Canopy Trees — The HOA has a Canopy Tree Policy for managing the maintenance, replacement, and removal of canopy trees. A critical aspect in managing the canopy trees is the requirement of the Indian River County (IRC) Section "926.15. – Single-family lot development canopy tree requirements" of IRC ordinance "Chapter 926. – LANDSCAPE AND BUFFER REGULATIONS". The ordinance requires the community to sustain a minimum planting of two (2) canopy trees per single-family lot. The ARB maintains a list of approved trees and palms.

1.) Removal Requests: The HOA documents homeowner requests for the removal of canopy trees with the "Owner Requested Removal of Canopy Tree Agreement" form. A separate form must be completed for each specific tree an owner wants removed. Completed forms must be signed and dated by the homeowner and submitted to the Community Association Manager (via email attachment, postal mail, or in-person delivery). When filling in the form on a computer, typing a name in the homeowner signature box is acceptable in place of signing with an ink pen. For authentication purposes, completed forms sent via email should originate from the homeowner's email address that is on file with the HOA management company.

2.) It is not necessary to separately submit an ARB Request for Modification form to have a canopy tree removed by the HOA. However, if a homeowner wants to arrange removal of a canopy tree by a personal contractor or perform the work themselves, then an ARB Request for Modification form must be submitted. The ARB will confirm lot compliance with the county ordinance in reviewing a Request for Modification form submission.

Canopy Tree Policy

This policy, initially adopted May 9, 2017 by the Trillium Board of Directors, is replaced as of February 20, 2018, to include:

1) reformatting the document using numbered paragraphs for easier reference;

2) shortening the title, as the policy applies to all aspects of managing canopy trees–not just *Replacement*;

3) editing Paragraph 4 - Replacement, to cover replacing canopy trees lost due to natural causes or disasters;

4) editing Paragraph 5 - Maintenance, referencing the declaration of restrictions document for HOA maintenance responsibility;

5) editing Paragraph 7 - Species, to remove the approved canopy tree list, which is published separately as revised by the ARB; and,

6) adding Paragraph 8 - Removal, defining the process for requesting HOA removal of canopy trees by submitting an agreement form.

1. **IRC Ordinance:** Enacted March 14, 2005, the Indian River County (IRC) Section "926.15. – Single-family lot development canopy tree requirements" of IRC ordinance "Chapter 926. – LANDSCAPE AND BUFFER REGULATIONS", requires a minimum planting of two (2) canopy trees per residential lot.

2. **Homeowner Lots:** Since the Trillium Community contains both individual homeowner lots and zero lot line homes, a homeowner lot (for the purposes of this policy) is defined as the ground around any single-family home and includes the common ground surrounding the zero lot line homes in Anthem Lakes and Drexel Park.

3. **Townhomes:** The townhomes within the Trillium Community are not subject to the Homeowner Lots definition as cited in Paragraph 2. Tree replacement on the common ground surrounding the community townhomes will be at the discretion of the HOA and ARB using the guiding principle of maintaining the aesthetic appearance and value to the entire area.

4. **Replacement:** The HOA is responsible for replacing canopy trees removed for maintenance reasons, or resulting from a natural cause or disaster loss as follows:

    4.1. **Lots with *less than two* (<2) Canopy Trees:** The HOA will make every effort to bring each lot into compliance with the county's two (2) canopy tree per lot requirement. The ARB will determine by an on-site examination if the homeowner lot has sufficient space to locate and support the replacement canopy tree. If the lot cannot be made to meet the county's requirement, records will be maintained by the ARB to justify and document the reasons for non-compliance for use should the county challenge the decision.

4.2. **Lots with *two or more* (=>2) Canopy Trees:** At the request of a homeowner, and on a case by case recommendation of the ARB, the HOA may approve replacement of additional canopy trees originally removed by the HOA that exceeded the two (2) canopy trees per lot requirement. Since the community has a severe over-population of canopy trees in some areas, the ARB will determine by an on-site examination if the homeowner lot has sufficient space to locate and support additional canopy trees. The maximum number of trees replaced on a single homeowner lot by the HOA will not exceed the number of trees from that same lot removed for maintenance reasons or for loss from a natural cause or disaster event.

4.3. **Oak Tree Maintenance Project:** The community conducted extensive survey and pruning work in 2016, which resulted in the removal of several oak trees as recommended by assisting certified arborists. The HOA is responsible for replacing any trees needed to ensure affected lots are brought back into compliance with the IRC ordinance.

5. **Maintenance:** In accordance with "Section 11. Lot and Exterior Maintenance." of the "CERTIFICATE OF AMENDMENTS TO THE TRILLIUM SUBDIVISION DECLARATION OF RESTRICTIONS ON REAL ESTATE", dated 05/24/2017, as is the current practice for developer or HOA planted trees, ongoing maintenance of all replaced canopy trees and palms remains the responsibility of the HOA.

