

Preparation for Transport

The leaves remaining on the palm should be tied together to prevent leaf damage and to facilitate handling. Palms with slender trunks should have splints attached to the trunks and leaf bundles to prevent the palms from snapping during handling. Use of splints is also recommended for palm species with large, heavy crowns, but soft wood, such as *Phoenix canariensis*.

Palms should be lifted only by means of nylon slings wrapped around the trunk (Figure 6). Never attach chain, cables, or ropes directly to palm trunks; such practices can result in injury and possibly fatal diseases, such as *Thielaviopsis* trunk. (For more on that topic, see EDIS Publication PP219, *Thielaviopsis Trunk Rot of Palm*, <http://edis.ifas.ufl.edu/pp143>.)



Figure 6. A palm being lifted in a nylon sling. The splint attached to the crown provides support. Credits: Timothy K. Broschat

During transport on truck or trailer, palms should be well supported along their entire length (Figure 7). Unsupported crowns may crack or damage the bud, resulting in reduced survival rates.



Figure 7. These palms are well supported on the trailer bed for transportation. Credits: Timothy K. Broschat

Site Preparation

Palms should be planted as soon as possible into their final site. However, if palms must be held for some time before they can be planted, they should be "healed-in" in an upright position with the leaf bundles untied until they can be moved to their permanent site. For shorter time periods, simply storing the palms upright and keeping the rootballs moist may be adequate.

Palms should not be planted into sites with high water tables or poor drainage (Figure 8). Such sites can be planted if mounds or berms are used to build up the area to be planted. Clay hardpans, where they occur, should be drilled through to improve drainage. Planting holes should be roughly twice the diameter of the rootball to facilitate backfilling, but need not be any deeper than the rootball.



Figure 8. This planting site has a high water table, which is unsuitable for palm installation. Credits: Timothy K. Broschat

Planting

Field-grown palms should always be transplanted to the same depth at which they were previously growing. Palms transplanted deeper have been shown to have increased incidence of chronic nutritional deficiencies, such as iron or manganese deficiencies (Broschat 1995). (For more on these nutritional deficiencies in palms, see EDIS Publication ENH1013, *Iron Deficiency in Palms*, <http://edis.ifas.ufl.edu/ep265>, and EDIS Publication ENH1015, *Manganese Deficiency in Palms*, <http://edis.ifas.ufl.edu/ep267>.) Such palms are also often stunted and grow poorly, compared to

properly planted palms (Figure 9). In addition to nutrient deficiencies, deeply planted palms may also suffer from water stress. As a result of these palms' weakened condition, they may attract secondary pests, such as palm weevils (*Rhychophorus* sp.). Palms that are planted too deeply may also develop secondary root rots due to the suffocation of deeply buried roots. Deeply planted palms may linger in a state of poor health for many years, or they may die at any time.

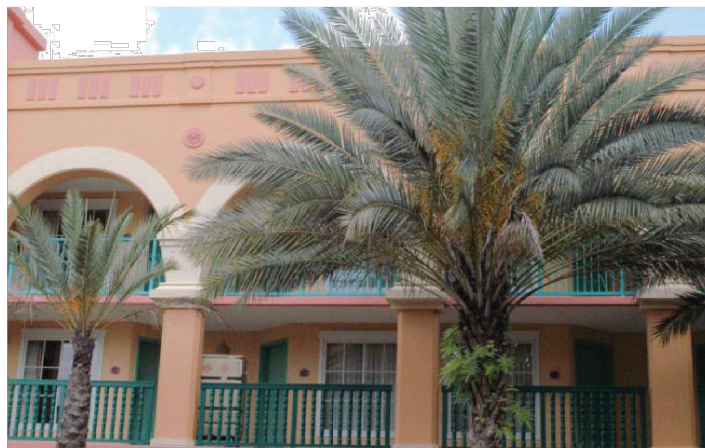


Figure 9. The palm on the left was planted too deeply. At the time of planting, these two palms were similar in size. Credits: Timothy K. Broschat

There is no scientific evidence that amending backfill with organic matter or other materials is beneficial to palms (Hodel et al. 2006). While adding commercial preparations of mycorrhizae and other beneficial microbes to the backfill is a common practice, Broschat and Elliott (2009) concluded that the only benefit derived from these products was due to the fertilizers that were added to some of the products and not to the microbes themselves.

