Tree 55

Sabal Palm (*Sabal palmetto*), facing west.

Sabal Palms do not require any root pruning, and a two feet diameter root ball is sufficient for relocation. Care shall be taken to ensure the trunk is also adequately protected during the actual relocation (at least three to four layers of burlap/compression resistant material). Palm can be lifted/relocated utilizing a boom lift and a nylon sling. Supplemental bracing (minimum three sides), tree protection fencing, and temporary irrigation (root ball bubblers) shall be required to be installed after relocation activities in accordance with the attached Tree Relocation Plan and "**Transplanting Palms in the Landscape"** article by Dr. Broschat.

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General Protection/Pruning Recommendations

Tree Protection:

1. All trees & palms slated to remain in place during construction shall be properly protected in accordance with the most recently published edition of *the* ***ANSI A300 (Part 5 Management of Trees and Shrubs during Site Planning, Site Development, and Construction)***. Protective barriers shall be placed at the dripline of each tree to be preserved (Tree Protection Zone) prior to any onsite construction activities, 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.
2. 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.
3. Once installed no alterations or removals of the tree protection barriers are permissible without written authorization from the City.
4. 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 #_______________________.

Structural Pruning (Hardwoods/Palms):

1. All pruning work shall be conducted by an **ISA Certified Arborist** who is also a licensed Broward County Class A Tree Trimmer. Supervision by an ASCA Registered Consulting Arborist is recommended.
2. All structural pruning performed shall be in accordance with ANSI A-300 (Part 1) (Most current version) standards and the below corrective pruning recommendations.
3. Removal of any existing deadwood, correction of stub cuts, and addressing any severe existing structural defects are the primary goals.
4. Secondary goals involve restoring good canopy form (strong branch structure) and aid lower canopy growth and reestablishment of properly spaced scaffold limbs.
5. Should branch removals be necessary, focus shall be on reduction cuts rather than complete removal cuts.
6. All pruning cuts shall leave clean edges, with no bark tears, cracks, or trunk/branch scarring.

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7. All cuts shall be made just outside of the bark branch ridge/collar when present.
8. Use of proper equipment and correct pruning cuts is critical to the success of the pruning plan. All equipment shall be well maintained, with sharp blades and be appropriate for the level of corrective pruning necessary.
9. Proper use of PPE (Personal Protective Equipment) and following ANSI Z133 safety standards are required.
10. Palm pruning shall only consist of frond removal below the horizontal plane, dead frond and or fruit removal. Care shall be taken to avoid any damage or removal of fronds originating at or above the horizontal plane. Sharp tools shall be utilized, boot removal is discouraged, and no climbing spikes shall be used during any palm pruning activities.

End Report

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CIR1047

Transplanting Palms in the Landscape[1]

Timothy K. Broschat[2]

Palms, when compared to similar-sized broadleaf trees, are relatively easy to transplant into the landscape. Many of the problems encountered when transplanting broadleaf trees, such as wrapping roots, are never a problem in palms due to their different root morphology and architecture. While broadleaf trees typically have only a few large primary roots originating from the base of the trunk, palm root systems are entirely adventitious. In palms, large numbers of roots of a relatively small diameter are continually being initiated from a region at the base of the trunk, a region called the root-initiation zone (Figure 1). And while the roots of broadleaf trees continually increase in diameter, palm roots remain the same diameter as when they first emerged from the root-initiation zone.

Figure 1. The inverted-cone-shaped tissue at the bottom of the trunk - an area from which all primary palm roots arise - is called the root-initiation zone. The pen marks the soil line.
Credits: Timothy K. Broschat

Understanding how palm roots grow and respond to being cut can greatly improve the chances of success when transplanting palms. In addition, other factors—such as rootball size, leaf removal and tying, physiological age of the palm, transplanting season, and planting depth—can also have a significant impact on the success of palm transplants. The purpose of this document is to discuss how these and other factors contribute to palm transplant survival rate.

Transplanting Container-Grown Palms into the Landscape

Container-grown plants often have roots that wrap around the inside of the container. In broadleaf trees, these large, wrapping roots must be cut prior to transplanting, or root distribution patterns and tree stability will be permanently affected. With container-grown palms, however, there is no need to cut such wrapping roots since large numbers of new, adventitious roots arising from the root initiation zone will initially supplement and will ultimately replace those early roots that were confined to the container.

Planting holes for container-grown palms should be roughly twice the diameter of the container in order to facilitate uniform and complete backfilling of the hole. Since the palm may have been growing in the container long enough to allow the potting soil to decompose and settle, base planting depth on the palm root-shoot interface, not on the surface of the container rootball. If extensive settling of the potting soil has occurred, this root-shoot interface may naturally be elevated above the potting-soil

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surface (Figure 2). Planting such palms at the same level as the top of the rootball will result in a poorly-anchored palm that is susceptible to toppling over (Figure 3). Container-grown palms should always be planted so that the top of the root-shoot interface is about one inch below the surface of the soil.