6. **Cost:** The replacement canopy trees will be a minimum 15-gallon sized container. Once the homeowner and HOA have agreed to the installation of the tree, the species of tree to be installed, and the location of the installation, the Association will contact the HOA vendor and order the installation of the tree. The HOA will notify the irrigation company of the required irrigation changes to facilitate the tree planting. Should an individual homeowner use a vendor of their own choice to supply and install replacement canopy trees, the HOA will only reimburse the homeowner up to the current replacement dollar value of $150. The replacement dollar value will be periodically adjusted by the HOA according to market conditions.

7. **Species:** The ARB approves and maintains a list of acceptable species of canopy trees and palms. Homeowners may request consideration for an alternative replacement species not on the list. However, the alternative species must have similar maintenance and growth characteristics as the other listed species and the alternative replacement must be approved by the ARB prior to installation. If the homeowner's choice is approved, the chosen species will be added to the list of canopy trees and palms.

8. **Removal:** The process for requesting removal of a canopy tree requires completion of the Owner Requested Removal of Canopy Tree Agreement form. The form must be filled in, signed, and dated by the owner, and submitted to the HOA Management Company (via email attachment, postal mail, or in-person delivery). A separate form must be completed for each specific tree an owner wants removed. The agreement will be reviewed by the Board of Directors for a decision on the removal of the canopy tree under the terms of the signed form. Once approval is granted, the HOA will execute a work order for the tree removal. *Note:* Under the terms of this policy, it is not necessary to separately submit an ARB Request for Modification form to have a canopy tree removed by the HOA.

Owner Requested Removal of Canopy Tree Agreement

I,_____, owner of _____

have requested the Trillium Homeowners' Association, Inc. to remove the canopy tree located at:

☐ Front ☐ Rear ☐ Left ☐ Right of my home (as viewed from the street).

Reason for Removal:

The homeowner has agreed to the following selected conditions:

- ☐ The HOA will pay for the removal of the canopy tree.
- ☐ The owner will pay for the removal of the canopy tree.
- ☐ The owner does not require a replacement canopy tree.
- ☐ If the owner requests a replacement canopy tree, the HOA will only pay $150.00 dollars towards the replacement cost and the homeowner will pay the rest if needed.

  (As per our Canopy Tree Policy)

Comments:

Trillium Homeowners' Association Inc.

_____ By: _____

Homeowner Association Representative

Date _____ Date _____

Trillium ARB Approved Canopy Trees and Palms

The trees and palms described in this document were initially approved by the Board of Directors on May 9, 2017 with the adoption of the Canopy Tree Policy. The Architectural Review Board (ARB) maintains this list as stated in the "Species" section of the policy document.

1. Trees:

1.1. Brisbane Box, Brush Box (Lophostemon confertus) [1]

1.2. Buttonwood (Conocarpus erectus) [1]

1.3. Camellia (Camellia japonica) [1]

1.4. Crapemyrtle (Lagerstroemia Indica) [1]

1.4.1. Crapemyrtle in Florida

1.5. Dahoon Holly (Ilex cassine) [1]

1.6. Devilwood, Wild Olive (Osmanthus americanus) [1]

1.7. Loquat (Eriobotrya jopinica) [1]

1.8. Red Maple (Acer rubrum) [1]

1.9. Rusty Blackhaw (Virburnum rufidulum) [1]

1.10. Sweetbay Magnolia (Magnolia virginiana) [1]

[1] 2017-05-09 Approved
[2] 2018-01-29 Revised

Trillium ARB Approved Canopy Trees and Palms

2. Palms:

2.1. Bismarck Palm (Bismarckia nobilis) [1]

2.2. Canary Island Date Palm (Phoenix canariensis) [1]

2.3. Pygmy Date Palm (Phoenix roebelenii) [1]

2.4. Royal Palm (Roystonea regia) [1]

2.5. Sabal or Cabbage Palm (Sabal palmetto) [1]

2.6. Wild Date Palm (Phoenix sylvestris) [1]

2.7. Areca Palm (Dypsis lutescens) [2]

2.8. Foxtail Palm (Wodyetia bifurcata) [2]

2.9. Queen Palm (Syagrus romanzoffiana) [2]

[1] 2017-05-09 Approved
[2] 2018-01-29 Revised

Lophostemon confertus

From Wikipedia, the free encyclopedia

Lophostemon confertus (syn. *Tristania conferta*), is an evergreen tree native to Australia, though it is cultivated in the United States and elsewhere. Common names include **brush box**, **Queensland box**, **Brisbane Box**, **pink box**, **box scrub**, and **vinegartree**.[2] Its natural range in Australia is north-east New South Wales and coastal Queensland[3] but it is commonly used as a street tree in Sydney, Melbourne, Perth and other cities in eastern Australia.

