Circular 1163

UNIVERSITY OF FLORIDA

Cooperative Extension Service
Institute of Food and Agricultural Sciences

Container Production of Palms[1]

Alan W. Meerow[2]

Container-grown palms are raised for essentially three markets:

- liners for field production
- wholesale or mass market retail sales for residential landscapes, and
- interior specimens, both mass market houseplants and interiorscape use.

The largest market for container production is the interior. Palms are outstanding plants for the interior environment. Properly acclimated, a large number of subtropical and tropical palm species are capable of residing under low light conditions for a relatively long period of time. See Figure 1.

PRODUCTION REGIMES FOR CONTAINER PALMS

There are basically four production regimes for growing palms in containers. Three of these are largely oriented toward growers in the tropics, where cold protection is not as crucial a consideration and the production environment is thus much less controlled. It is, however, absolutely essential that a specimen-sized palm intended for indoor use be acclimated for at least 1 year prior to exposure to low light conditions. A palm leaf produced in full sun will not survive under typical interior conditions (Broschat et al., 1989).

Containerized sun-grown—Container palms produced in full sun will either be used as liners for field production or landscape plants (retail or wholesale).

Figure 1. Container palm operation in Florida.

Containerized, full sun grown, shade acclimated—
This production strategy is also largely limited to tropical and subtropical areas due to climatic considerations. The palms remain containerized throughout production, but are grown first in full sun for several years. Though foliage may bleach in some species (e.g., Lady palm—*Rhapis excelsa*, Bamboo palm—*Chamaedorea seifrizii*), exposure to full sun stimulates increased "suckering" of many cluster palms, and larger caliper on solitary palms. The palms

1. This document is Circular 1163, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Publication date: June 1996.

2. Alan W. Meerow, Palm and Tropical Ornamentals Specialist and associate professor, Department of Environmental Horticulture, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL 32611.

are moved to 70–80% shade for the final 3–12 months of production time. Palms treated in this manner are usually smaller than specimen size, but both mass market and intermediate size interiorscape products can be successfully produced.

Containerized, shade grown—This is the exclusive method for production for interior palms in more temperate areas (in greenhouses), though growers in tropical areas also grow a number of species in containers under open shade throughout the entire production cycle. Palms produced under shade usually have darker green leaves, but growth tends to be slower and less compact. Using a lower degree of shade (50–63%) during the first part of the production cycle and then shifting to heavier shade (70–80%) for the final year of production provides some degree of compromise, if the additional costs can be justified. Retractable shade systems may provide an even better solution in the future. The vast majority of the palms produced in this manner are for the mass market or small specimen interiorscape markets.

Containerized field grown specimens—Palms are grown to specimen size in the field nursery in full sun or (in the case of understory palms) as an interplant with an upper canopy species. When the palm achieves the desired size, it is dug, containerized and moved under 70–80% shade for at least 1 year before sale. This method is largely reserved for high market value large specimens (15–40 ft overall height) and is restricted to subtropical and tropical regions. Smaller, mass market palms can be produced similarly, however labor costs are high.

HANDLING PALM SEEDLINGS

Growers of containerized palms can choose to grow their own liners from seed or purchase seedlings from another nursery. A grower wishing to produce material from seed is referred to *Palm Seed Germination* (Cooperative Extension Bulletin 274).

Transplanting the Seedlings

Palm seedlings may be transplanted either immediately after germination or after 1 or 2 leaves have formed. The objective is to lessen the degree of root disturbance to the seedlings; thus it is best to transplant before roots begin to circle the container or roots of adjacent seedlings become entangled. Transplant in the warmer months of the year, when root growth will be rapid. Seedlings will usually have one long root at the time of first transplanting. Seedlings should be first transferred from the germination container to a small liner pot that just accommodates the root system and allows some subsequent root growth. Deep liner pots with essentially open bottoms are being used by a increasing number of growers. Palm seedlings benefit from the deeper root run, and long roots emerging through the bottom opening are "air pruned" and cease growth, thus significantly eliminating the circling of roots around the inside walls of the pot. Two strategies are then possible for subsequent transplanting of the seedlings. They can be shifted successively to slightly larger containers as they grow (frequent small shifts), or they can be transplanted to larger containers than their size might seem to warrant (fewer and larger shifts). Frequent small shifts lessen the chance of loss due to over-watering, but increase labor costs. Transplanting into large containers lowers labor costs and provides for more unrestricted root growth, but may promote increased loss due to root rots when the seedlings are small. Thus, larger, less frequent shifts will require careful irrigation monitoring while the transplants establish in the new containers.