When backfilling palm planting holes, be sure to wash soil down into all voids to eliminate air pockets (Figure 10). A shallow berm should be constructed around the perimeter of the rootball of the newly transplanted palm to retain water in the rootball area during irrigation (Figure 11). The soil around the rootball should be kept uniformly moist, but never saturated during the first four to six months following transplanting. After that time, irrigation frequency can be reduced or eliminated altogether if adequate rainfall is received. Research has shown no benefit to irrigating the crown of the palm versus soil application of water (Broschat 1994).

Leaves should be untied as soon as the palm is installed. Research in Florida and California has shown that keeping the leaves tied up provides no benefit to the palm, but can provide a favorable environment for plant diseases, such as

*Gladiadium* blight (pink rot) (Broschat 1994; Hodel et al. 2003; 2006).



Figure 10. Using water to force sand under and around the rootball. Credits: Timothy K. Broschat



Figure 11. Mounding up soil around the rootball forces water into the rootball, where it is needed. Credits: Timothy K. Broschat

Support

Tall palms should be provided with supports to prevent toppling over in high winds and to provide a stable rootball-soil interface (Broschat and Donselman 1987). Deep planting is not an acceptable alternative to mechanical support. Support timbers must not be nailed directly into the trunk since any wounds to a palm trunk are permanent and can allow for entry of pathogens, such as *Thielaviopsis*. (For more on that topic, see EDIS Publication PP219, *Thielaviopsis Trunk Rot of Palm*, <http://edis.ifas.ufl.edu/pp143>.)

An excellent method for providing support to a tall palm during establishment is to strap short lengths of 2 x 4-inch lumber to the trunk and nail the support timbers into these

pieces (Figure 12). Supports should be left in place for about a year.

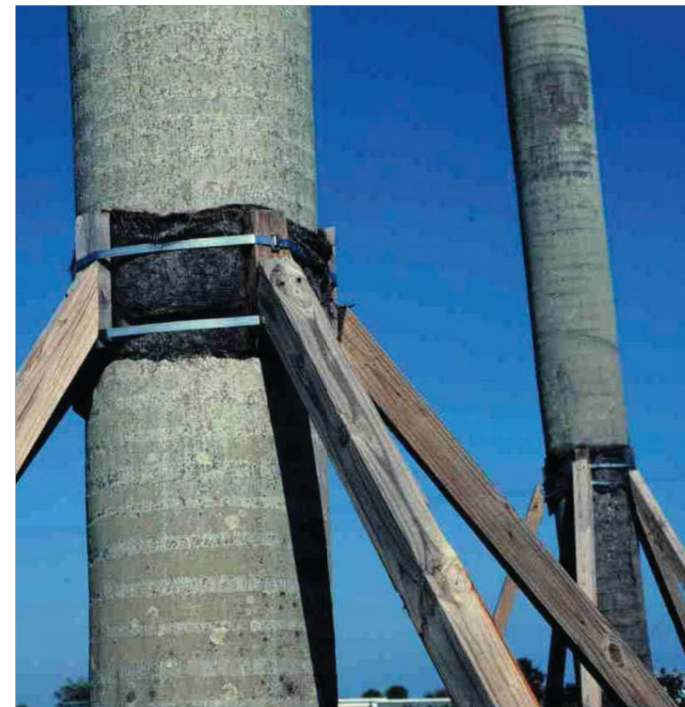


Figure 12. An excellent method of attaching support timbers to a palm trunk without damaging the trunk. Credits: Timothy K. Broschat

