

***Palm Culture and Landscape Use
in South Louisiana***

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Introduction

Through the ages, few plants have been as important as palms in providing food, fuel, timber and aesthetic beauty to mankind. While many view the plant as only sustainable in tropical or arid regions of the world, there are many varieties that are native to, or adapt well to the subtropical climate found in South Louisiana. Through this bulletin, we hope to inform both professional horticulturists as well as the general public of those palms that have shown to be capable of reliable landscape performance in South Louisiana.

There are many precautions that must be undertaken by both landscapers and consultants when determining which palms to choose for their particular location, not the least of which is cold tolerance. Climate is without a doubt the single largest limiting factor in selecting palms. Therefore in order to be successful in growing palms, it is imperative that you be able to correctly identify those that are native or adapt readily to our region. This bulletin will describe those palms which grow in South Louisiana and the reliability of each when used in the landscape.

Classification and Physiology

Palms are classified as angiosperms in the subclass monocotyledons and are found in the family *Palmae* or *Arecaceae*. Due to the fact that they are monocots like bamboo and grasses, there are many physiological differences between palms and other trees that require that they be treated differently when it comes to care and maintenance as well as transplanting. Palms are considered woody plants that have solid stems or trunks. However, being a monocot, this stem tissue is not differentiated into wood, bark, pith, or annual growth rings like most trees but rather have scattered bundles of vascular tissue distributed throughout the cross-section of the trunk. Without these vascular bundles, the strength of the trunks of palms would be significantly reduced. Stems of palms tend to be cylindrical in shape and usually have no leaf bearing lateral branches. There is usually one main growing point known at the terminal bud where all leaves arise. The root system found on palms is fibrous making them very sturdy and hard to uproot once well established; but at the same time, very easy to transplant. However, as with all monocots, wounds generally do not heal so extreme care must be taken during transplant.

Cycads

A group of plants often confused with palms are cycads. All cycads are a tropical or subtropical species that resemble palms or tree-ferns in overall appearance; however, this is where the similarities end. While palms are angiosperms, cycads are gymnosperms. While technically a woody plant, cycads possess a pachycaul stem which is a thick soft stem or trunk made up of mostly storage tissue with very little true wood. The most common cycad found in South Louisiana is the Sago Palm (*Cycas revoluta*). This cycad is a native of Japan that is hardy to 15 degrees F. Leaves are 2-3 ft. long (can be larger on older plants) and are divided into many narrow, needle like segments. The primary problem Sago Palms experience in South Louisiana is a fungal leaf spot disease that they are especially susceptible to during periods of high humidity.

Palms in South Louisiana

Palms in South Louisiana vary in height from 50-60 feet like the *Phoenix canariensis* (Canary Island Date Palm) to the native *Sabal minor* (palmetto) which usually does not grow

taller than 6-8 feet. While species does play a major role in the eventual mature size of a palm, environment can play a major role as well. For example, while most palmetto palms grown on a dryer site with a heavy soil do not appear to have a trunk at all, palmettos grown in frequently flooded areas may have a trunk as high as 6-8 feet.

An extensive survey found 14 genera of palms comprising 21 species growing in landscapes in South Louisiana (Table 1). Of these, less than half were found to be statistically reliable for planting in South Louisiana. Those recommended for South Louisiana are *Brahea armata* (Blue Hesper), *Chamaedorea microspadix* (Parlor Palm), *Phoenix canariensis* (Canary Island Date Palm), *Rhapidophyllum hystrix* (Needle Palm), *Sabal mexicana* (Texas Palmetto), *Sabal minor* (Dwarf Palmetto), *Sabal palmetto* (Cabbage Palm), *Serenoa repens* (Saw Palmetto) and *Trachycarpus fortunei* (Windmill Palm). Those species found to be unreliable, including but not limited to *Butia capitata* (Pindo Palm), *Chamaerops humilis* (Mediterranean Fan Palm), *Livistonia chinensis* (Chinese Fan Palm), *Rhapis excelsa* (Lady Palm), *Syagrus romanzoffiana* (Queen Palm), *Washingtonia filifera* (Petticoat Palm), and *Washingtonia robusta* (Washington Palm), were deemed so due to cold tolerance.