Palms are very intolerant of being planted too deep, regardless of age or size. For palm seedlings, planting as little as ½″ too deep can result in severe production setbacks and, ultimately, death of the seedlings. Palm seedlings should be transplanted so that the point on the seedling stem just above where the root system appears to begin lies at the soil surface. This point is sometimes marked by a noticeable swelling, particularly on older seedlings. Do not sever the connection of the seed to the seedling palm. If the seed is still attached to the plant by the cotyledonary petiole (remote germination), drape the seed over the edge of the pot or allow it to sit on the soil surface.

Some growers prune palm seedling roots when transplanting. This is not recommended, and usually results in growth setbacks or even death of some of the seedlings. If the seedling root is longer than the transplant container, it can be allowed to slightly curve upward or around the inside perimeter of the container. A better solution is use pots large enough to accommodate the full length of the root.

Ideally, newly transplanted seedlings should be placed under light shade (30–50%) for several weeks, or until new growth is apparent. If this is not possible, irrigation frequency must be carefully monitored so that the transplants are not water-stressed during establishment.

Division of Clustering Palms

Clustering palms, that is those that produce new erect shoots from a common base or system of rhizomes, can be divided carefully as a means of increasing stock. Species that produce new shoots at some distance from the parent stems (e.g., *Rhapis* species) are the most easily divided. In South Florida, containerized *Rhapis excelsa* (Lady palm) are typically propagated in this manner from clumps established in the ground. Divisions from the parent plant are made with a sharp spade and carefully lifted with as much of the root ball as can be managed. Newly separated divisions are potted and kept shaded and well-watered until established (4–6 months). A drench with a broad spectrum fungicide is advisable after potting.

PRODUCTION PARAMETERS

Medium

A container medium for palms should be well-drained, well-aerated and slow to break down (some palms may remain in the same container for several years); percent air space of 10–15% is advisable with a water-holding capacity of 30–40% by volume. A 2:1:1 (v:v:v) mix of peat, pine bark and wood shavings works well for short term crops, as does a 2:2:1 peat:bark:sand mix. Indications are that either cocopeat or coir dust (coconut mesocarp short fibers) is an acceptable substitute for peat. Slower growing palms benefit from a mix with a higher sand fraction. Many other mixes are possible as long as they are slow to break down and meet these porosity and water-holding characteristics.

Irrigation

Good quality container palms have been produced with overhead irrigation, drip or trickle irrigation, and sub-irrigation. Overhead irrigation can detract from the saleability of the palms if water high in iron and calcium carbonate leaves deposits on the foliage. Overhead irrigation may lessen problems with two-spotted spider mites. For small, mass-market containerized palms, drip irrigation is the most sensible system to consider and can be integrated with a fertigation program for maximum success. Irrigation frequency of containerized palms will vary considerably depending on the species grown, the prevailing temperatures, the type of growing medium, and the size of the container. This makes it difficult to generalize. A reasonable rule-of-thumb is to program irrigation so that the medium remains evenly moist but never saturated.

Temperature

Tropical palms grow most productively at temperatures between 75–95°F. Air temperatures up to 100°F will usually not have any deleterious effects. It is important to recognize that the root activity of many tropical palm species will decrease markedly if soil temperatures drop below 65°F. During the winter months, irrigation and fertilization frequency may need to be reduced accordingly in unheated growing environments.

Fertilization

Palms seedlings do not generally require fertilization during the first 2–3 months after germination. During this time, all nutrients are supplied by storage tissue in the seed. After this period several fertilization strategies are possible.

Fertigation

Injection of soluble fertilizers into irrigation water works best in tandem with drip irrigation and/or fast growing species. Injection of nutrients into overhead irrigation systems is wasteful and potentially polluting. For slow-growing palms, fertigation may result in excess soluble salt accumulation in the root zone. Constant feeds of 150–200 parts per million (ppm) nitrogen and potassium and 50–75 ppm magnesium are recommended. The containers should be leached with plain water once per month if not exposed to rainfall. The program should be reduced if temperatures drop below 65°F.

