooted sufficiently for transplanting.

## Division

Plants with a multi-stem or clumping growth habit, offshoots, or with underground storage structures such as rhizomes or tubers can be propagated by division. Division involves cutting large clumps into smaller sections, making sure that each smaller clump has an adequate amount of stems, leaves, roots and buds to survive transplanting. Ferns, orchids, daylilies, bulbous plants, nandina, and liriope are commonly propagated by division. Division is an excellent way to increase the area in the landscape covered with plants such as asparagus fern, confederate jasmine, and liriope. Each season dig the plants from a portion or all of the ground cover area,

divide the clumps, and replant them into a larger area. Some plants can be pulled apart, but many must be cut. Transplant the separated clumps at the same depth they were growing originally Do not divide plants when they are flowering, but any other time during the growing season is suitable, as long as adequate care is provided after planting.

## SEXUAL PROPAGATION

Seed propagation is the least expensive way to produce large numbers of new plants, but seedling characteristics are usually quite variable and this may be a disadvantage. However, genetic variability offers an opportunity to select seedlings with new or different features. Seed propagation is a means of reproducing plants that are extremely difficult or impossible to propagate vegetatively. Most palms are grown from seed because they are single stemmed, and cuttings can not be taken without destroying the parent plant. Wax myrtle and native azaleas are usually propagated by seed because asexual methods are less successful.

### Seed Collection and Storage

There are no firm rules for determining when seeds of selected plants are mature and ready for collection. Changes in size, shape, weight, and color of fruit serve as visual guides to seed maturation. For example, fruit of the southern magnolia are a brilliant red, and those of the pindo palm are orange and somewhat soft when mature. Fruit should be collected during this stage because after they fall to the ground viability may decrease. The period of seed viability for many subtropical and tropical plants is short-sometimes only 3 to 10 days. This situation is especially true for seeds coming from pulpy or fleshy fruit such as that of palms; these seeds should be planted immediately after they are harvested and cleaned.

Some seeds do not have to be planted immediately, but can be stored under controlled environmental conditions. Although optimum seed storage conditions differ with plant species, seeds should be separated from fleshy pulp as soon as possible after collection. Southern magnolia, ardisia, podocarpus, sea grape, and carissa are examples of plants with fleshy fruit. The flesh or pulp should be removed to aid drying, and because the pulp may contain chemicals that inhibit germination. Removal of the pulp by hand is possible for a small number of fruit, but alternative methods can be used for greater quantities of fruit. The pulp can be removed by allowing the fruit to soften in water and then scraping them over a wire screen. A blender with rubber tubing on the blades can also be used. Another method of pulp removal involves placing the fruit in a container with water and a small amount of coarse sand. Use a wire brush on an electric drill to stir the mixture and remove the pulp. Spread the clean seeds in thin layers in the sun or a warm room to dry.

Optimum storage temperature and seed moisture content vary with species, but generally seeds should be stored at 40°F (5°C) and in an environment with 30 to 35 percent relative humidity. Household refrigerators usually maintain temperatures suitable for seed storage, but the relative humidity may exceed that optimum for some seeds. Seeds can be stored in metal cans, plastic bags, or paper or aluminum foil lined envelopes. A protective fungicide treatment is advised for seed known to be susceptible to fungal diseases. Consult your local extension agent for recommended fungicides.

### Seed Germination

Proper moisture, oxygen, temperature, and sometimes light must be provided for germination. Although optimum conditions differ with plant species, general recommendations can be made. Optimum temperatures for germination of most ornamental plant seeds are 75°F to 80°F (24°C to 27°C). A variation of 9°F (5°C) between day and night temperatures stimulates the germination of some species. The lower temperatures should be during the dark period.

The germination medium must hold adequate water yet drain freely. A mixture of equal volumes of peat moss and builder's sand is suitable, but other materials such as shredded sphagnum, vermiculite, and perlite used alone or in combinations are satisfactory. The particle size of a germination medium in relation to the seed size should be considered. A small seed positioned between large particles may dry rapidly even though the medium particles are moist, because there is inadequate surface contact between the seed and the germination medium.