TABLE 1. Palm species found growing in South Louisiana

Species	Common Name	Leaf Shape
1. <i>Arenga engleri</i>	Arenga Palm	Pinnate
2. <i>Brahea armata</i>	Blue Hesper or Windmill Palm	Palmate
3. <i>Butia capitata</i>	Jelly or Pindo Palm	Pinnate
4. <i>Chamaedorea microspadix</i>	Parlor Palm	Pinnate
5. <i>Chamaerops humilis</i>	Mediterranean Fan Palm	Palmate
6. <i>Livistonia chinensis</i>	Chinese Fan Palm	Palmate
7. <i>Phoenix canariensis</i>	Canary Island Date Palm	Pinnate
8. <i>Phoenix dactylifera</i>	Date Palm	Pinnate
9. <i>Phoenix reclinata</i>	Senegal Date Palm	Pinnate
10. <i>Phoenix</i> sp.		Pinnate
11. <i>Rhapidophyllum hystrix</i>	Needle Palm	Palmate
12. <i>Rhapis excelsa</i>	Lady Palm	Palmate
13. <i>Sabal mexicana</i>	Texas Palmetto	Palmate
14. <i>Sabal minor</i>	Dwarf Palmetto	Palmate
15. <i>Sabal palmetto</i>	Cabbage Palm	Palmate
16. <i>Sabal</i> spp ‘quadrilogy’ <i>S. bermudana</i> or <i>S. blackburniana</i> or <i>S. domingensis</i> or <i>S. umbraculifera</i> and <i>Sabal</i> spp. seedlings		
17. <i>Serenoa repens</i>	Saw Palmetto	Palmate
18. <i>Syagrus romanzoffiana</i>	Queen Palm	Palmate
19. <i>Trachycarpus fortunei</i>	Windmill Palm	Pinnate
20. <i>Washingtonia filifera</i>	Petticoat Palm	Palmate
21. <i>Washingtonia robusta</i>	Washington Palm	Palmate

Transplanting and Planting

While it is best to transplant most trees and shrubs is in the late fall and winter, the best time to transplant a palm is in the spring and summer months (end of April through August). This is done because the soil is warm and it gives the roots time to grow vigorously. However, it must be noted that many palms are not very tolerant of transplanting when the root initiation zone at the base of the stem is developing to its full potential, or the establishment phase. When

obvious trunk development has taken place, transplanting can be most successfully achieved. Conversely, young plants without obvious trunks should only be transplanted from containers.

In the past, it has been believed that once palm roots have been cut, the roots would die and new roots would regenerate replacing the old ones. However, it has been shown in research that this is not true for all palms. As a result, it is often best to obtain as large a root ball as possible then transplanting any palm. An exception to this is the Cabbage Palm (*Sabal palmetto*). Roots may be cut to within one foot of the trunk. However, root pruning six to eight weeks prior to transplanting any palm is advisable to allow time for needed root regeneration near the trunk.

At time of transplanting, one-third to one-half of the older fronds should be removed from most species to reduce water loss by transpiration. Also, the ring of leaves immediately next to the bud should be removed to alleviate pressure on the bud. The remaining leaves should be gathered around the new emerging leaf and tied into place. This not only reduces transpirational losses, but also protects the bud. Rough handling of the palm or severe vibrations during transport can break the tender bud causing death many months down the road. It is also important to transplant the palm as soon as possible after digging and to never allow the roots to become dry. Additionally, Cabbage palm leaves can be removed at transplanting for better survivability.