Figure 2. Container substrate subsidence and shallow planting resulted in the root- initiation zone of this palm being above the current soil line. These new root initials will probably never enter the soil.
Credits: Timothy K. Broschat

Figure 3. This palm has been planted too shallowly from a container and eventually fell over from its own weight.
Credits: Timothy K. Broschat

If shallowly planted palms are encountered in the landscape, stabilize the palms by mounding up soil to cover the root-initiation zone. This mound of soil will allow the root initials to continue their growth down into the soil, firmly anchoring the palm.

Fertilization of palms transplanted from containers is critical to successful establishment. Palms growing in Florida landscapes grow best with a relatively low nitrogen (N) content fertilizer (e.g., 8-2-12-4Mg). (For more on this topic, see EDIS Publication ENH1009, *Fertilization of Field-grown and Landscape Palms in Florida*, http://edis.ifas.ufl.edu/ep261.) By contrast, palms growing in containers have very high N requirements due to microbial demands for N as microbes degrade pine bark and other organic components in the potting soil. (For more on this topic, see EDIS Publication ENH1010, *Nutrition and Fertilization of Palms in Containers,* http://edis.ifas.ufl.edu/ep262.) When a palm is transplanted to the landscape from a container, most of the palm's root system will remain largely confined to the original organic potting soil for several months following transplanting. As a result, container-grown palms that do not receive high N fertilizers after transplanting are likely to establish slowly and display symptoms of N deficiency during the first six to 12 months following planting. (For more on this topic, see EDIS Publication ENH1016, *Nitrogen Deficiency in Palms*, http://edis.ifas.ufl.edu/ep268). New research has demonstrated that palms fertilized with a high N fertilizer during the first six months after transplanting from containers established faster than those receiving lower-N, landscape-maintenance fertilizers.

Fertilizers applied at time of transplanting should be top-dressed over the original rootball, and the area of fertilization should extend out 6–12 inches beyond the rootball edge. Subsequent fertilizations can follow recommendations for landscape palm maintenance. (For more on this topic, see EDIS Publication ENH1009, *Fertilization of Field-grown and Landscape Palms in Florida*, http://edis.ifas.ufl.edu/ep261.)

Treatment of transplanted, container-grown palms with various mycorrhizal or microbial inoculants has been marketed extensively. However, a recent study evaluating four such products on *Washingtonia robusta* and *Syagrus romanzoffiana* showed no benefit from any of these inoculants when compared to proper fertilization alone (Broschat and Elliott 2009). Since many of these inoculant products also contain fertilizer, it was concluded that any benefits observed from their use was due to their nutrient content, not due to their microbes.

Palms transplanted from containers will require regular irrigation until they become established (six to eight months) since the well drained potting soil in their original root ball will dry out more rapidly than the surrounding soil. If the palms are to be irrigated by hand, a shallow berm should be constructed just outside of the rootball perimeter to retain water in the rootball area. The frequency of irrigation required will vary with soil type and weather conditions, but irrigation or rainfall events on alternate days are usually adequate for palms during the establishment phase. Once palms become established, irrigation frequency can be reduced and eventually eliminated completely.

Transplanting Field-Grown Palms

Root Regeneration Responses

The question of how a palm responds to having its roots cut is central to palm transplanting success. To answer that question, Broschat and Donselman (1984; 1990b) demonstrated in a series of experiments that different palm species respond differently (Table 1). For example, when roots of *Sabal palmetto* were cut, virtually all cut roots died back to the trunk and were eventually replaced by massive numbers of new roots originating from the root-initiation zone (Figure 4). As a result of this response, it didn't matter whether roots of a *Sabal palmetto* were cut close to the trunk or 3 feet away from the trunk.

Figure 4. Large numbers of new roots arising from a palm's root-initiation zone.
Credits: Timothy K. Broschat

In the coconut palm, regardless of whether roots were cut close to the trunk or some distance away from the trunk, about half of all the roots that were cut survived, branched, and continued growing. Very few new roots were initiated from the root initiation-zone in response to root cutting in this species.

For most other species of palms, however, root survival strongly correlated with the distance from the trunk that the root was cut; roots cut 3 feet from the trunk survived much better than roots cut 6 inches from the trunk.

The number of new roots produced from the root-initiation zone in response to cutting of roots also varied among palm species. Thus, survival of *Sabal palmetto* depends solely on initiation of new roots from the root-initiation zone. For coconut and queen palms, however, survival of existing cut roots is critical. For *Washingtonia robusta*, *Phoenix reclinata*, and *Roystonea regia*, survival of existing roots and initiation of new ones is critical.

