Plant Propagation Techniques for the Florida Gardener[1]

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Most plants grown for Florida landscapes or as houseplants can be easily propagated. Home gardeners can thereby increase the number of plants they have and decrease costs.

There are two types of propagation techniques: sexual or asexual. Sexual propagation involves starting plants from seed, while asexual propagation involves multiplying plants from vegetative plant parts such as shoots, roots, and leaves, or specialized organs such as bulbs and corms. Information on budding and grafting propagation methods can be found in *Propagating Fruit Crops in Florida* (SP171) a for-sale booklet from the UF/IFAS Extension Bookstore (http://ifasbooks.ifas.ufl.edu/).

Methods of propagating common Florida landscape plants are presented in Table 1. Additional information can be found in this online index: http://hort.ifas.ufl.edu/database/lppi/index_scientific.shtml#G.

Asexual Propagation

The most important reason to use asexual propagation is to reproduce plants with the same characteristics as the parent plant. It is especially useful for plants that are difficult or impossible to propagate from seed.

Cuttings

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

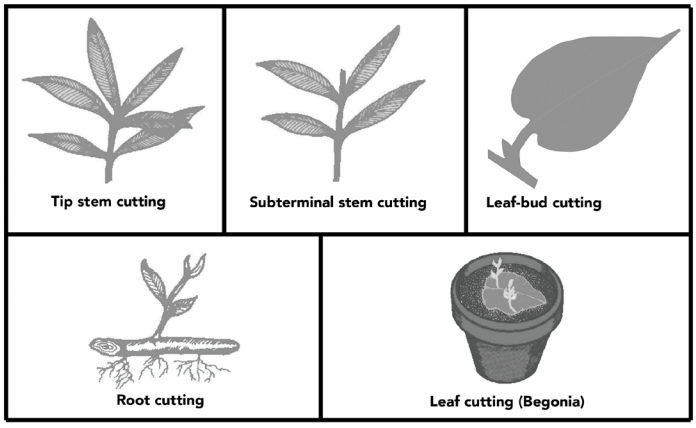

Figure 1. Types of cuttings.

STEM CUTTINGS

Stem cuttings consist of just the growing tip of a plant or stem sections below the tip (Figure 2 and Figure 3). The age of the stem is important because some plants root better from new tender stems, while others do best with more mature tissue. These stages of stem growth are called softwood, semi hardwood, or hardwood. Softwood and semi-hardwood cuttings are from the current season's growth, and hardwood cuttings (seldom taken in Florida) are from the previous season's growth. Softwood cuttings are generally taken in spring or early summer when plants are producing soft, succulent new growth. Semi-hardwood cuttings are taken after a growth flush has matured. Stems of semi-hardwood cuttings will usually "snap" like green

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beans when broken. Many Florida plants root best as semi-hardwood cuttings.

Figure 2. Tip cutting.

Figure 3. Subterminal stem cutting.

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 the stem and the cuttings are then stuck upright in a medium (i.e., soil mixture/substrate) just deep enough to hold them upright, usually ½ to 1 inch (1.2 to 2.5 cm).

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 peat, vermiculite, sand, and coir are also satisfactory. The medium should drain freely and be free of disease, organisms, and weed seed. Packaged sterile 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 or barbeque grill at 220°F (104°C) for 1 hour. (Warning: the odor may be offensive.) Rooting can be enhanced with commercially available products called rooting hormones. The bottom ½ inch (1.2 cm) of the cuttings are dipped into the product before sticking them in a medium. These commercial preparations are available at most garden centers in various concentrations, suited for easy-, moderate-, or difficult-to-root plants. Some talc formulations also contain a fungicide to protect the cutting from disease.

LEAF CUTTINGS

A leaf cutting (Figure 4) may be comprised of only the leaf or the leaf and petiole (leaf stem). Begonias and African Violets are commonly propagated this way. Stick leaf cuttings upright in the propagation medium making 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. Leaf cuttings of some plants, such as the Rex begonia, are first 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. New shoots and roots will emerge where the veins were cut.

Figure 4. Leaf cutting. (Begonia)

LEAF-BUD CUTTINGS

Leaf-bud cuttings include the leaf, the petiole, the axial bud, and a ½- to 1-inch (1.2- to 2.5-cm) segment of the stem (Figure 5). Every joint (node) can be used as a cutting. When the stem roots, the axial bud produces a new shoot.