The practice of filling the planting hole with peat moss, pine bark, manure, etc. is no longer recommended for palms or any woody shrub for that matter because by using these additives, the immediate environment around the root zone is physically altered causing the roots to avoid penetrating into the native surrounding soil. However, if an entire bed is being prepared for a raised bed, a good bed mixture recommendation consisting of ¼ fine sand, ¼ sharp sand, 1/3 amendment grade pinebark mulch and ¼ peat or composted rice hulls can be used. For hole preparation, dig the hole twice as wide as the root ball. The palm should then be placed in the hole with the top of the root ball even with the surrounding soil. Do not plant the root ball lower than the surrounding grade. The backfill should consist of the soil originally taken out of the hole which has been texturized to remove any large clods and watered thoroughly to remove any air pockets as roots will not grow through an air pocket. It is best to make a saucer like depression around the root zone to hold a greater quantity of rain or irrigation water so as to soak into the root system thoroughly. The area should then be covered with a mulch such as rice hulls, cypress mulch, pine bark, or pine needles to help conserve moisture and discourage weeds. The plant should be given a final soaking to mat down the mulch and firm up the soil. It is also important to keep the soil evenly moist to a depth of 6-8 inches during the first several months by watering every four to five days when there is no rain.

Bracing may be necessary for many tall palms to help stabilize them; however, the braces should never be nailed directly into the trunk as palms do not have the ability to heal wounds. Therefore, nail holes or other injuries invite pathogens. An insulated collar made of wood or metal can be used to support the trunk or a rope can secure the plant into place. The supports can be removed after six to eight months.

Fertilization

For vigorous, healthy growth of palms, fertilization should be done twice a year in mid-April and again in mid-June. In the past, it has been popular to use organic fertilizers such as composted manure, tankage or sewer sludge; however, 10 to 25 pounds may be needed for proper fertilization of large palms for each fertilization. An easier and less expensive way to

fertilize is by using inorganic fertilizers. A 15-5-10, 16-4-8, or 12-4-8 fertilizer may be used at a rate of ½ to ¾ pound per 100 square feet of root spread. The method of application for granular fertilizers should consist of broadcasting the fertilizer from the base of the trunk outward to several feet beyond the margins of the leaf tips. One should irrigate thoroughly after fertilization so as to reduce fertilizer burn to nearby plants and palms. Tree spike fertilizers may also be used, but are expensive and have a tendency to concentrate the fertilizer into a small area of the root zone.

Pruning

Pruning consists of removing the leaves or inflorescence as they become senescent and unsightly. Decapitating a palm below the crown and leaves in an attempt to reduce the height will kill the plant.

Sometimes freezing weather will impart injury to all the leaves and possibly the bud. If such an occurrence should take place, do not hurriedly remove the plant, rather give the palm time to recuperate. Some palms take as long as two growing seasons to regenerate new growth. Looking for new growth at the center of the crown will give an indication of the status of the palm. If new growth is not present by August of the following year, removal is advised. However, if new growth is observed, remove all necrotic leaves, fertilize and irrigate as necessary.

Propagation

While the majority of palm species are propagated by seed, some palms may be propagated by separation of offshoots from the main trunk, an example being *Phoenix reclinata* (Senegal Date Palm). There are a few others that may be propagated by division or root clumps where multi-trunked species exist. Examples of these are *Chamaerops humilis* (Mediterranean Date Palm) and *Chamaedorea microspadix* (Parlor Palm).

Propagation by seed is probably the easiest way to increase palm numbers. The following is a step by step procedure for propagation of palm seeds.

1. Palm seeds should be planted as soon as they are ripe. Seeds of some species are relatively short lived and some others begin to lose their viability in as soon as two to three weeks after ripening.
2. The seeds should be soaked in water and the fleshy seed coat removed to accelerate germination.
3. To enhance germination, thick, hard seed coats can be scarified. Scarification allows water and gasses to pass through the seed thus hastening germination.
4. The seeds should be planted in a sterilized soil medium. Many are available commercially or a mixture containing one-half peat moss and one-half sand or any combination of peat moss, sand, perlite or vermiculite can be used. Generally a good rule of thumb for planting depth is that seeds should only be planted as deeply as the width of the seed itself.
5. Freshly planted seeds should receive bright light, high humidity, moist soil conditions and a temperature between 80 and 95 degrees F. The use of bottom heat is also recommended.