It is considered useful as a street tree, due to its disease and pest resilience, its high tolerance for smog, drought and poor drainage, and the fact that it needs only moderate-to-light upkeep.[4] It often requires lopping to accommodate overhead power lines, but survives pruning quite well.[5] It has a denser foliage and hence provides more shade than eucalypts, and is considered safer than eucalypts because it rarely sheds limbs. In form it is used as a replacement for the weedy Camphor Laurel *(Cinnamomum camphora)* while having a low potential for being weedy itself.

Flowers

The species was formally described in 1812 by Scottish botanist Robert Brown, based on plant material collected from the Hunter River region in New South Wales. Brown named the species *Tristania confertia*. The species was transferred to the genus *Lophostemon* in 1982.[6]

In the wild its habitat ranges from moist open forest and rainforest ecotones, where it might reach heights of 40 metres or more, to coastal headlands where it acquires a stunted, wind-sheared habit.

Lophostemon confertus

Scientific classification

Kingdom:	Plantae
(unranked):	Angiosperms
(unranked):	Eudicots
(unranked):	Rosids
Order:	Myrtales
Family:	Myrtaceae
Genus:	*Lophostemon*
Species:	***L. confertus***

Binomial name

Lophostemon confertus

(R.Br.) Peter G.Wilson & J.T.Waterh.

Synonyms[1]

- *Lophostemon arborescens* Schott
- *Melaleuca conferta* (R.Br.) Steud.
- *Tristania conferta* R.Br.
- *Tristania conferta* Griff. Misapplied
- *Tristania depressa* A.Cunn.
- *Tristania griffithii* Kurz
- *Tristania macrophylla* A.Cunn.
- *Tristania subverticillata* H.Wendl.

References

1. "The Plant List: A Working List of All Plant Species".
2. Hyland, B. P. M.; Whiffin, T.; Zich, F. A.; et al. (Dec 2010). "Factsheet – '**Lophostemon confertus**'". *Australian Tropical Rainforest Plants*. Edition 6.1, online version [RFK 6.1]. Cairns, Australia: Commonwealth Scientific and Industrial Research Organisation (CSIRO), through its Division of Plant Industry; the Centre for Australian National Biodiversity Research; the Australian Tropical Herbarium, James Cook University. Retrieved 30 July 2013.
3. "Atlas of Living Australia".
4. Friends of the Urban Forest http://www.fuf.net/tree/brisbane-box/
5. Shire of Yarra Ranges, *Streetscape Strategy* http://www.yarraranges.vic.gov.au/files/F9CFF3E3-E1F0-4DF2-892E-9DA501084B96/Lophostemon_confertus.pdf

6. " ' 'Tristania conferta *R.Br.*". Australian Plant Name Index (APNI), IBIS database. *Centre for Plant Biodiversity Research, Australian Government. Retrieved 30 July 2013.*

Wikimedia Commons has media related to ***Lophostemon confertus***.

Wikispecies has information related to: ***Lophostemon confertus***

Categories: Myrtaceae | Myrtales of Australia | Flora of Queensland | Trees of Australia | Trees of mild maritime climate | Ornamental trees | Myrtaceae stubs | Tree stubs | Australian rosid stubs

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UF IFAS Extension UNIVERSITY of FLORIDA

ENH338

Conocarpus erectus: Buttonwood[1]

Edward F. Gilman and Dennis G. Watson[2]

Introduction

This low-branching, multi-trunked, shrubby, evergreen tree has glaucous medium-green leaves. The inconspicuous, small, greenish flowers appear in dense conelike heads in terminal panicles in spring and are followed by 1/2-inch, conelike, red-brown fruits. The dark brown attractive bark is ridged and scaly. The tree is 'clean' with small leaves which fall between the grass blades of the lawn or are easily washed away in the rain.

Figure 1. Mature *Conocarpus erectus*: buttonwood
Credits: Ed Gilman, UF/IFAS

General Information

Scientific name: *Conocarpus erectus*
Pronunciation: kawn-oh-KAR-pus ee-RECK-tus
Common name(s): Buttonwood
Family: *Combretaceae*

USDA hardiness zones: 10B through 11 (Fig. 2)
Origin: native to North America
Invasive potential: little invasive potential
Uses: specimen; street without sidewalk; screen; deck or patio; hedge; reclamation; parking lot island < 100 sq ft; parking lot island 100–200 sq ft; parking lot island > 200 sq ft; sidewalk cutout (tree pit); tree lawn 3–4 feet wide; tree lawn 4–6 feet wide; tree lawn > 6 ft wide; urban tolerant; highway median; bonsai; shade
Availability: not native to North America

Figure 2. Range

Description

Height: 30 to 45 feet
Spread: 20 to 30 feet
Crown uniformity: symmetrical
Crown shape: vase, spreading

1. This document is ENH338, one of a series of the Environmental Horticulture Department, UF/IFAS Extension. Original publication date November 1993. Reviewed May 2014. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Edward F. Gilman, professor, Environmental Horticulture Department; Dennis G. Watson, former associate professor, Agricultural Engineering Department, UF/IFAS Extension, Gainesville FL 32611.