The medium should be sterile to prevent disease. Damping-off, a common disease of seedlings, is caused primarily by the fungi *Pythium* and *Rhizoctonia*. Sterile propagation media can be purchased, or a small quantity can be sterilized in an

oven (but the odor may be offensive). Heating a 2-inch (5 cm) layer of moist medium at 220°F (104°C) for 1 hour will kill pathogenic fungi. The medium should be moistened before the seeds are planted, and kept moist, but not too wet, for optimum germination. A fungicide treatment may be justified when specific seedlings are known to be susceptible to soil-borne fungi.

Seed should not be planted deeper than 1 to 2 times their diameter. Small seeds should be scattered over the germination medium surface or planted thickly in rows. Medium-sized seeds sown on the surface should be covered with a thin layer of shredded sphagnum or peat moss. Larger seeds should be planted at a depth less than their diameter since a 2- to 3-inch (5.0 to 7.5 cm) planting depth is maximum for any species. Coconut palm and cycad seeds are exceptions, and should be planted just under or level with the medium surface.

## Seed Dormancy

Although seeds of many ornamental plants in Florida are ready to germinate as soon as the fruit matures, some seeds will not germinate until certain internal conditions are overcome. Such seed dormancy can be caused by an impermeable or hard seed coat. The seed coat may inhibit water movement into the seed or physically restrict embryo expansion. Seeds may also contain chemicals that inhibit water movement into the seed or physically restrict embryo expansion. Seeds may also contain chemicals that inhibit germination. Some chemical inhibitors are water soluble and can be leached from the seeds by soaking them in water. Other inhibitors must be degraded or modified by exposure to certain environmental conditions such as cold temperatures. Seeds can exhibit dormancy due to an immature embryo, in which case proper storage allows further embryo development. Seeds can also be dormant due to a combination of these factors.

Seed dormancy is nature's way of setting a time clock that allows seeds to initiate the germination process when conditions are suitable for germination and seedling growth. For example, Florida dogwood produces mature seeds in the fall, but conditions during late fall and winter are not suitable for seedling growth. Through evolution, the dogwood has developed a mechanism that keeps the seeds dormant until spring, when conditions are favorable for germination and seedling growth. Many Florida plants, especially tropical species, have no dormancy mechanism because conditions in nature at the time of seed maturation are usually conducive to germination and seedling growth. Plant propagators need only to provide a suitable environment for germination of these seeds as soon as they mature.

Dormancy caused by a hard seed coat can be overcome by breaking the seed coat. Scarification is the process of penetrating or cracking the seed coat barrier. Although acids and hot water treatments are sometimes used in commercial nurseries to break or soften the seed coat, mechanical scarification is most suited for the landscape gardener. Small numbers of seeds can be scarified by rolling them on a cement floor using a brick or board, by rubbing the seeds with sandpaper, or by cutting the seed coat with a knife. Mechanical devices may be purchased or constructed to scarify larger numbers of seeds. The seed coat should be dull in appearance after scarification, but not deeply pitted, or cracked enough to expose or injure the embryo. Scarified seeds will not store as well as nonscarified seeds and should be germinated as soon after treatment as possible.

Seeds of many temperate-zone plants require a cold period before they will germinate. This requirement is met by cold stratification - storing the seeds in a cold, moist environment. Seeds are mixed with moist sphagnum peat or vermiculite after a 12- to 24-hour soak in water at room temperature. It is also advisable to spray the seeds with a protective fungicide treatment before putting them in refrigerated storage. The seeds should be stored for 2 to 6 months at 37°F to 40°F (3°C to 5°C). Temperatures in household refrigerators are usually adequate. Suitable containers for stratification are flats, trays, boxes, or cans that provide aeration, prevent drying, and allow drainage. Polyethylene bags no more than 0.004 inch (4 mil) thick may also be used. Seeds should be planted immediately after removal from refrigeration.