6. The germination time of palm seeds varies with the species. While some species will germinate in 4-8 weeks, others can take as long as 3-7 months. Seed reference guides should be consulted on this matter.
7. When the first leaf is 2-4 inches long, the palm seedlings should be immediately transferred to individual containers. The plants can be planted into the landscape from April through August when 2-3 feet tall, but it is best to provide protection from full sun and high winds until the plants are well established.

Plant Pests

While palms are relatively pest free, there are occasions where they fall under attack from insects and diseases. Some of the more common insect and disease problems include, but are not limited to, scale, caterpillars, mealybugs and other leaf eating beetles. Termites have also been known to attack the trunk of older palms. Wasps are also commonly found in palm canopies.

To control scale and mealybugs, an application of Orthene or a summer oil spray is recommended whenever the insect is present. Malathion also can control these pests. To control caterpillars or other leaf eating beetles, an application of Sevin will be effective. For caterpillars alone, a biological control such as Dipel, biological Worm Control, or Thuricide is suggested. Contact your local county agent for current recommendations on termite control.

A few leaf spot diseases may attack in this area and can be controlled by spraying with Daconil or other ornamental fungicides as soon as the leaf spot is detected. However, diseases are usually not severe in the South Louisiana area. Be sure to read and follow label directions for the use of any pesticides.

Palm Species

Although the total number of palm species that can be grown in South Louisiana is relatively small, the few that can be grown certainly provide a semi-tropical atmosphere to this area of the country. While the following list is a description of palms that are commonly found in South Louisiana, not all palms on this list are deemed reliable for planting due to the fact that some are not very cold tolerant.

Palm Species with Palmate (fan-shaped) Leaves

Sabal Palm

- (1) **Palmetto (*Sabal minor*):** This plant is native to Louisiana and may be found from Texas over to Florida and up to South Carolina. This palm may reach from 6-8 feet tall. The leaves are 1-3 feet wide and fan shaped. The unarmed leaf stalks, or petioles, may be three feet long. The palmetto produces very numerous white flowers from May to June, followed by black fruit 3/8 inch in diameter later in the year. Transplanting palmetto from the wild is often very difficult because of the subterranean trunk. Palmettos are relatively slow growing plants.
- (2) **Cabbage Palm (*Sabal palmetto*):** Native to Florida, this palm may reach a height of 80-90 feet; but many only grow to 20 or 30 feet. The trunk height is variable. Sometimes the trunks may be covered with the crisscross pattern of old leaf bases; however, in the New Orleans area, most of the cabbage palms have smooth, thin trunks usually less than 12 inches in diameter. The leaves are fan shaped and may be 3-6 feet in length. The leaf stalk or petiole is unarmed and may be longer than the leaf itself. Often the petiole base is split. The flower stalk is 2-3 feet or more in length, producing numerous whitish flowers followed by global, shiny, black fruit, 1/3 inch in diameter. It also will adapt well to our wet, poorly drained soils. Cabbage palms are moderate in growth rate.

- (3) **Texas Palmetto (*S. texana*, *S. mexicana*):** This species of palm is native to northern Mexico and southern Texas and may reach a height of 60 feet. It is the largest of all *Sabal* palms grown in South Louisiana. The trunk is smooth, grayish and usually free of the leaf bases. The leaves are fan shaped and may be 6 feet long. The petioles or leaf stalks are 6 feet long and extend into the leaf. The flower stalks are shorter than the leaves. The fruit at maturity is about ½ inch in diameter, dark brown and somewhat flattened at the bottom. This palm is moderate in growth rate.
- (4) **Saw Palmetto (*Serenoa repens*):** This clumping palm that forms thickets is native from South Carolina, southwest throughout Florida and westward to Louisiana. It may reach a height of 10 feet, but more commonly grows to about three feet. The leaves are fan shaped and are approximately three feet across. The leaf color varies from yellowish-green to blue-green. Saw Palmetto should do very well in south Louisiana. However, availability is scarce. They are slow growing palms.

