softwood material which is greenwood with brown at the base. Dip in a 0.1% IBA or Seradix I as a quick-dip. The dipped cuttings are then planted into a 90:10% mix of pumice, sand and peat, then placed on bottom heat of 25°C with mist. Results are relatively quick with this type of soft material, the first roots showing in 3 to 4 weeks. A 30- to 40% rooting rate has been our initial experience with this species. This low percentage has led us to offer material to a local tissue culture laboratory that has had success with reproducing other *Metrosidros* species. We have been fortunate in getting *Metrosidros carminea* established in culture.

Specimens taken out of micropropagation situations are in their juvenile or climber form, not the desired adult form. However, they advanced to the adult form within a period of approximately three months from deflasking.

Due to the still experimental nature of this material from culture, I cannot comment on the time lapse to flowering at this stage. However, we feel this specimen has much to offer as a potted tub plant or a small garden shrub with its unique masses of carmine red flowers.

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VEGETATIVE PROPAGATION OF FOLIAGE PLANTS

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The various methods of propagating foliage plants include making cuttings, airlayers, divisions, tissue cultures, sowing seed, and spores. Vegetative propagation by cuttings is the most popular. Cuttings are sometimes placed in flats or benches, but placement in pots is the method used most. Although direct sticking requires more space, growth is usually accelerated and labor for transplanting is reduced. Less labor is a big advantage as labor costs continue to increase.

The vigor of the stocks plant is important. They should be healthy, turgid, free of insects, diseases, and nutritional deficiencies (Table 1). Single-eye cuttings of *Ficus elastica* 'Decora' stock plants grown in full sun and fertilized with 21 grams of 18-6-12 per

12-in. pot had 97% survival rate while 70% was obtained from stock plants fertilized with 7 grams and grown in 30% shade. Maximum leaf surface should be left on cuttings since reduction in leaf surface reduces production of carbohydrates and natural hormones needed for growth and root development.

Many propagators do not appreciate the importance of stock plants. For example, they may wonder why they are losing variegation in a cultivar as they continue to propagate from plants that are part of their sales inventory. The problem is that the best plants are being sold.

Table 1. Cutting weight of *P. oxycardium* and subsequent vine length.

Cutting (g)	Vine (cm)
4.4	20
2.9	15
2.4	14
1.8	10

The most frequently used cuttings are terminal stem (tip) and single node (single eye). Leaf cuttings and cane are also used. Tip cuttings are used frequently for *Dracaena*, *Aglaonema*, *Peperomia*, and *Dieffenbachia*. *Dracaena* and *Aglaonema* cane propagation is widespread. Much of the material is coming in from the tropics and seems not to suffer from storage. About 1 in. should be removed from the bottom before sticking the cane. *Ficus* may also be air-layered, but it is not necessary to propagate it in this way.

Since plants are frequently sold soon after rooting, tip cuttings are usually 4 to 6 inches long. The smaller cuttings usually root faster and require less space. Only foliage that is damaged or will have its base in the medium should be removed. A poorly-rooted cutting will make it if properly cared for.

Leaf-bud cuttings are used to propagate foliage plants that grow as vines. A single-eye cutting consists of a stem section, usually 1 to 1½ inches long, with a node and attached leaf. Soft tips and hard bases of vines should be avoided. Cuttings are placed with the bud at or slightly below the rooting medium. Initial cost is small, but a salable plant requires 6 weeks to 3 months. Single-bud cuttings of some of the large *Ficus* species produce 12-in. stems in six months.

A few foliage plants, such as Rex begonia, are propagated by leaf cuttings. A large number of plants can be obtained from a small amount of material.

Dracaena fragrans 'Massangeana', *Yucca elephantipes* and some large *Dieffenbachia* are rooted by long cane cuttings. Canes of *D.* 'Massangeana' used for propagation can be as long as six feet. Fresh cane should be obtained and the lower ½ inch removed before placement in sawdust or peat. Canes should be treated as carefully as delicate leaf cuttings. They should not be exposed to heat or

drying conditions. *Dieffenbachia* cane is usually cut as one or two nodes per section. Once healthy cuttings are selected, the proper environmental conditions should be maintained.