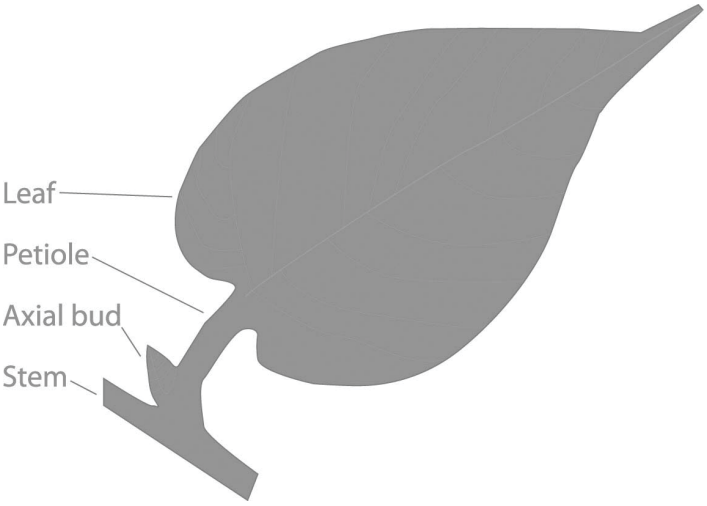

Figure 5. Leaf-bud cutting.

ROOT CUTTINGS

Root cuttings (Figure 6) are usually taken from plants in early spring or late winter before they start growing. At this time of year, healthy roots have ample stored food (carbohydrates) that will support root development. 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 growth. Small, delicate root cuttings (⅛ to ¼ inch or 3.2 to 6.4 mm in diameter) should be positioned horizontally in the propagation medium and covered with ½ inch (12 mm) of medium. Larger root cuttings (¼ to ½ 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 digging involved in obtaining the root cuttings.


Figure 6. Root cutting.

HARDENING ROOTED CUTTINGS

The rooting period will vary from 2 to 16 weeks depending upon plant species, the condition of the cuttings, and the rooting environment. New leaves and roots of rooted cuttings typically need to be "hardened" before transitioning to containers or the landscape.

The first step in hardening is to decrease the humidity either by increasing the time between mistings (if a mist system was used) or by increasing the air flow around the cuttings (if an enclosed rooting structure was used). After a gradual decrease in humidity, the light intensity can be slowly increased by moving the plants into areas receiving increasing amounts of sunlight. Plants that are not adequately hardened are less likely to survive transplanting.

Layering

Layering is a relatively easy method of asexual 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 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 branches that are growing vigorously in adequate sunlight should be chosen for layering since these usually have more food reserve (carbohydrates) and therefore root faster. Branches from pencil size to about ¾ inch (2 cm) in diameter are best for layering. The various types of layering are air, tip, trench, mound, and serpentine.

AIR LAYERING

Air layering is commonly used to reproduce fiddle-leaf figs, rubber plants, crotons, hibiscus, calliandra, oleanders, camellias, azaleas, and magnolias. The stem is wounded and encased in moist sphagnum moss into which roots grow. Once an adequate root system has been produced, the rooted stem is cut from the parent plant. The air layer is usually made at least 12 to 15 inches (30 to 38 cm) below the tip of the branch. The first step is to remove leaves and twigs for 3 to 4 inches (8 to 10 cm) above and below the point where the air layer is to be made (Figure 7).

One method consists of removing a ½ 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.

A second method of wounding, illustrated in the top left corner of Figure 7, involves making a long slanting cut upward about one-fourth to one-half the way through a small stem. On larger or brittle stems, two small cuts are made on opposite sides. 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 incisions should be kept open by inserting a small chip of wood or toothpick to prevent the cut from healing over.

Figure 7. Air layering. Progressive steps to making an air layer (from left).

With either approach a rooting hormone can be applied around and just above the wound to hasten rooting, but hormones are not necessary for most air layers. The wounded area should be bound with a large 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 twine and wrap it in plastic film. Securely tie the wrapped area with "twist-ties" above and below the ball to prevent the moss from drying. The ball should then be covered with aluminum foil to prevent excessive heat buildup under the plastic.

When a mass of roots is visible through the plastic—(1 month to a year later, depending upon plant species and time of year)—the layered branch can be removed from the parent plant. Layers removed during the growing season should be potted in containers and hardened much like rooted cuttings discussed previously. Layers harvested in winter can usually be transplanted directly into the landscape if adequate care is provided.