Crown density: moderate
Growth rate: moderate
Texture: fine

Foliage

Leaf arrangement: alternate (Fig. 3)
Leaf type: simple
Leaf margin: entire
Leaf shape: lanceolate, oblong
Leaf venation: pinnate
Leaf type and persistence: evergreen
Leaf blade length: 2 to 4 inches, 4 to 8 inches
Leaf color: green
Fall color: no color change
Fall characteristic: not showy

Figure 3. Foliage

Flower

Flower color: white/cream/gray, purple
Flower characteristics: not showy

Fruit

Fruit shape: oval
Fruit length: less than .5 inch
Fruit covering: dry or hard
Fruit color: brown, red
Fruit characteristics: does not attract wildlife; showy; fruit/leaves not a litter problem

Trunk and Branches

Trunk/bark/branches: branches droop; showy; typically multi-trunked; thorns
Pruning requirement: needed for strong structure
Breakage: resistant
Current year twig color: green
Current year twig thickness: thin
Wood specific gravity: unknown

Culture

Light requirement: full sun
Soil tolerances: clay; sand; loam; alkaline; acidic; occasionally wet; well-drained
Drought tolerance: high
Aerosol salt tolerance: high

Other

Roots: not a problem
Winter interest: no
Outstanding tree: no
Ozone sensitivity: unknown
Verticillium wilt susceptibility: unknown
Pest resistance: free of serious pests and diseases

Use and Management

Capable of reaching a height of 40 feet with a 20-foot spread, buttonwood is often seen as a small, somewhat asymmetrical shrub but is ideal for use as a screen, clipped hedge, or specimen planting. The species is less common and grows taller than the silver buttonwood. Due to the attractive bark and soft foliage, a multi-stemmed specimen can make a nice patio or street tree. Planted in the open as a tree, buttonwood will grow to about 20 to 25 feet tall and wide, and will often take on a picturesque, contorted appearance when exposed to constant seashore winds, creating an attractive specimen. The crown is more symmetrical 1/2 mile or more from the coast or on the inland side of a tall ocean-front building. The wood of buttonwood was formerly used for firewood, cabinetwork, and charcoal making and is very strong. It is an ideal wood for smoking meats and fish. Included or embedded bark often develops in major branch crotches, but the strong wood appears to compensate for this potential defect. Trees are tough and long-lasting in the landscape.

A Florida native, buttonwood is ideal for seaside plantings as it is highly tolerant of full sun, sandy soils, and salty conditions. It also tolerates brackish areas and alkaline soils, thriving in the broken shade and wet soils of hammocks. This is a tough tree! It withstands the rigors of urban conditions very well and makes a durable street or parking lot tree. Due to its small size, plant on 15-foot centers to form a closed canopy along a street. Purchase single-trunked trees for street and parking lot plantings.

The cultivar 'Mombo' has a dense crown and may be smaller than the species, 15 to 20 feet tall.

Pests

Sucking insect secretions will result in problems with sooty mold on trees inland from the coast.

Diseases

No diseases are of major concern.

Camellias at a Glance[1]

Sydney Park Brown[2]

Native to Asia, the first camellia plants were brought to America in 1797 and grown in New England greenhouses. Over the last 200 years, they have proven to be dependable additions to the southern landscape, where they grow and bloom with minimal care (Figure 1).There are numerous species of *Camellia*, but the types commonly grown as landscape shrubs in Florida are *Camellia japonica, Camellia sasanqua*, and hybrids of these. *Camellia japonica* typically grows larger and has bigger leaves and flowers than *Camellia sasanqua*. *Camellia reticulata, Camellia hiemalis, Camellia vernalis*, and their hybrids are less commonly used in landscapes. The young leaves of another species, *Camellia sinensis*, are processed for tea, one of the world's most popular drinks (see *Tea Growing in the Florida Landscape* at http://edis.ifas.ufl.edu/hs308).

Camellias can be grown successfully in most inland areas of north and central Florida. Their success as a landscape plant is usually determined by soil type since they demand well-drained soils with an acidic pH. Special care with regard to soil modification and watering is necessary where these conditions do not exist and, in such cases, they are probably best grown in large containers. Camellias are long lived and function well as foundation plantings, screens, accent plants, background groupings, and hedges. Camellias flower in the fall and winter when few other plants are blooming. The Sasanqua-type camellias (*Camellia sasanqua, C. hiemalis, C. vernalis*) bloom the earliest (October–December), followed by *Camellia japonica* types (January–March). For the remainder of the year, their glossy, evergreen foliage, interesting forms and textures, relatively slow growth, and low maintenance make camellias excellent landscape plants worthy of more use.