## Seedling Establishment

Seed germination and early seedling development is best accomplished in a moist environment with moderate temperatures (75°F to 80°F or 24°C to 27°C). Although light is not required for germination of many seeds, high intensity light is necessary to produce stocky, strong seedlings. Low intensity light will result in weak and spindly, pale green seedlings.

Seedlings planted close together soon become crowded, resulting in slow growth and weak, spindly

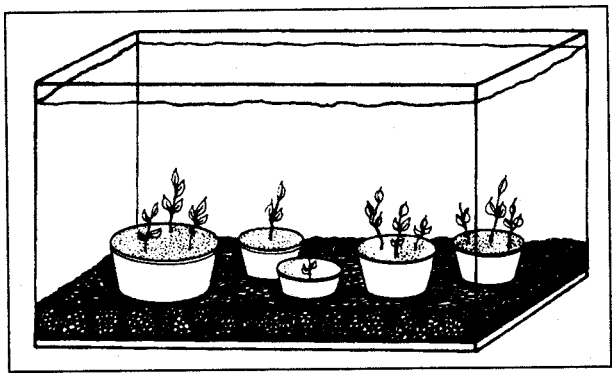

**Figure 7.** Aquarium used as propagation unit.

stems. Crowded seedlings must be transplanted with wider spacing into flats or individual or multi-celled containers. Seedlings can be grown in these containers until they are mature enough to transplant into larger containers or the landscape.

Tender seedlings transplanted without a transition period into a hot, dry environment have poor survival rates. The environment in which seedlings are grown should be modified gradually until it is similar to the environment into which they will be transplanted. Watering frequency should be decreased gradually followed by a gradual increase in light intensity.

## SMALL SCALE PROPAGATION UNITS

The key to successfully rooting cuttings and germinating seeds is a moist environment maintained at a favorable temperature. Environmental control is less important for other propagation methods, such as layering, because the mother plant provides some degree of support to the developing new plant. However, most cuttings and young seedlings are susceptible to environmental stress and will be successful only if an appropriate environment is provided.

An environment with a relative humidity near 100 percent will minimize water loss from cuttings and developing seedlings, although water loss is less critical for seedlings than cuttings. Cuttings cannot take water from the medium to replace that lost through the leaves, so if high rates of water loss occur, cuttings will dry-out. Temperature influences the physiological activity of plants. Excessively high or low temperatures injure plants or slow their growth and development, but temperatures in the range of 70°F to 80°F (21°C to 27°C) stimulate optimum growth and development for most plants.