TIP LAYERING

Tip layering (Figure 8) is a proven means of propagating climbing roses, jasmine, abelia, oleander, and pyracantha. Most plants with a trailing or vining 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 ½ to 1 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. The injured area is anchored 2 to 3 inches (5 to 8 cm) deep into the soil. It is extremely important to keep the soil moist.

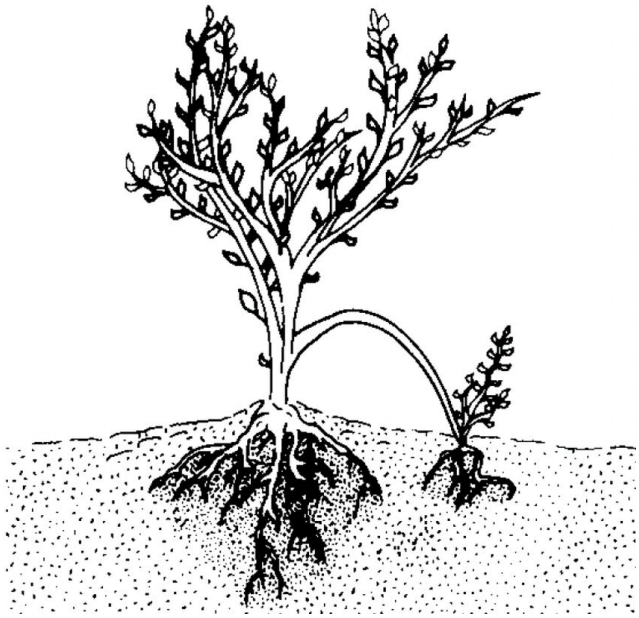

Figure 8. Tip layering: an easy method of propagating plants.

Spring is the best time to tip layer, since the injured portion will develop roots during warm 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 result in several new plants along the layered branch. (Figure 9).

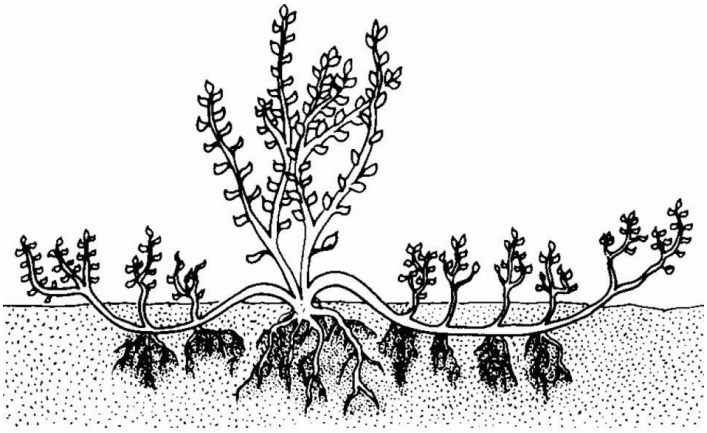

Figure 9. Trench layering: a method well adapted to propagating certain plants.

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 leaf node, leaving the alternate nodes above ground (Figure 10). This method requires plants with pliable or vining stems such as grapes, trumpet creeper, and confederate jasmine.

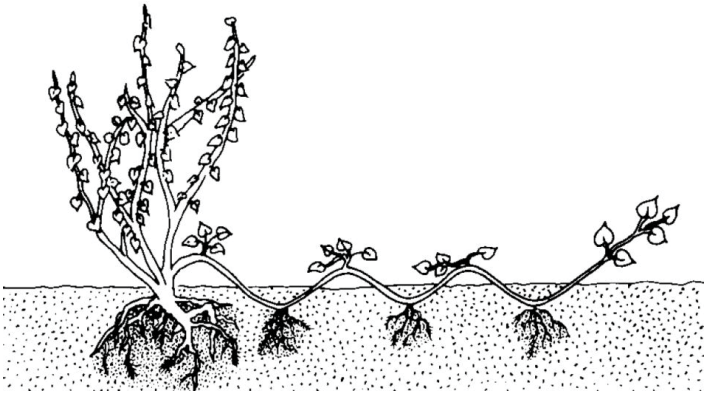

Figure 10. Serpentine layering: alternate nodes along the branch are rooted resulting in multiple plants.