Figure 1. Camellia flower
Credits: Harry P. Leu Gardens

Selection of Varieties

Camellias can be purchased at nurseries, garden festivals, and camellia shows. Varieties range in plant size and form from compact to large and spreading to upright. A huge assortment of flower sizes, colors, and forms also exist, and new cultivars are introduced each year. Blooms vary in color from pure white to brilliant crimson, with many color

1. This document is CIR461, one of a series of the Environmental Horticulture Department, UF/IFAS Extension. Original publication date September 1985. Revised April 2012 and September 2015. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Sydney Park Brown, associate professor emerita; UF/IFAS Extension, Gainesville FL 32611.

combinations and patterns. Six flower forms are commonly recognized (Figure 2).

Figure 2. Camellia flower forms. From top left: single form, semi-double form, anemone form. From bottom left: peony form, formal double form, rose form double (flower opens to reveal stamens) Credits: Leu Gardens. Rose form double: Sydney Park Brown

Another important characteristic of camellia flowers is their season of bloom. Midseason flowering varieties that bloom from November through January are best suited for Florida conditions. Warm fall temperatures may prevent early varieties from flowering properly. Late-blooming plants may start growing before the end of the flowering period, resulting in "bullnosing," which is characterized by flowers that do not open fully and may even drop while still tight buds.

Some good performers for Florida landscapes are listed in Table 1. Others, particularly heirloom varieties, also do well but are difficult to find in the trade. A comprehensive list with variety descriptions and images is available from the American Camellia Society (https://www.americancamellias.com/care-culture-resources). Local camellia societies and their flower shows are excellent sources of information, and they often sell easy-to-grow and/or hard-to-find varieties. Noteworthy camellia collections are on display at Harry P. Leu Gardens in Orlando, Bok Tower Gardens in Lake Wales, and Alfred B. Maclay Gardens State Park near Tallahassee.

General Culture

Soils

Camellias prefer fertile, well-drained soils high in organic matter with a pH between 5.0 and 6.5. Soils that are too sandy or alkaline can be modified with soil amendments and fertilizer to make them more suitable for camellias. Another option is to grow camellias in large containers.

Exposure

Camellias perform best in partially shaded locations with good air movement. Dense shade may result in sparse foliage and poor flowering. Plants exposed to full sun may appear yellow green in color but may yield more flowers than plants in heavy shade. They are cold hardy but should be protected from cold winds.

Planting

Camellias are best planted from November to February so the roots can become established before the heat of summer. Late spring or summer planting is possible if extra care is provided. Very sandy soils should be amended by mixing 3–6 inches of organic matter into the top 12 inches of soil. The entire planting bed, rather than individual planting holes, should be amended if possible. The planting hole should be two to three times wider and slightly shallower than the root ball. When planted, the root ball should be 1–2 inches above the soil line to allow for sinking. Camellias cannot tolerate being planted too deeply. A 2–3-inch layer of mulch insulates the root system and conserves moisture in the root zone. Avoid placing mulch over the root ball to allow for air exchange. Plants should be spaced according to their mature size and rate of growth, usually at least 5 feet apart.

Fertilization

Camellia enthusiasts who compete in flower shows typically fertilize their plants four times a year. However, camellias growing on a suitable site perform well with significantly less fertilizer. One or two applications a year should be adequate. Use a fertilizer containing equal amounts of nitrogen and potassium (the first and third numbers on the fertilizer tag) and low phosphorus (the middle number).

The rate should be about half a pound of 12-4-12 or 15-5-15 (or similar fertilizer) per 100 square feet of planting area in spring and/or early summer. Late summer or fall fertilization may cause tender growth, which may be injured by early cold periods. Water the plants before and after fertilizer applications. Acid-forming "Azalea & Camellia" fertilizer should only be used on camellias established in the landscape (i.e., not young or containerized plants).

Camellias growing on alkaline pH soils often appear chlorotic (yellow) because of deficiencies in micronutrients like iron, manganese, and zinc. Micronutrient sprays applied to the foliage or the soil may correct the problem temporarily.

Watering

Camellias are fairly drought tolerant but need irrigation during extended dry periods; 1 inch of water should be applied every 10 days to 2 weeks. Camellias also need 1 inch

of water per week during flowering. They are sensitive to overwatering and succumb to root rot when kept too wet.