Slow-release fertilizers

For a short term palm crop, incorporation of slow-release fertilizers in the medium before potting is a good idea. Per cubic yard of a peat-based medium, incorporation of 12–15 lb of NPK, 1–2 lb of micronutrient blend, and 5–7 lb of dolomitic limestone (for pH adjustment as well supplementary calcium and magnesium) should provide sufficient nutrition for the first 6–12 months of growth. New resin-coated "total" fertilizers are becoming available with release durations of up to three years. The high cost of such fertilizers may be offset by the reduced labor for a short-term crop. A 3:1:3:1 ratio of nitrogen, phosphorus, potassium and magnesium appears excellent for palms (Broschat and Meerow, 1991), though this exact ratio may not be as important for organic container media as for field soils.

Granular top-dressing

Most "palm specials" in the United States are formulated for landscape or field nursery use. There are a number of granular fertilizers available for use as container top-dresses for nursery stock, and they work adequately for palms. A 3:1:3:1 N:P:K:Mg ratio is recommended (Broschat and Meerow, 1991). While it is also recommended that 50% of both N and K be in slow-release form for landscape and field nursery use, the good cation exchange capacity of most container media makes this less urgent a priority, unless irrigation and/or rainfall is frequent and heavy.

Foliar feeds

Many indoor palm growers carry on a regular program of foliar fertilization, even though research has not supported this method as the most effective way to fertilize. This is an extremely inefficient way to provide macronutrients; palm leaves can only absorb marginal quantities of N, P, K and Mg through the leaves. While micronutrients can be applied as a foliar spray, even chelated forms are best applied to the root zone for maximum efficiency of uptake. Foliar applications of micronutrients should not be performed more than once per month.

Foliar analyses are valuable diagnostic tools for container grown palms if sub-optimal nutrition levels are suspected in the crop. In table 1, suggested foliar nutrient levels are listed for several ornamental palms. Further information and color pictures of common palm nutrient deficiency symptoms are available in University of Florida Publication SS-ORH-02, Palm Nutrition Guide.

Weed Control

Preemergent herbicides should be applied to weed-free container medium surfaces before weed seeds germinate. Some herbicides require incorporation into the soil either manually or by ½–2″ of precipitation or overhead irrigation. Palm species tolerant of preemergent herbicides are listed in table 2. Each herbicide listed in table 2 has been tested for safe weed control in selected palms. Other palm species must be tested for possible plant toxicity before being added to the label for use in commercial palm production.

Postemergent herbicides are applied to actively growing weeds. They are most effective when the weeds are small. These herbicides should be applied one or more hours before any rainfall or overhead irrigation. Weeds should not be cultivated for several days after application or effectiveness may be reduced. The only postemergent herbicides registered for use in palm nurseries are Fluazifop-P-butyl butyl(R)-2-[4-[[5-trifluoromethyl]-2-pyridinyl]phenoxy] propanoate (Ornamec) and sethoxydim (Vantage). These two herbicides will only kill annual and perennial grasses; they are ineffective on broadleaf weeds and sedges. In some cases, both must be applied as a directed spray around the base of palms. Glyphosate will kill grasses, broadleaf weeds, and sedges. Should glyphosate drift onto leaves or green stem tissue of palms (and possibly exposed white roots as well), plants may be stunted and new leaves deformed. However, palms should grow out of this injury within a few weeks (Donselman and Broschat, 1986).

Cold protection

Palms in heated greenhouses are generally safe from freeze damage unless heaters fail. In open shadehouses or in the full sun container nursery, special protection is necessary. Anti-transpirant chemicals applied to the foliage may help prevent cold damage, but there is insufficient research proving that these chemicals provide significant cold protection.

Overhead irrigation (Icing)

Icing the plants with overhead irrigation works well if performed properly. The irrigation must be turned on before temperatures reach freezing and should continue until the ice visibly melts from the plant surfaces. The weight of the ice can, however, cause breakage of palm leaves.

Thermal blankets

Specialized fabrics for covering container plants are available for use during short periods of freezing weather. Unfortunately, the small increment of protection (2–3°F) is usually reduced by at least half after the first night.