Washingtonia Palms

- (5) **Petticoat Palm (*Washingtonia filifera*):** This palm is native to southern California, western Arizona and northwestern Mexico. It may grow to a height of 50 feet. Often the dead leaves remain attached to the trunk giving the appearance of being skirted. If the leaves are removed, the trunk appears light gray and somewhat thicker than *Washingtonia robusta*. It may be three feet in diameter, but not enlarged at the base. The leaves may be six feet or more in diameter and fan shaped. The petiole or leaf stalk may extend six feet or more from the trunk, and the leaf base at the point of attachment may be six inches wide. The petiole is armed with prominent green teeth. The small numerous white flowers are followed by fruit 1/3 of an inch long, ¼ inch wide and lightly wrinkled. This palm is slightly more cold hardy than *W. robusta*. Both *Washingtonia* palms are fast growing with *W. robusta* being the fastest.
- (6) **Southern Washingtonia (*Washingtonia robusta*):** This palm is native to northwest Mexico. The trunk may extend to 80 feet. It is usually more slender except for an expanded base. The trunk is reddish brown and a crisscross pattern of leaf bases may be evident, however not nearly as prominent as palmetto. The leaves are fan shaped, bright green and usually not as wide as *W. filifera*. The petiole is reddish brown and toothed. Both species of *Washingtonia* are difficult to distinguish. This *Washingtonia* is slightly less hardy than *W. filifera*.

Other Palmate Leaf Palms

- (7) **Windmill Palms (*Trachycarpus fortunei*):** This palm is native to central and eastern China. The plant may reach 40 feet in height, but in New Orleans, it usually ranges from 10-20 feet. A mat of dark brown, hair-like fibers coat the trunk on younger palms. However, older Windmill Palms tend to lose this mat. The leaves are fan shaped, dark green, and about three feet in diameter. The petiole is about 1 ½ feet long and armed with teeth. The plant is considered monoecious which means that there are male flowers and female flowers on the same plant. The flowers are yellow and the mature blue fruit is three lobed, kidney shaped and approximately ½ inch long. Windmill palms are moderately slow growing. Very popular palm in south Louisiana.
- (8) **Mediterranean Fan Palm or Hair Palm (*Chamaerops humilis*):** The Mediterranean Fan Palm may reach a height of 20 feet, but usually only grows to 3-8 feet. The trunk is usually covered with old leaf bases. It may be found in multi-trunked clumps, or it may be found growing solitary. Either way, it is usually low and bushy with stiff, fan-shaped leaves that may be 2-3 feet in diameter. The petiole is slender, long and strongly armed. The Mediterranean Fan Palm has yellow flowers followed by oval, three sided, ½ to 1 ½

inch long, brown to yellow fruit. Most plants are dioecious, meaning that there are male and female plants. However, some contain both male and female flowers on the same plant. This palm is the only palm native to Europe, and interestingly enough, it is one species of one genus. This slow growing palm is another good candidate for planting in a relatively small area. Mediterranean Fan Palms are moderately slow growing palms.