Pruning

Camellias typically need minimal pruning. Necessary grooming and shaping should be done in late winter or very early spring after blooming. Pruning in late summer or fall removes flower buds. Selective removal of undesirable branches can be done anytime to retain a neat shape. Shearing should be avoided because it destroys the natural plant form and results in a dense outer layer of foliage that blocks light from the interior branches.

Propagation

The most common and easiest methods of propagating camellias are by cuttings and air layering. Rooting plants from cuttings ensures that plants retain the characteristics of the parent plant. Cuttings are usually taken in July from hardened spring growth.

Air layering is a simple propagation method that allows one to produce a good-sized, "true to type" plant in a short amount of time. A ring of bark is removed from a pencil-sized stem, and moist sphagnum moss is wrapped around the wound. Roots grow into the moss and the rooted stem can be cut from the mother plant and then potted to allow for further root growth. Once they are well rooted in the container, they can then be planted into the landscape. Air layers should be started in April and will be ready by August.

Grafting is used to propagate varieties that have desirable characteristics, such as exceptional flowering, but a weak root system. Grafting permits the union of the desired top (scion) with a vigorous root system (root stock) to yield a superior plant. Seed propagation results in tremendous seedling variation with a high percentage of undesirable seedlings. Seeds should be collected as soon as they are ripe (July–September) and placed in flats or pots. Germination can be expected in 2–4 months if the seed coat is broken or scarified before sowing.

For detailed information on these techniques, see *Propagation of Landscape Plants* (http://edis.ifas.ufl.edu/mg108).

Disbudding and "Gibbing"

Some camellia growers enjoy competing in flower shows and manipulate the flower buds to achieve larger and earlier flowers. This involves removing competing flower buds and applying gibberellic acid (a plant hormone). Details on this technique can be found at the American Camellia Society website (https://www.americancamellias.com/).

Pests and Diseases

Insects and Mites

Camellias are generally low-maintenance plants, but a few pests can sometimes be problematic, the most common being tea scale, aphids, and spider mites.

Tea scale (Figure 3) is the most common scale on camellia. Scales generally feed on the underside of leaves and may not be noticed until large populations have developed. Identification and management information for tea scale can be found at http://edis.ifas.ufl.edu/in522.

Aphids injure camellias by sucking juices from young leaves. Injured leaves curl and become distorted. Aphids secrete a sticky substance called honeydew, which is an excellent medium for sooty mold, a black growth that grows on the upper surface of leaves and becomes a cosmetic problem if the insects are not managed. See *Ornamental Insects Sheet 2* (http://edis.ifas.ufl.edu/in024) for more information.

Spider mites (Figure 3) are tiny pests generally found on the underside of leaves. The tops of infested leaves soon display a rusty or reddish speckling of the green surface. Two-spotted spider mite infestations usually appear during hot, dry conditions and in areas of the landscape with poor air circulation and little exposure to rainfall. See *Ornamental Insects Sheet 1* (http://edis.ifas.ufl.edu/in023) for more information. Southern Red Spider Mites thrive in the cool spring and fall weather of Florida.

Specific management information on the above insects can be obtained from your local UF/IFAS Extension office (http://solutionsforyourlife.ufl.edu/map/).

Figure 3. Tea scale (on left); spider mite injury (on right)
Credits: Harry P. Leu Gardens

Diseases

Camellias that are correctly planted and cared for rarely develop serious disease problems, but known diseases of

this plant include leaf spot, dieback, leaf and bud gall, and root rot.

Leaf spots vary in size and shape depending upon the species of fungi causing the problem, but the fungi do little damage and usually only attack leaves injured by another means. Attention should be given to improving general cultural practices if leaf spots appear.

Dieback is most common during the spring months and is characterized by wilt and sudden death of new twigs. Older branches can also be infected but usually die more slowly. The leaves characteristically remain on the branches for considerable lengths of time after they die.

The best dieback control is sanitation. The fungus causing this problem is inside the stem and is not satisfactorily controlled by fungicides. Diseased branches should be removed about 6 inches below the lowest visible symptoms of disease. Pruning tools must be sterilized after each cut with an antiseptic, such as 10% chlorine bleach or Lysol® solution. Removed branches should be destroyed and not recycled in the landscape.

Leaf and bud galls appear as thickened and enlarged leaves or buds during the cool spring months. One or several leaves on a single shoot may be affected. Control can be accomplished in the home garden by simply pinching off and destroying infected leaves. Disease activity usually stops with the advent of warm weather.

Camellias are occasionally attacked by root rot—a problem usually related to poor soil drainage and overwatering. The entire plant or a section of the plant gradually weakens and dies. It is difficult, if not impossible, to correct root rot once these symptoms appear. The wisest course of action is to remove the plant.