PESTS

Container palms, like other tropical foliage plants, are subject to a number of generalized plant pests such as mealybugs, thrips and scales. False oleander, black thread and brown scales are the most common scale insects on Florida container palms. Supracide (a highly toxic, restricted use insecticide) and Cygon 2E (demethoate) have proven effective on both scales and mealybugs. Lannate has successfully controlled number of thrips, but has now lost its ornamental label. Several pests are particular problems on container palms, however.

Two-spotted (red) spider mite

Spider mites are a particular problem on greenhouse-grown indoor palms, and on many *Chamaedorea* species. The predatory mite species, *Phytoseiulus persimilis* has been very successfully used to control two-spotted mites on palms in the greenhouse environment and in shadehouses as well.

Banana moth (*Opogona sacchari*)

The larva of this moth has been a destructive pest on *Chamaedorea* species and arecas chiefly, but other palm species, especially slender stemmed species, are susceptible as well. The pest is confined to South Florida. The caterpillar tunnels through the stems of the palms. Lindane and Sevin have had some success in control, and Dipel (*Bacillus thungeriensis*) may be effective as well. Parasitic nematodes have also been fairly effective in controlling infestations of this insect.

DISEASES

The most complete and current review of palm diseases can be found in Chase and Broschat (1989). Several disease problems are particularly prevalent in container palm production in the United States.

Gliocladium blight (Pink rot)

This fungal disease is a serious problem on *Chamaedorea* species and areca palms. The causal agent is not active at temperatures above 85°F, thus it is primarily a winter disease. Oozing lesions occur on the stems, and leaves turn brown and droop. The fungus produces salmon-pink, powdery fruiting bodies. The disease is easily spread if affected leaves are pulled off the plant prematurely, thus leaving an entrance for new disease inoculum.

Leaf spots

Leaf spots diseases caused by various *Bipolaris*, *Exserohilum* and *Phaeotrichones* fungi (often called the Helminthosporium-complex) affect a broad range of indoor palms. The disease is easily spread by overhead irrigation and poor greenhouse sanitation. *Cercospora* leaf spot is frequently a problem on *Rhapis* palms, cylindricladium on kentia (*Howea forsteriana*), and anthacnose (*Colletotrichum*) on various species.

Phytophthora bud rots

Often this disease is not observed until the spear leaf wilts, turns brown and then black. If pulled, a foul smell is often noticed. Unfortunately, at this point, it is too late for control measures. This soil borne, warm-season disease is aggravated by wet conditions. Soil drenches with metalaxyl (Subdue), or foliar spray with fosetyl aluminum (Alliette) are the best controls in the early stages of infection. Bacterial bud rots are less common, but frequently the cause of bud loss after freeze damage (Meerow, 1992).

EUROPEAN AND CALIFORNIA CERTIFICATION

Palms grown for export into the European market must be produced in a media that contains no conifer bark.

Palms grown for the California market must be produced on raised benches at least 18″ above the ground and treated with approved insecticides for fire ant control.

Growers interested in certification for either market should contact the Florida Department of Agriculture, Division of Plant Industry for the latest regulations.

PRODUCTION TIMES

Production times vary widely depending on the species and the finished size. For fast-growing areca palms (*Chrysalidocarpus lutescens*), a 8–10″ container crop can be produced in 1.5–2 years from seed, while a slow-growing species such as kentia (*Howea forsteriana*) may take 3–5 years from seed to a finished 10″ container.

BIBLIOGRAPHY

Broschat, T. L. and Meerow, A. W. 1990. Palm nutrition guide. University of Florida Extension Circular SS-ORH-02, Gainesville.

Broschat, T. L., Donselman, H., and McConnell, D. B. 1989. Light acclimatization in *Ptychosperma elegans*. HortScience 24:267–268.

Burch, D., Atilano, A. and Reinert, J. 1983. Indoor palm production guide for commercial growers. University of Florida Extension Fact Sheet OHC-8, Gainesville.

Chase, A. C. and Broschat, T. K. (editors). 1991. Diseases and Disorders of Ornamental palms. American Phytopathological Press, St. Paul, Minn.

Donselman, H. and Broschat, T. K. 1986. Phytotoxicity of several pre- and postemergent herbicides on container grown palms. Proc. Fla. State Hort. Soc. 99:273–274.