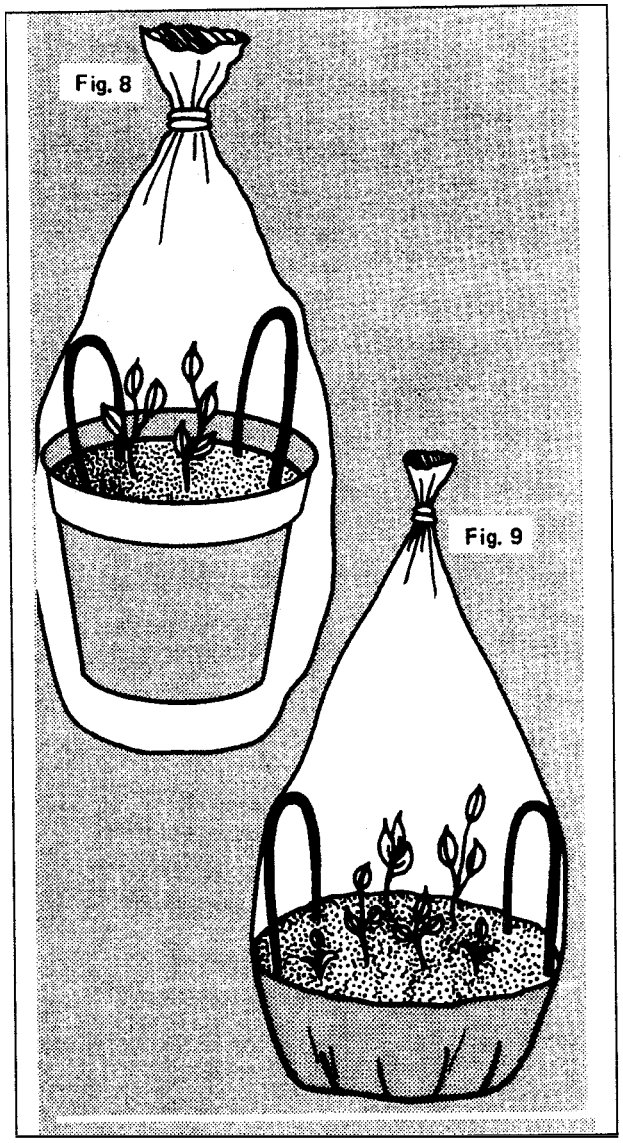


**Figure 8.** Large pot in plastic bag for propagation.
**Figure 9.** Plastic bag alone as propagation environment.

The home gardener can provide a warm, humid environment for seed germination and rooting of cuttings by construction or purchasing small-scale propagation units. These units are inexpensive, require little attention, and are convenient to use in the home landscape or indoors.

A propagation unit can be made from a terrarium or aquarium (Figure 7). These structures are usually constructed of glass or Plexiglass, but a suitable structure could be constructed of wood and glass or plastic. Approximately 2 to 4 inches (5 to 10 cm) of propagation medium can be placed in the bottom of the tank, and cuttings stuck or seed sown directly in

the medium. Alternatively, 2 inches (5 cm) of gravel can be put in the bottom of the tank, and containers with propagation medium placed on the gravel. A glass or plastic cover should be put on the container after adequate moisture has been added.

Large plastic pots and a plastic bag can be used to create a suitable propagation environment (Figure 8). Stick the cutting in a moist propagation medium in the container and add moisture as required. Place the whole container in a large, clear plastic bag. Wire hoops or stakes can be used to prevent the plastic bag from laying on the cuttings or seedlings.

A plastic bag alone can serve as a propagation environment (Figure 9). Simply place some moist propagation medium in the bottom of the bag, insert the cuttings, and tie the top of the bag closed.

The placement of these simple structures is critical. Put the structures in diffused light and never in full sun. The temperature in these sealed units will rapidly become too high in full sun, and cutting or seedling injury or death will result. Units kept indoors should be placed near a north window or under fluorescent lights for 12 to 16 hours per day. Temperatures of 65°F to 80°F (18°C to 27°C) should be maintained. Although these units are designed to prevent moisture loss, routine examination of the moisture level is suggested. Add moisture if no water has condensed on the inside of these units overnight, or if the propagation medium appears dry.

**Table Ia.** Propagation Methods for Landscape Plants: *Abelia grandiflora, Glossy* Abelia - *Hemerocallis spp.,* Daylily

| *Botanical*/Common Name | Seed | Layering | Division | Cuttings |
|---|---|---|---|---|
| *Abelia grandiflora* Glossy Abelia | | tip | | *semi-hardwood, tip, early summer |
| *Acer rubrum* Red Maple | *collect seed when mature in late spring; sow seed in outdoor protected ground bed or greenhouse flats in spring | | | softwood, tip, early spring |
| *Agave spp.* | | | clump, aerial plantlets | |
| *Allamanda cathartica* Yellow Allamanda | | | clump | *softwood, spring |
| *Araucaria heterophylla* Norfolk Island Pine | *rapid growth from seed; no pretreatment required; greater internode length than from cuttings | | | terminal tip only |
| *Ardisia spp.* | *collect, clean and sow in late winter or early spring | | | softwood, warm season |
| *Asparagus densiflorus* 'Sprengeri' Asparagus Fern | sow when mature | | *clump | |
| *Aspidistra elatior* Cast Iron Plant | | | clump | |
| *Aucuba japonica* Japanese Aucuba | sow when ripe | | | *semi-hardwood, early summer |
| *Bauhinia spp.* Orchid Tree | sow when ripe | air | suckers | *softwood, tip, summer |
| *Berberis julianae* Wintergreen barberry | | | | semi-hardwood, summer |
| *Bougainvillea spp.* | | tip, serpentine | -- | *semi-hardwood or hardwood, tip or stem |