Rootball Size

The above data can be useful in determining the minimum rootball size expected to result in good transplant success for these species. Based on Table 1 data, we can recommend a minimal rootball size for *Sabal palmetto* since taking a larger rootball will not improve survival of existing roots. Similarly, the rootball for *Cocos nucifera* need not be large since survival of existing roots is similar for both short and long root stubs. For *Syagrus romazoffiana*, 6–12 inches represents the minimum rootball radius from the trunk. For *Washingtonia robusta* and *Roystonea regia*, 1–2 feet is the minimum recommended rootball radius. A roobtall radius of 2–3 feet is recommended for *Phoenix reclinata*. Keep in mind that rootballs are three-dimensional, and rootball depth also contributes to root survival.

Effects of Developmental Age

Landscapers have long observed that juvenile (without visible trunks) *Sabal palmetto* rarely survive transplanting while older *Sabal palmetto* specimens with trunks at least 10 feet tall transplant with a high degree of success. This difference in transplanting success among palms that are of the same species, but at a different developmental age is because the root-initiation zone is not developed until a palm develops a trunk. Since no cut roots of *Sabal palmetto* survive, and juvenile palms have no root-initiation zone to produce replacement roots, the juvenile *Sabal palmetto* have no chance of surviving the transplant process.

In one experiment, Broschat and Donselman (1990a) found that among 340 juvenile palms of 17 species that had their root systems cut off, not a single new root was produced, and all those palms ultimately died. However, when trunked specimens of two of these species were similarly treated, all of these palms produced new root systems and survived. Thus, for species such as *Sabal palmetto* and others that depend on the initiation of replacement

root systems for transplant survival, only specimens that have a visible trunk should be transplanted from a field or landscape.

Seasonal Effects

Although root growth is more rapid during warm months (Broschat 1998), palm transplant success is also strongly influenced by wet-dry seasonality. Late spring months in South Florida are some of the warmest months, but these months are also the driest.

In the case of *Sabal palmetto*, which depends solely on water stored within the trunk to survive until a new root system can be produced, transplanting during the warm, dry months in South Florida has been shown to greatly reduce this palm's survival rate. The lower survival rate is because these palms are typically under water stress in the natural environment at that time of year in South Florida, prior to being dug up for transplanting.

For most palms in Florida, planting during the rainy season (June–November) will increase rates of transplant survival. By contrast, in Mediterranean climates, such as California, Pittenger et al. (2005) recommend planting during the warm, but dry months of May to July.

Rooting Hormone Effects

Stimulation of new roots from the root-initiation zone using rooting hormones would be a useful tool for enhancing palm transplant survival. However, Broschat and Donselman (1990a) found that *Phoenix roebelenii* did not respond to trunk soaks in solutions of IBA (indolebutyric acid).

Root Pruning

Root pruning is a common practice in the production and harvesting of broadleaf trees. However, because of the nature of palm root systems, it usually is not necessary to prune palm roots. Nonetheless, for valuable, but difficult-to-transplant palm species, such as *Bismarckia nobilis*, root pruning is often practiced. With this technique, a fraction of the roots are severed just inside the future rootball about four to six weeks prior to digging. This pruning stimulates the production of new roots from the root-initiation zone and allows new root tips to begin growth prior to moving the palm. However, great care must be taken to ensure that new root tips are not recut during the digging process. Some growers dig one-half of the rootball in advance and wrap that side with polypropylene weed-barrier fabric to prevent new roots from growing beyond the intended rootball diameter.

Digging Palms

Palms can be dug by hand or with mechanical tree spades. Prior to digging, the soil should be moistened to help keep the palm's rootball intact. Palms growing in sandy soils will need to have their rootballs wrapped in burlap after digging. Palms that are not to be planted immediately should have their rootballs moistened regularly to prevent drying out.

Effects of Leaf Removal

Since water stress appears to be the primary physiological problem associated with transplanted palms, any practice that reduces water stress in transplanted palms should improve palm survival rates. Typically, one-half to two-thirds of the oldest leaves are removed at the time of digging to facilitate handling and to reduce leaf surface area, from which water loss occurs (Figure 5).

Figure 5. The lower leaves of this palm have been removed, and the remaining ones tied into a bundle for transport.
Credits: Timothy K. Broschat

For *Sabal palmetto*, the species in which few or no roots survive after cutting, Broschat (1991) and Costonis (1995) showed that survival and regrowth rates after transplanting were significantly greater for palms that had all leaves removed at the time of transplanting. In other palm species, however, leaving some or all leaves on the palms resulted in more rapid rooting and canopy regrowth than if all leaves were removed (Broschat 1994; Hodel et al. 2003; 2006).

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