Meerow, A. W. 1991. Treating cold damaged palms. University of Florida Fact Sheet OH-92, Gainesville.

Norcini, J. G., Meerow, A. W., and Meister, C. W. 1991. Weed control in palm production. Florida Nurseryman 38(12):12–14.

Table 1. Critical concentrations of 13 elements in: Group I—*Chamaedorea elegans* (Neanthe bella), *C. erumpens* and *Chrysalidocarpus lutescens* (Areca); Group II—*Howea fosteriana* (Kentia) and *Rhapis excelsa* (Lady palm). Concentrations above the maximum range are considered excessive. All data from Chase and Broschat (1991).

Element	Group	Deficient	Low	Normal	High
N (%)	I	1.90	2.0-2.4	2.50-3.50	3.60-4.50
	II	0.84	0.85-1.19	1.20-2.75	2.76-4.00
S (%)	I	0.14	0.15-0.20	0.21-0.40	0.41-0.75
	II	0.10	0.11-0.14	0.15-0.75	0.76-1.25
P (%)	I	0.10	0.11-0.14	0.15-0.30	0.31-0.75
	II	0.10	0.11-0.14	0.15-0.75	0.76-1.25
K (%)	I	1.20	1.25-1.55	1.60-2.75	2.80-4.00
	II	0.59	0.60-0.84	0.85-2.25	2.26-4.00
Mg (%)	I	0.20	0.21-0.24	0.25-0.75	0.76-1.00
	II	0.19	0.20-0.24	0.25-1.00	1.01-1.25
Ca (%)	I	0.39	0.40-0.99	1.00-2.50	2.51-3.25
	II	0.25	0.26-0.39	0.40-1.50	1.51-2.50
Na (%)	I	—	—	0-0.20	0.21-0.50
	II	—	—	0-0.20	0.21-0.50
Fe (ppm)	I	39	40-49	50-300	301-1000
	II	39	40-49	50-250	251-1000
Al (ppm)	I	—	—	0-250	251-2000
	II	—	—	0-250	251-2000
Mn (ppm)	I	39	40-49	50-250	251-1000
	II	39	40-49	50-250	251-1000
B (ppm)	I	17	18-24	25-60	61-100
	II	15	16-20	21-75	76-100
Cu (ppm)	I	3	4-5	6-50	51-200
	II	4	5-7	8-200	201-500
Zn (ppm)	I	17	18-24	25-200	201-500
	II	17	18-24	25-200	201-1000

Table 2. Herbicides labelled for use in or around palms.

Latin Name	Common Name	Herbicide(s)
Butia capitata	Pindo palm, Jelly palm	Southern Weedgrass Control
Caryota mitis	Fishtail palm	Ronstar G
Chamaedorea cataractarum	Cat palm	Gallery, Snapshot DF
Chamaedorea elegans	Parlor palm	Gallery, OH-II, Ronstar G, Snapshot DF
Chamaedorea seifrizii	Bamboo palm	Gallery, Ronstar G
Chamaerops humilis	European fan palm	Southern Weedgrass Control, Vantage
Chrysalidocarpus lutescens	Areca palm	Ornamec
Licuala grandis	Licuala palm	Ronstar G
Livistona chinensis	Chinese fan palm	Ornamec
Phoenix canariensis	Canary Island palm	Ornamec, Southern Weedgrass Control
Phoenix dactylifera	Date palm	Southern Weedgrass Cotnrol
Phoenix reclinata	Senegal date palm	Southern Weedgrass Control
Phoenix roebelenii	Pygmy date palm	Ornamec, Southern Weedgrass Control
Phoenix repicola	Cliff date palm	Southern Weedgrass Control
Phoenix sylvestris	Wild date palm	Southern Weedgrass Control
Ptychosperma macarthuri	Macarthur palm	Ronstar G
Syagrus romanzoffiana	Queen palm	Vantage
Trachycarpus fortunei	Windmill palm	Southern Weedgrass Control, Vantage
Veitchia merrilli	Manila palm, Adonidia, Christmas palm	Ronstar G
Washingtonia filifera	Desert fan palm	Southern Weedgrass Control
Washingtonia robusta	Washington palm	Devrinol, Ornamec, Southern Weedgrass Control