Table **Ia.** Propagation Methods for Landscape Plants: *Abelia grandiflora,* Glossy Abelia - *Hemerocallis* spp., Daylily

| *Botanical/Common* Name | Seed | Layering | Division | Cuttings |
|---|---|---|---|---|
| *Bursera simaruba* Gumbo-Limbo | sow when mature | | | *hardwood; large trunks or branches root readily |
| *Butia capitata* Pindo Palm | collect seed when mature before they fall; remove pulp; germinate immediately at 80°F to 90°F for best results | -- | | |
| *Buxus* spp. Boxwood | | | | semi-hardwood, tip, early summer |
| Calliandra haematocephala Powderpuff | when available germinate readily | *air, mound | | |
| *Callistemon* spp. Bottlebrush | collect seed when mature; pretreat at 40°F for 2 months; much seedling variability | | | *semi-hardwood, tip, early summer; hardwood in fall or winter |
| *Camellia* spp. | scarification of seed coat necessary | air | | semi-hardwood, tip, early summer grafting and budding |
| *Carissa grandiflora* Natal Plum | clean and sow when ripe; slow germination | | | *semi-hardwood, tip, early summer |
| *Carpinus* spp. Hornbean | collected seed while wings are still pliable; do not allow to dry; sow outdoors in autumn or stratify and sow in spring. | | | |
| *Cattleya* spp. Orchid | aseptic conditions required for germination | | *rhizome | |
| *Chaenomeles speciosa* Flowering Quince | | mound | | *softwood, tip, early summer; hardwood while dormant |
| *Chionanthus virginicus* Fringe Tree | cold-warm-cold stratification; over 2 years to germinate | *air | | graftage on ash seedlings |
| *Chrysoba/anus icaco* Cocoplum | sow when mature; do not allow to dry out | | | *semi-hard wood |
| *Coccoloba uvifera* Sea Grape | collect and clean seed when ripe; germinate immediately at 75°F to 85°F | --- | | *softwood, tip, summer |
| *Codiaeum variegatum* Croton | germinate easily when fresh; much variability | Air, mound | | *softwood, tip, or leaf-bud |
| *Corpus florida* Flowering Dogwood | *collect when softening; stratify 60 to 90 days at 40°F; germinate at 70°F to 85°F in 90 to 100 days | | | semi-hardwood, tip, spring |
| *Cortaderia selloana* Pampas Grass | sow when ripe | | *clump | |
| *Cycas* spp. Cycads | *remove fleshy coat when ripe; high humidity germination | — | clump, C. *revo/uta* | |
| *Datura* spp. | sow when ripe | | | *softwood |
| *Dracaena* spp. Dracaena | | air | | *softwood or semi-hardwood, tip or stem |

***Table 1a.*** *Propagation Methods for Landscape Plants: Abelia grandiflora, Glossy Abelia - Hemerocallis spp., Daylily*