MOUND LAYERING

Mound layering can be used to propagate heavy-stemmed or closely-branched plants such as Japanese magnolia, croton, and calliandra. Mound layering (Figure 11) 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 1½ feet (46 cm). Adding peat or sphagnum moss to the mounded soil helps hold the soil and roots together when removing the rooted branches. It takes about one growing season to produce sufficiently-rooted shoots.

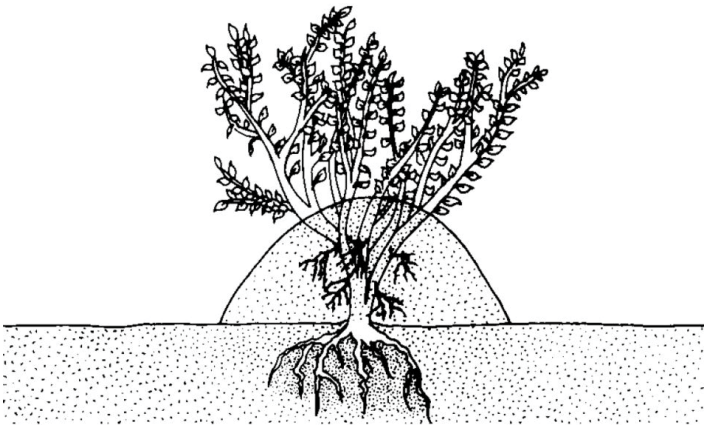

Figure 11. Mound layering: roots form in the soil mounded around wounded stems.

Division

Plants with a multi-stem or clumping growth habit, off-shoots, or 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 (Figure 12). Ferns, orchids, daylilies, liriope, and bulbous plants are commonly propagated by division. Some plants can be pulled apart, but many must be cut. Plant 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. Division is an excellent way to create or expand ground cover areas.

Figure 12. Plant propagation by division.
Credits: UF/IFAS

Sexual Propagation

Seed propagation is the least expensive way to produce large numbers of new plants or to reproduce plants that are difficult or impossible to propagate asexually. The disadvantage of this method is that seeds contain a mix of genetic characteristics from the parent plants and seedlings are often quite variable. On the other hand, genetic variability offers an opportunity to select seedlings with new or different features. Most palms are grown from seed because they are single stemmed, and cuttings cannot be taken without destroying the parent plant. Wax myrtle and native azaleas are typically propagated by seed because asexual methods are usually less successful.

Seed Collection and Storage

To determine when fruits are mature and ready to collect, one must rely on visual clues such as fruit size, shape, weight, and color. For example, mature fruits of the southern magnolia are a brilliant red, and those of the pindo palm are orange and somewhat soft when mature. Fruit of these plants should be collected during this stage because viability decreases after they fall to the ground. 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, podocarpus, sea grape, and carissa are examples of plants with fleshy fruit. The flesh or pulp should be removed to aid drying and because it may contain chemicals that inhibit germination. Allow the fruit to soften in water and then remove the pulp by hand or by scraping the fruit 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) 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 often advised for seed known to be susceptible to fungal diseases, but these fungicide products may be difficult to locate.

Seed Germination

Proper moisture, oxygen, temperature, and sometimes light must be provided for germination. Optimum conditions differ with plant species, but generally the optimum temperature range for most seeds is 75°F to 80°F (24°C to 27°C).

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 out rapidly 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 or grill (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 be planted no deeper than 1 to 2 times their diameter. Tiny seeds should be scattered over the 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 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 a hard seed coat that inhibits water movement into the seed or physically restricts the embryo's 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. Others must be degraded or modified by exposing the seed to certain environmental conditions such as cold temperatures. Seeds can also exhibit dormancy due to an immature embryo, in which case proper storage allows further embryo development. Some seeds can be dormant due to a combination of these factors.

Seed dormancy is nature's way of setting a time clock that allows seeds to postpone germination until conditions are suitable for sprouting 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 more favorable. Many tropical and subtropical species have no dormancy mechanism and will readily germinate if provided a suitable environment once the seed is mature.

Dormancy caused by a hard seed coat can be overcome by scarification—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 more appropriate for the home gardener. 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 large numbers of seeds. The trick is to wear down the seed coat without exposing or injuring the embryo. Scarified seeds will not store as well as non-scarified 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 first soaked in water for 12 to 24 hours at room temperature, then mixed with moist sphagnum peat or vermiculite and 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 after germination to produce stocky, strong seedlings. Low intensity light will result in spindly, pale green seedlings.