- (9) **Chinese Fan Palm (*Livistona chinensis*):** This slow growing palm may reach 20-30 feet in height. Often the leaf bases cling to the trunk. The leaves may be 4-6 feet wide, and the segments of the leaves droop downward in a graceful manner. The petioles are armed with yellowish colored teeth which may be more prominent near the base. The teeth seem to disappear with age. These plants are monoecious, meaning that there are male flowers and female flowers on the same plant. The fruit, when mature, may be oblong, $\frac{3}{4}$ inch long and a dull bluish-green. This is another palm that would be acceptable planted in a relatively small area especially with its graceful appearance. They are moderate in growth rate.
- (10) **Needle Palm (*Rhapidophyllum hystrix*):** This slow growing palm is native from South Carolina to Florida and west to Mississippi. It may reach a height of 6-8 feet and is found often in heavy clusters. The petioles (leafstalks) are short, with the petiole base covered with dark fibers and long black spines 6-10 inches long extending from the trunk toward the leaves. The leaf is fan shaped and up to four feet in diameter. The inflorescence is short, 6-12 inches long, much branched and buried among the leaf bases and spines.
- (11) **Blue Hesper Palm, Blue Fan Palm and Blue Windmill Palm (*Brahea armata*):** It is native to lower California and can reach a height of 40 feet in its native habitat. In South Louisiana, a height of 8-10 feet is typical. The petiole may be up to three feet long and armed with strong, curved white teeth. The palmate leaf may span 3-5 feet and is blue-gray in color extending beyond the foliage in an arching manner. They are moderately slow growing palms and scarce in the nursery trade.
- (12) **Lady Palm (*Rhapis excelsa*):** This palm is native to southern China and may attain a height of 15 feet in its native habitat. In South Louisiana, it scarcely reaches above 3-4 feet except in well protected courtyards. It is a multiple trunk species and very slow growing. The leaves are 10-16 inches broad, fan-shaped and dark green in color. The slender trunks are covered with woven fibers and leaf bases. This species is best used as a container plant protected from winter winds.

Palm Species with Pinnate (*Feather-shaped*) Leaves

Date Palms

- (13) **Canary Island Date Palm (*Phoenix canariensis*):** This plant may attain a height of 50-60 feet at maturity. The Canary Island Date Palm is probably the most tropical and stately of all the palms grown in the New Orleans area. The trunks are very stout when young, up to 4 feet thick; but when older, the trunk becomes smooth, and in some cases, it erodes to possibly less than a foot in diameter. The leaves are pinnate and may be 17-20 feet long. The palm is dioecious, meaning that there are male plants and female plants. This date palm is moderately fast growing. The orange globose fruit is about one-inch in diameter and is formed in heavy clusters. This palm is excellent for street planting in any area where it can be allowed to spread to 15 feet and ascend to 50-60 feet. Interestingly, there are several specimens of *Phoenix dactylifera*, the true date palm, growing in and south of the metropolitan New Orleans area. Their growth rate is faster than *P. canariensis*.