| Botanical/Common Name | Seed | Layering | Division | Cuttings |
|---|---|---|---|---|
| *Duranta repens* Golden Dewdrop | sow in spring | | | *softwood |
| *Elaeagnus pungens* Silverthorn | remove fruit; stratify at 40°F in sand for 90 days; long storage life | — | | *softwood, tip, early summer |
| *Epipremnum aureum* Pothus | | tip, serpentine | -- | *leaf-bud or stem, anytime |
| *Erythrina* spp. Coral-bean | sow when ripe; soak in warm water overnight | | | *softwood, tip, summer |
| *Eugenia spp.* | *sow when ripe | | | softwood, tip, summer |
| *Euonymus* spp. | | | | softwood or semi-hardwood, tip, spring |
| *Fatsia japonica* | germinate at 70°F to 75°F | | | *softwood |
| *Feijoa sellowiana* Pineapple guava | collect' fruit when they soften; remove fleshy pulp; *germination in 2 or 3 weeks* | | | |
| *Ficus* spp. | | air | | *semi-hardwood, tip, or stem, summer |
| *Ficus pumila* Creeping fig | | air, trench | | *semi-hardwood |
| *Gardenia jasminoides* | | | | *semi-hardwood, tip, early summer; grafting |
| *Gelsemium sempervirens* Carolina Jasmine | | tip | clump | *hardwood, fall |
| *Gordonia lasianthus* Loblolly Bay | stratification required | air | | *softwood, early spring |
| *Hibiscus rosa-sinensis* | | air | | *semi-hardwood, tip; grafting & budding |
| *Hemerocallis spp.* Daylily | sow when ripe | *clump | | |

* Most common means of propagation

Table 1b. Propagation Methods for Landscape Plants: *Ilex* spp., Holly - *Zamia floridana,* Florida Coontie

| Botanical/Common Name | Seed | Layering | Division | Cuttings |
|---|---|---|---|---|
| *flex* spp. Holly | broadcast or sow in fall or spring; cover seed with 1/8"' to 1/2" of soil and mulch fall-sown beds; complete germination will not occur until the 2nd or 3rd spring | air | air | semi-hardwood, tip, early summer |
| *Illicium* spp. Anise | | tip | | *softwood, tip or 2" stem, early summer |
| *Ixora coccinea* | | | | softwood or semi-hardwood |
| *Jacaranda mimosifolia* | seed capsule black when mature; remove seed from capsule and germinate immediately | | | |

Table 1b. Propagation Methods for Landscape Plants: *Ilex* spp., *Holly - Zamia floridana,* Florida Coontie

| *Botanical/Common* Name | Seed | Layering | Division | Cuttings |
|---|---|---|---|---|
| *Jasminum spp.* Jasmine | | tip, serpentine | -- | *softwood, early summer |
| *Jatropha integerrima* Peregrina | collect before they are ejected from the capsule and sow immediately | | | *softwood or semi-hardwood |
| *Juniperus spp.* Juniper | germinate readily when available | | | semi-hardwood, hardwood, tip, late fall; some are difficult |
| *Koelreuteria spp.* Goldenrain Tree | can be stored in air tight container at 40°F, scarification required; sow in fall | | | |
| *Lagerstroemia spp.* Crape Myrtle | sow when ripe; germination in 10 to 14 days | root suckers | | *semi-hardwood, non-flowering tip, early summer; hardwood in winter; root |
| *Ligustrum spp.* Privet | | tip, trench | | *semi-hardwood, tip, early summer |
| *Liriope muscari* Lilyturf | collected in fall; remove pulp with food blender 3/4 full water; use rubber covered blades; germinate immediately at 70°F | | *clump | |
| *Magnolia grandiflora* Southern Magnolia | *collect when cones turn brown in fall; remove red fleshy part; stratify for 120 to 150 days at 50°F | air, tip | | semi-hardwood, tip, summer |
| *Magnolia soulangiana* Japanese Magnolia | *do not allow seed to dry; stratify for 120 to 150 days at 40°F | mound | | softwood |
| *Mahonia bealei* Leatherleaf Mahonia | *do not let dry-out; clean and sow when ripe | | | semi-hardwood, tip, early summer |
| *Murraya paniculata* Orange Jasmine | *clean and sow when ripe | | | semi-hardwood, tip, spring |
| *Myrica cerifera* Wax Myrtle | *sow in beds in fall or spring; cover with 1/4" of soil; mulch with straw or leaves for fall-sown beds; seed must be sown late in fall to avoid germination and seeding mortality during winter; for spring sowing, seed should first be stratified at 34°F to 40°F for 90 days | | | semi-hardwood, tip, early summer |
| *Nandina domestica* Heavenly Bamboo | *collected when mature in fall; store dry at 40°F; germinate in fall or winter at 75°F to 80°F | — | off-shoots, clump | |
| *Nerium oleander* Oleander | | tip, air | | *semi-hardwood, tip, early summer |
| *Ophiopogon japonicus* Mondograss | clean and stratify for 4 to 6 months at 40°F | | *clump | |
| *Pandanus spp.* Screw Pine | | air | *clump, off-shoots | semi-hardwood |