Seedlings planted close together soon become crowded, resulting in slow growth and weak stems. Crowded seedlings should be thinned or transplanted into ever-larger containers and allowed to grow. The environment of young plants 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 maintaining a moist environment and a favorable temperature. This is less important for other propagation methods, such as layering, because the parent plant provides some degree of support to the developing new plant. An environment with a relative humidity near 100 percent will minimize water loss from tender cuttings and developing seedlings. This is critically important for cuttings which, without roots, cannot absorb water to replace that lost through the leaves. Temperatures in the range of 70°F to 80°F (21°C to 27°C) stimulate optimum growth and development for most plants.

The home gardener can provide a warm, humid environment for seeds and cuttings with a simple, small-scale propagation unit such as a recycled aquarium. Approximately 2 to 4 inches (5 to 10 cm) of propagation medium is placed in the bottom of the tank, and cuttings are stuck or seed is 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 (Figure 13). A glass or plastic cover should be put on the container after adequate moisture has been added.

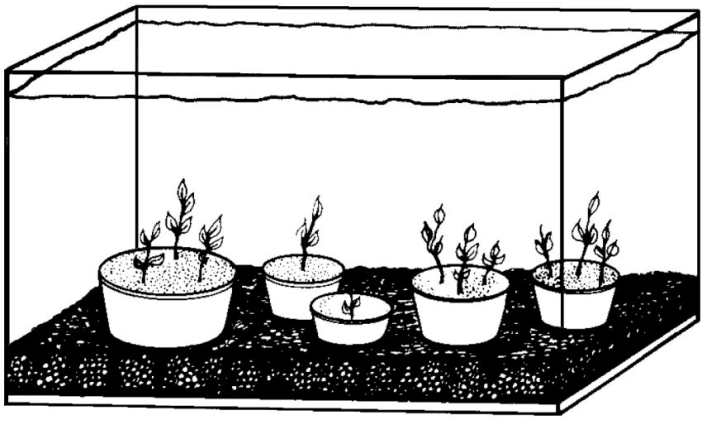

Figure 13. Aquarium used as a propagation unit.

Plastic pots can also be used to create a suitable propagation environment (Figure 14). Stick the cutting(s) in moist propagation medium, and cover the pot with a clear plastic bag. Hoops or stakes should be used to prevent the plastic bag from laying on the cuttings or seedlings.

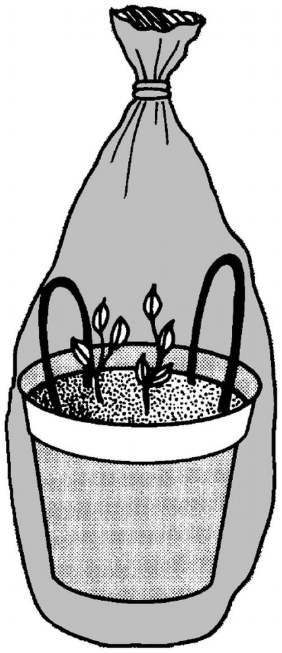

Figure 14. A simple propagation unit can be made from a pot and a plastic bag.

A plastic bag alone will serve the purpose as well (Figure 15). Simply place some moist propagation medium in the bottom of the bag, insert the cuttings, and tie the top of the bag closed.

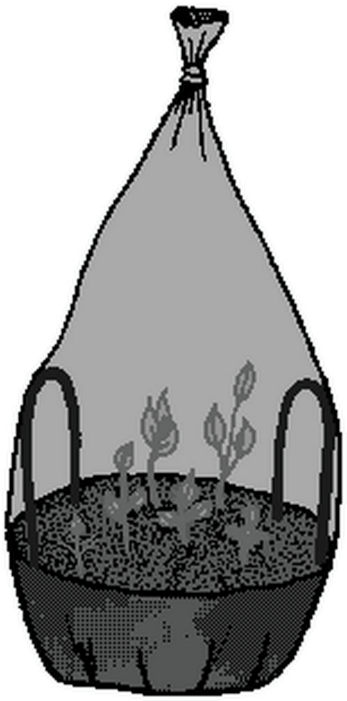

Figure 15. A plastic bag alone can serve as a propagation unit.