Other Pinnate Leaf Palms

- (14) **Senegal Date Palm (*Phoenix reclinata*):** This moderately fast-growing palm is native to tropical Africa. It usually forms a cluster of plants, or if the suckers are removed, the single trunk will usually grow taller than normal. The plant may attain a height of 25 feet, but a mature plant often leans or reclines at an angle. The bright green, slightly recurved leaf is pinnate, and on mature plants the leaves may be 20 feet long. The plant is considered dioecious. The reddish brown fruit is $\frac{3}{4}$ inch long and somewhat egg shaped. These plants remain somewhat small (less than 10-15 feet in height) in New Orleans because of frequent freezes.
- (15) **Butia Palm or Jelly Palm (*Butia capitata*):** It is native to South America, more specifically Brazil, Paraguay and Argentina. It may attain a height of 20 feet but usually ranges from 10-15 feet here in south Louisiana. The trunks are covered with old leaf bases and may be up to 18 inches thick. The bluish-gray, green leaves are pinnate and recurving, revealing a graceful, arching effect. The petiole is slender with prominent teeth on the margins. The flower stalk may be 4-5 feet long and contain clusters of fruit weighing up to 75 pounds. The individual bright orange fruit may be one-inch long and somewhat ovoid in shape. This fruit may be eaten raw or prepared into jelly. It is relatively slow-growing and somewhat short in growth habit but needs 10-15 feet to spread.
- (16) **Queen Palm (*Syagrus romanzoffiana*, [*Arecastrum romanzoffianum*, *Cocos plumosa*]):** The Queen Palm is native to Central Brazil and Argentina. It may reach a height of 25 feet or taller. The gray trunk may be 1-2 feet in diameter and somewhat smooth but ringed. The plant is particularly attractive and most graceful especially at pool side. The arching green leaves may range from 8-15 feet long with many narrow leaflets. The flowers are cream colored followed by ovoid, yellowish, 1 inch long to 1 $\frac{1}{4}$ inch wide poisonous fruit. It's relatively fast growing.
- (17) **Arenga Palm (*Arenga engleri*):** This less commonly known, hard to find, multi-trunked palm is native to Taiwan. It may reach 6-7 feet tall in a well-protected area such as an enclosed courtyard. This palm has feather-shaped leaves that reach up to 4 feet long. The leaf segments are somewhat undulate or irregularly, but attractively, notched on both sides. It is moderately slow growing.
- (18) **Bamboo Palm (*Chamaedorea microspadix*):** It is a feather-leaf palm and native to eastern Mexico. This bamboo palm may be easily identified by its orange to red fruit. The multiple trunks may reach up to 6-8 feet tall in New Orleans and look similar to bamboo trunks. Care should be given to plant this palm in a shady to partly shady environment. This species of Bamboo Palm may be difficult to find in the trade; therefore when purchasing, insist on the botanical name. It is a relatively fast growing, attractive, clumping palm.

Additional Palm Literature

For more information about palms, consult the following books:

- (1) *Palms* by Alec Blomberry and Tony Rodd. Angus and Robertson Publishers, Australia, 1984, 199p. *Palms* has excellent color photographs and fairly good descriptions. Approximately 15 pages are devoted to palm culture, but most of the text is devoted to descriptions. It's written in easy to understand language and would be of help in identifying locally grown palms.
- (2) *Diseases and Disorders of Ornamental Palms* edited by A.R. Chase and T.K. Broschat. American Phytopathological Society Press, 3340 Pilot Knob Road, St. Paul, Minn. 55121, 1991, 56p. This paperback booklet is definitive for palm diseases and disorders as

far as is known today. Dr. Broschat has excellent color photos of palm disorders as far as it is known today. Dr. Broschat has excellent color photos of palm disorders, such as lightning injury, mineral deficiencies and other environmental disorders. The disease descriptions are academic, but good control measures are described.

- (3) *Chamaedorea Palms: The Species and Their Cultivation* by Donald R. Hodel. The International Palm Society, Allen Press, Lawrence, KS 1992, 338p. Excellent publication. The cultural information not only eloquently describes how best to culture *Chamaedoreas*, but also the same cultural advice would suffice for most all palms grown in containers and in the landscape. The color photos are outstanding and the descriptions authoritative and definitive. The descriptions are botanical, but the cultural information is easy to read and understand.
- (4) *Palms in Australia* by David Jones, Reed Books Publishing. LTD. NSW – available in the U.S. by W.M. Chapman, 1526 Sackett Cr., Orlando, FL 32818, 1988, 278p. This is a favorite book with good color photos and descriptions. Practically all of the palms that we can grow in South Louisiana are described in this text. The botany of palms is well presented as is their economic importance and cultivation. It's also a good text for identifying local palms. It is fairly easy to read and well worth having.
- (5) *Palms and Cycads around the World* by Jack Krempin. Horwitz Grahame Pty. Ltd. Sidney, Australia. 1990, 276p. There are some good color photos and fair descriptions of palms. Unfortunately, the cultural information concerning palms is neither authoritative nor complete. However, there are some excellent color photos of cycads which are invaluable for identification purposes since few texts contain photos of cycads. The text is easy to read and understand.

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