Acknowledgements

The author wishes to thank the following reviewers of this publication: Gary Knox, UF faculty; Jerry Conrad, Erinon Nursery and member of the Camellia Society of Central Florida; and Eileen Hart, Master Gardener and member of the Tampa Bay Area Camellia Society. Also thanks to Robert Bowden, director of Harry P. Leu Gardens, for photos.

Table 1. Camellia varieties for Florida landscapes

Variety	Flower color	Season of flower	Flower size and form	Plant form	Growth rate	Comments
***Camellia japonica* and hybrids**						
Charlie Bettes	White	Early	Large to very large, semi-double	Compact	Vigorous	
Debutante	Light pink	Early to midseason	Medium, full peony	Upright	Vigorous	Heirloom, prone to leaf drop when young
Delores Edwards	Light orchid pink	Early to midseason	Large, semi-double to anemone to peony	Upright	Medium	Non-reticulata hybrid
Early Autumn	Lavender rose	Early to midseason	Medium, formal double	Upright	Medium	
Gigantea	Red marbled white	Midseason	Large to very large, semi-double anemone to peony	Open	Vigorous	Very large flowers, hard to find
Kramer's Supreme	Red	Midseason	Large to very large, full peony	Compact, upright	Vigorous	Fragrant
Mathotiana	Red	Midseason to late	Large to very large, rose form double	Compact, upright	Vigorous	Heirloom, available with different flower forms and colors
Pink Perfection	Shell pink	Early to late	Small, formal double	Upright	Vigorous	Heirloom, difficult to establish
Pope John XXIII	White	Midseason	Medium to large, formal double	Upright	Vigorous	
Professor Sargent	Red	Midseason	Medium, full peony	Compact, upright	Vigorous	Withstands direct sun
Rena Swick	Pink with darker veins	Midseason	Large, semi-double	Upright	Medium	Variegated flower form exists
Royal Velvet	Red	Midseason	Large, semi-double	Compact	Medium	
Sea Foam	White	Late	Medium to large, formal double	Upright	Vigorous	
Sweetie Pie	Pink	Early to midseason	Large to very large, semi-double	Upright	Vigorous	Occasional red stripes on petals
Taylor's Perfection	Light pink	Midseason to late	Very large, semi-double	Open, upright	Average	Non-reticulata hybrid
Walter Bellingrath	Light to rose pink	Midseason to late	Large, loose peony to anemone	Spreading	Vigorous	Grows in full sun
***Camellia reticulata* and hybrids**						
Dr. Clifford Parks	Red	Midseason to late	Very large, semi-double to peony	Upright	Average	Always a good performer
Frank Houser	Red, variegated form available	Early to midseason	Very large, semi-double to peony	Spreading, open, upright	Vigorous	Best *C. reticulata* for Florida, but hard to find
***Camellia sasanqua, C. hiemalis, C. vernalis,* and hybrids**						
Bonanza	Red	Early	Medium, semi-peony	Upright, dense	Vigorous	
Cleopatra	Rose to light pink	Early	Medium, semi-double	Compact, upright	Vigorous	Also known as Sawada
Cotton Candy	Clear pink	Early	Medium, semi-double	Spreading, loose, upright	Medium	
Jean May	Shell pink	Early	Large, rose form double	Compact, upright	Slow	May be difficult to find
Kanjiro	Rose	Early	Small to medium, semi-double	Upright	Vigorous	

Variety	Flower color	Season of flower	Flower size and form	Plant form	Growth rate	Comments
Mine-no-yuki	White	Early	Small, semi-double to loose peony	Spreading, willowy	Medium to vigorous	Profuse bloomer, also called Snow on the Mountain
Setsugekka	White	Early	Large, semi-double	Large, upright	Vigorous	Good understock for grafting
Sparkling Burgundy	Rose pink	Early	Small to medium, peony	Upright, compact	Vigorous	
Stephanie Golden	Hot pink	Early to midseason	Medium, semi-double	Upright, dense	Vigorous	
Shishi-gashira	Red	Early	Small, semi-double to rose form double	Dwarf	Medium	
Yuletide	Red	Early	Small, single	Compact, upright	Medium	Prominent yellow stamens
Fragrant hybrids						
Cinnamon Cindy	Rose pink with white center	Early to midseason	Small, peony	Upright to spreading	Medium	Cinnamon fragrance, non-reticulata hybrid
Fragrant Pink	Deep pink	Early to late	Miniature, peony	Spreading	Medium	Non-reticulata hybrid
High Fragrance	Ivory pink with rose edges	Midseason	Medium, peony	Open	Vigorous	
Sweet Emily Kate	Light pink	Midseason to late	Medium, peony	Pendulous	Slow	Non-reticulata hybrid

UF IFAS Extension UNIVERSITY of FLORIDA

ENH-501

Lagerstroemia indica: Crapemyrtle[1]

Edward F. Gilman and Dennis G. Watson[2]

Introduction

A long period of striking summer flower color, attractive fall foliage, and good drought-tolerance all combine to make Crape-Myrtle a favorite small tree for either formal or informal landscapes. It is highly recommended for planting in urban and suburban areas.