The propagation medium should be easily obtained, uniform, and available in consistent quantity. The medium should support the cuttings and allow easy removal after development of root systems. Satisfactory rooting of cuttings will occur with a pH of 5.5 to 6.5, although good rooting can occur at a wider range. Good water-holding capacity and aeration of the medium are important characteristics. The medium should hold enough water for adequate absorption by the plant, but there must be ample pore space for oxygen to penetrate the rooting medium. Many media have been developed that meet these requirements. Superphosphate should not be incorporated into the growing medium because some plants such as *Dracaena, Yucca,* and *Chlorophytum* are damaged by the fluoride found in superphosphate (Table 2).

Table 2. Influence of SSP* and basal-end removal on shoots/yucca cane.

Base removed	SSP (kg/m^3) 0	4
Yes	3.9	2.0
No	2.6	2.8

*Single superphosphate

Light, water, and temperature are critical for proper rooting of foliage cuttings. Maximum light should be utilized. The best light for growth of the rooted plant is best for the cutting if temperature and humidity are optimum. Cuttings with insufficient light will frequently initiate roots but will not produce enough carbohydrates to promote shoot growth. Light levels of 2,500 foot candles can be used with most foliage plants when humidity and temperatures are optimal. Although the light level should not be too high, most foliage plants will take more than we originally believed.

Some foliage plants need little moisture while initiating roots; others need high humidity to prevent wilt and encourage rooting. Mist systems provide the best method for maintaining moisture. Duration of mist and frequency of misting can vary considerably depending upon light intensity, time of year, and season. Thirty seconds every 30 minutes is satisfactory for most situations.

Slow rooting is often caused by low medium temperature. Root initiation is improved by media temperatures as high as 90°F, but root growth is inhibited at this temperature. Maximum temperature for root growth of most foliage plants is 80°F. If medium temperatures are below 70°F, root initiation and growth are greatly inhibited.

Fluorine in the water can damage cuttings. It is also often present in superphosphate. Damage often shows as leaf spotting and burning. Increasing pH may help.

Most foliage plants root readily when they are obtained from healthy stock plants and placed in an optimum rooting environment, but there is slight benefit with the use of rooting hormones for some plants (Tables 3 and 4).

Table 3. Cutting response of selected foliage plants to Hormodin 2.

Postive	None
Aphelandra 'Dania'	*Aglaonema* 'Silver Queen'
Ficus benjamina	*Dracaena sanderana*
Peperomia obtusifolia	*Maranta leuconeura*
Polyscias balfouriana	
Syngonium podophyllum	

Table 4. Effect of Hormodin and soil temperature on number of roots of *Aglaonema* 'Fransher'.

	Soil Temperature (°F)	
	66(10 wks)	86 (5 wks)
Control	5.5	7.7
Hormodin 1	5.6	9.3
Hormodin 2	7.2	17.2
Hormodin 3	7.4	18.8

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PROPAGATION OF DWARF NANDINA CULTIVARS

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Dwarf nandinas (*Nandina domestica*) are relatively easy to root. However, there are three problems: It is hard to obtain enough cutting wood; the work is very labor intensive; and, third, the proper application and frequency of the mist is critical.

At the Hines (Houston) facility, we grow four cultivars of dwarf nandinas: 'Compacta Nana' ('Purpurea Nana'), Harbour Dwarf, 'Gulf Stream' (Plant Patent 5656), and 'Moon Bay' (Plant Patent 5659). We use the same propagation techniques for all four.

All of the propagation wood is collected from container-grown material which is a very time consuming job. We use the tips only with no brown wood. Usually the stem part of the cutting will be ½ to 1½ in. long. The wood is stored in a walk-in cooler at about 50°F for up to 48 hours, but preferably no longer than 24 hours.

The cuttings are prepared indoors. All we do is strip off a few bottom leaves, just enough so that the foliage is not too thick during the rooting process. On 'Harbour Dwarf' we also reduce the overall diameter of the foliage. We occasionally recut the basal end if the cutting is too long. The cuttings are bundled into groups held together by a rubber band and then quick-dipped into a solution of Benlate and Agristrip at the recommended rates.