Whatever the structure, it is critical that it be placed in diffused light and never in full sun where it will overheat. 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. 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.

Additional Information

Plant Propagation: http://umaine.edu/gardening/master-gardeners/manual/propagation/plant-propagation/

Palm Seed Germination: https://edis.ifas.ufl.edu/ep238

Propagating Foliage & Flowering Plants: http://aggie-horticulture.tamu.edu/ornamental/a-reference-guide-to-plant-care-handling-and-merchandising/propagating-foliage-flowering-plants/

Table 1a. Propagation methods for some common Florida landscape plants.

***Botanicall* Common Name**	**Seed**	**Layering**	**Division**	**Cuttings**
Abelia x Glossy Abelia	---		---	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	---
Araucaria heterophylla Norfolk Island Pine	*rapid growth from seed; no pretreatment required	---	---	semi-hardwood; terminal tip only
Aspidistra elatior Cast Iron Plant	---	---	clump	---
Aucuba japonica Japanese Aucuba	sow when ripe	---	---	*semi-hardwood, early summer
Berberis julianae Wintergreen barberry	---	---	---	semi-hardwood, summer
Bougainvillea spp.	---	serpentine	---	*semi-hardwood or hardwood, tip or stem
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 microphylla Japanese Boxwood	---	---	---	semi-hardwood, tip, early summer
Calliandra haematocephala Powderpuff	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 macrocarpa Natal Plum	clean and sow when ripe; slow to germinate	---	---	*semi-hardwood, tip, early summer
Carpinus spp. Hornbean	collect 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	---
Chionanthus virginicus Fringe Tree	cold-warm-cold stratification; seeds require 2 years or more to germinate	*air	---	graft on pop ash (*Fraxinus*)
Chrysobalanus 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

***Botanicall* Common Name**	**Seed**	**Layering**	**Division**	**Cuttings**
Cornus 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
Cycas spp. Cycads	*remove fleshy coat when ripe	---	clump, *C. revoluta*	---
Cyrtomium falcafum Holly Fern	spores	---	*clump	---
Dracaena spp. Dracaena	---	air	---	*softwood or semi-hardwood, tip or stem
Duranta erectar Golden Dewdrop	sow in spring	---	---	*softwood
Erythrina spp. Coral-bean	sow when ripe; soak in warm water overnight	---	---	*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; germinate in 2 or 3 weeks	---	---	---
Ficus benjamina Weeping Fig	---	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	---		clump	*hardwood,tip, fall
Gordonia lasianthus Loblolly Bay	stratification required	air	---	*softwood, tip, early spring
Hibiscus rosa-sinensis Chinese Hibuscus	---	air	---	*semi-hardwood, tip; grafting & budding
Hemerocallis spp. Daylily	sow when ripe		*clump	---
*Most common means of propagation				

Table 1b.

***Botanical*/ Common Name**	**Seed**	**Layering**	**Division**	**Cuttings**
Ilex spp. Holly	broadcast or sow in fall or spring; cover seed with ⅛" to ½" of soil and mulch fall-sown beds; complete germination will not occur until the 2nd or 3rd spring	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	---	---	---
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 present	---	---	*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	---	---	---

***Botanical*/ Common Name**	**Seed**	**Layering**	**Division**	**Cuttings**
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 japonicum Japanese Privet	---	tip, trench	---	*semi-hardwood, tip, early summer
Liriope muscari Bordergrass Lilyturf	collected in fall; remove pulp with food blender ¾ 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 ¼" 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
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
Phoenix robelenii Pygmy Date Palm	same as *Butia*, Pindo Palm	---	---	---
Photinia glabra 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, allow 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 equisetiformis Firecracker Plant	sow when ripe	trench	---	*softwood

***Botanical*/ Common Name**	**Seed**	**Layering**	**Division**	**Cuttings**
Sabal palmetto Cabbage Palm	same as *Butia*, Pindo Palm	---	---	---
Spiraea thunbergii	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
Trachelospermum spp. Confederate/ Asiatic Jasmine	---	tip, serpentine	*clump	softwood, early summer
Viburnum spp.	---	trench	---	*tip, early summer
Washingtonia robusta Washingtonia Fan Palm	same as *Butia*, Pindo Palm	---	---	---
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				