Post-Transplant Care

Container-grown palms have been shown to benefit greatly from high N fertilization at planting time since the bulk of their root system is confined to the N-demanding potting soil in which they were produced. For their first 6–12 months, these palms should be fertilized with high N controlled-release fertilizers like those used for container production. Transplanted field-grown palms have also been shown to benefit from light fertilization with an 8-2-12-4Mg controlled-release fertilizer at planting even though they have lost the majority of their root systems. Regular maintenance fertilization with this material can begin as soon as new shoot growth is observed (For more on this topic, see EDIS Publication ENH1009, *Fertilization of Field-grown and Landscape Palms in Florida*, <http://edis.ifas.ufl.edu/EP261>.)

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Table 1. Average percentage of cut roots branching in four different root-length classes.

Species	Root-stub length (inches)				Avg. no. of new roots
	<6	6–12	12–24	24–50	
<i>Cocos nucifera</i>	47	61	50	50	20
<i>Phoenix reclinata</i>	0	2	8	32	62
<i>Roystonea regia</i>	1	6	24	36	97
<i>Sabal palmetto</i>	1	1	3	1	196
<i>Syagrus romanzoffiana</i>	3	41	49	57	13
<i>Washingtonia robusta</i>	2	14	31	59	144

Data from Broschat and Donselman (1984; 1990b).

2201 Atlantic Blvd. Pompano Beach, FL Project-  
(6/13/2022)

Relocation Plan Specifications

**General.** *Tree Relocations*, shall be performed by an ISA Certified Arborist in accordance with the most recently published editions of the **ANSI A-300 (Part 6- Planting and Transplanting Standards)** and approved techniques as outlined in the below phases and contained within the associated Arborist Report dated June 13, 2022:

Pre-Mobilization:

1. Structural pruning, specifically removal of any dead limbs one inch and above shall be performed in accordance with **ANSI A300 (Part 1) - 2017 Pruning** guidelines and Palm frond removal to be done in accordance with article **"Transplanting Palms in the Landscape"** by Dr. Broschat. All pruning work shall be conducted by an **ISA Certified Arborist** who is also a licensed Broward County Class A Tree Trimmer. All work must also be performed in accordance with **ANSI Z133.1** safety regulations as required by OSHA.
2. The most recently published edition of *the ANSI A300 (Part 5 Management of Trees and Shrubs during Site Planning, Site Development, and Construction)* shall be followed regarding necessary tree protection.
3. Protective barriers shall be placed at the dripline of each tree to be relocated (Tree Protection Zone), and in no case less than fifteen (15) feet from the trunk of the tree unless an ISA Certified Arborist determines that a lesser or greater distance is required.
4. Tree Protection barriers should be a minimum of four feet high and should be constructed of continuous chain link fence with metal posts at 8-foot spacing, or of two-by-four-inch posts with three equally spaced two-by-four-inch rails.
5. Once installed no alterations or removals of the tree protection barriers are permissible without written authorization from the City.
6. Signage (2 signs minimum) to be placed at the boundary of all tree protection fencing specifying the following:
  - a. Tree Protection Zone
  - b. No storage of construction equipment, materials, buildings or debris.
  - c. No disposal of hazardous wastes, liquids etc.
  - d. No construction equipment operation.
  - e. No changes to existing grade.
  - f. No temporary barrier removals.
  - g. No trenching.
  - h. No vehicles allowed.
  - i. Onsite Contact Information # \_\_\_\_\_.