Table 1b. Propagation Methods for Landscape Plants: *Ilex* spp., Holly - *Zamia fldridana,* Florida Coontie

| *BotanicallCommon* Name [1] | Seed | Layering | Division | Cuttings |
|---|---|---|---|---|
| *Phanerophlebium falcatum* Holly Fern | spores | | *clump | |
| *Phoenix spp.* Date Palm | same as Pindo Palm | | | |
| *Photinia X fraseri* Redtip | | | | softwood, tip, early summer |
| *Plumbago auriculata* | sow when ripe | | clump | *softwood, tip, in spring; semi-hard, tip, in late summer |
| *Pittosporum tobira* | | tip, trench | | *semi-hardwood, tip, summer |
| *Plumeria rubra* Frangipani | | | | hardwood allowed to dry 2 to 4 days before sticking |
| *Podocarpus* spp. | sow when ripe | | | *semi-hardwood, tip, early summer |
| *Pyracantha* spp. Firethorn | | tip | | *softwood, summer |
| *Pyrostegia venusta* Flame Vine | | | | softwood, warm season |
| *Quercus* spp. Oaks | do not let dry out; sow in ground beds in fall & protect from rodents & squirrels or stratify at 40°F for 3 months | | | |
| *Rhapis excelsa* Lady Palm | | | clump, off-shoots | –– |
| *Rhododendron* spp. Azalea | sow as soon as ripe; dry storage in airtight container at 40°F tolerated for 1 year; difficult due to small seed size | tip, air | | *semi-hardwood, early summer |
| *Rosa* spp. Roses | | tip | | *softwood; hardwood in winter; grafting and budding |
| *Russelia* spp. | sow when ripe | trench | | *softwood |
| *Sabal palmetto* Cabbage Palm | same as Pindo Palm | | | |
| *Sansevieria* spp. | | | clump | *leaf, anytime; variegation may not come true from cuttings. |
| *Spiraea* spp. | sow in fall; no stratification required; can germinate at low temp. (32°F to 36°F) when stored for more than 120 days | tip, mound serpentine | clump | *softwood, early summer; hardwood, winter |
| *Swietenia* spp. Mahogany | collect before pods open; fast growing from seed | | | |
| *Taxus floridana* Florida Yew | may require warm then cold stratification | | | *hardwood, late fall or winter |
| *Tecomaria capensis* Cape Honeysuckle | | sow when ripe -- | | *softwood or semi-hardwood |

Table 1b. Propagation Methods for Landscape Plants: *Ilex* spp., Holly - *Zamia floridana,* Florida Coontie

| *BotanicallCommon* Name | Seed | Layering | Division | Cuttings |
|---|---|---|---|---|
| *Tibouchina semidecandra* Princess Flower | | mound | | *softwood |
| *Trachelospermum spp.* Confederate Jasmine | | tip, serpentine | *clump | softwood, early summer |
| *Viburnum spp.* | | trench | | *tip, early summer |
| *Washingtonia filifera* Washingtonia Palm | same as Pindo Palm | | | |
| *Wedelia trilobata* | | | | softwood, tip, warm season |
| *Wisteria sinensis* Wisteria | sow when ripe | tip, trench, serpentine | | *softwood, early summer |
| *Yucca* spp. | sow when ripe | | *clump, off-shoot | root, fall and winter |
| *Zamia floridana* Florida Coontie | *collect when ripe after cone falls apart; remove fleshy coat; scarify; high humidity | | clump | |

* Most common means of propagation