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Tree Relocation Initial Preparation

1. All tree relocation work shall be performed in accordance with **ANSI A300 part 6 (2012) Planting and Transplanting** standards. Palm relocations shall also be performed in accordance with the article **"Transplanting Palms in the Landscape"** by Dr. Broschat.
2. Underground utility locates are required to be completed at least a week prior to any proposed root pruning/excavation activities.
3. Removal of any existing concrete, curbs, sidewalks etc. within the Tree Protection Zone (includes Critical Root Zone area) is to be performed in such a way as to minimize any root zone impacts or damage. ((i.e.) use of a mini excavator, by hand etc.)
4. Continued excavation of the area(s) to be root pruned (once all concrete, asphalt and curb is removed as applicable) shall be performed by hand or using compressed air tools such as an Air Spade/Air Knife to minimize impacts to existing roots that may be present.
5. Photographs of all exposed roots should be taken prior to any initial pruning cuts being made.
6. Root pruning duration timetables and root ball diameters for relocated trees shall be as indicated within the Arborist Report dated June 13, 2022.
7. Temporary irrigation (rootball bubblers, canopy spray) shall be required for any tree(s) to be relocated and must be in place at least a week prior to initial demolition/construction/root pruning activities. Care shall be taken to ensure that adequate soil moisture levels are maintained, and that root zone desiccation does not occur during the root pruning process.
8. Roots may not be torn off with power equipment, and cut roots shall not be left with ripped, ragged, or shredded ends. Roots must be cleanly severed with sharp hand tools or power root saws.
9. After root pruning, the root pruning trench shall be backfilled with soil/organic mulch/root barrier product as applicable.
10. Soil backfill/mulch should not be applied within 6" of any tree trunk/trunk root flare and should be spread in a uniform area with a 2-3" depth over the remainder of the tree(s) root zone area for each tree to be relocated.
11. Liquid fertilization with root stimulating products is recommended for all relocated trees prior to root pruning, along with gradual creation of a soil berm using clean fill at the root ball edges during root pruning.

Tree Relocation

1. All tree relocation work shall be performed in accordance with **ANSI A300 part 6 (2012) Planting and Transplanting** standards. Palm relocations shall also be performed in accordance with the article **"Transplanting Palms in the Landscape"** by Dr. Broschat.
2. Verify that the planting locations are free of any obstructions or above/below ground utilities and confirm adequate drainage.

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3. Underground utility locates need to be completed at least a week in advance of tree relocation.
4. All planting holes shall be double the width of the root ball and no lower than the root ball depth.
5. Professionally licensed surveyor to provide grade stakes adjacent to each proposed planting site indicating final grade height.
6. Before initial digging, the root ball shall be thoroughly watered for two days until soil field capacity is met.
7. Hand digging shall only be performed outside of the formed root ball, without damaging any newly established roots.
8. Final root ball sizes/diameters are to be as indicated within the Arborist Report dated June 13, 2022.
9. The tree shall be boxed or balled and burlapped with natural fiber materials prior to relocation.
10. The moving of the tree shall be supervised by an **ISA Certified Arborist** and a qualified experienced equipment operator or like. The City will be notified one week in advance of any scheduled relocations.
11. Appropriate equipment, including slings/booms etc., will be used, and determined by a qualified experienced equipment operator.
12. The tree trunk shall be protected with padding from cable/boom/spade chaffing; the trunk may be used for support but shall not be used to lift or push the tree.
13. The tree shall be lifted from beneath the root ball.
14. Once the tree is planted, the area surrounding the root ball shall be backfilled with clean fill and watered in thoroughly to remove air pockets.
15. Adequate tree supports shall be installed on at least 3 sides with care to be taken not to damage, constrict or otherwise harm the trunk of the tree.
16. A temporary berm consisting of clean fill shall be placed around the edge of each root ball for water retention.
17. A Temporary automated overhead irrigation system shall be installed within the canopy (spray heads) and over the root ball (bubblers/spray heads) and remain operational throughout the establishment period for all hardwood trees. A minimum of 3 bubblers shall be installed for all relocated palms (triangle pattern).
18. No additional pruning of the tree shall occur except for dead, dying, diseased or broken limbs per **ANSI A300 (Part 1) - 2017 Pruning** guidelines and shall only be performed by an **ISA Certified Arborist** who must also possess a current Broward County Class A Tree Trimmer license.
19. No supplemental fertilizers shall be applied.
20. The most recently published edition of *the ANSI A300 (Part 5 Management of Trees and Shrubs during Site Planning, Site*

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