Figure 1. Young *Lagerstroemia indica*: Crapemyrtle
Credits: Ed Gilman

General Information

Scientific name: *Lagerstroemia indica*
Pronunciation: lay-ger-STREE-mee-uh IN-dih-kuh
Common name(s): Crapemyrtle
Family: *Lythraceae*
USDA hardiness zones: 7A through 9A (Fig. 2)
Origin: not native to North America

Invasive potential:has been evaluated using the IFAS Assessment of the Status of Non-Native Plants in Florida's Natural Areas (Fox et al. 2005). This species is not documented in any undisturbed natural areas in Florida. Thus, it is not considered a problem species and may be used in Florida.

Uses: street without sidewalk; specimen; deck or patio; container or planter; trained as a standard; parking lot island < 100 sq ft; parking lot island 100-200 sq ft; parking lot island > 200 sq ft; tree lawn 3-4 feet wide; tree lawn 4-6 feet wide; tree lawn > 6 ft wide; urban tolerant; highway median; shade

Availability: not native to North America

Figure 2. Range

1. This document is ENH-501, one of a series of the Environmental Horticulture, UF/IFAS Extension. Original publication date November 1993. Revised March 2007. Reviewed February 2014. Visit the EDIS website at http://edis.ifas.ufl.edu.

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Description

Height: 10 to 30 feet
Spread: 15 to 25 feet
Crown uniformity: symmetrical
Crown shape: vase
Crown density: moderate
Growth rate: moderate
Texture: medium

Foliage

Leaf arrangement: opposite/subopposite (Fig. 3)
Leaf type: simple
Leaf margin: entire
Leaf shape: elliptic (oval), obovate, oblong
Leaf venation: pinnate
Leaf type and persistence: deciduous
Leaf blade length: less than 2 inches, 2 to 4 inches
Leaf color: green
Fall color: orange, red, yellow
Fall characteristic: showy

Figure 3. Foliage

Flower

Flower color: white/cream/gray, pink, purple, lavender, red
Flower characteristics: very showy

Figure 4. Flower

Fruit

Fruit shape: oval, round
Fruit length: less than .5 inch
Fruit covering: dry or hard
Fruit color: brown
Fruit characteristics: does not attract wildlife; showy; fruit/leaves not a litter problem

Trunk and Branches

Trunk/bark/branches: branches droop; showy; typically multi-trunked; thorns
Pruning requirement: little required
Breakage: resistant
Current year twig color: brown, green
Current year twig thickness: thin
Wood specific gravity: unknown

Culture

Light requirement: full sun
Soil tolerances: clay; sand; loam; alkaline; acidic; well-drained
Drought tolerance: high
Aerosol salt tolerance: moderate

Other

Roots: not a problem
Winter interest: yes
Outstanding tree: no
Ozone sensitivity: unknown
Verticillium wilt susceptibility: resistant
Pest resistance: resistant to pests/diseases

Use and Management

Available in all shades of white, pink, red, or lavender, the 6- to 12-inch-long clustered blooms appear on the tips of branches during late spring and summer in USDA hardiness zones 9 and 10, and summer in other areas. The individual flowers are ruffled and crinkly as to appear made of crepe paper. The smooth, peeling bark and multi-branched, open habit of Crape-Myrtle make it ideal for specimen planting where its bright red to orange-colored fall leaves add further interest. Most forms of the tree are upright, upright-spreading, or vase-shaped, spreading out as they ascend. Most tree types grow to 20 to 25 feet tall although there are more dwarf types available. The upright, vase-shaped crown makes the tall-growing selections well-suited for street tree planting.

Pruning should be done in late winter or early in the spring before growth begins because it is easier to see which branches to prune. New growth can be pinched during the growing season to increase branchiness and flower number. Pruning methods vary from topping to cutting Crape-Myrtle nearly to the ground each spring to the removal of dead wood and old flower stalks only. Topping creates

several long, thin branches from each cut which droop down under the weight of the flowers. This practice disfigures the nice trunk and branch structure. Lower branches are often thinned to show off the trunk form and color. You can remove the spent flower heads to encourage a second flush of flowers and to prevent formation of the brown fruits. Since cultivars are now available in a wide range of growth heights, severe pruning should not be necessary to control size. Severe pruning or topping can stimulate basal sprouting which can become a constant nuisance, requiring regular removal. Some trees sprout from the base of the trunk and roots even without severe heading. This can be a maintenance nuisance.

Crape-Myrtle grows best in full sun with rich, moist soil but will tolerate less hospitable positions in the landscape just as well, once it becomes established. It grows well in limited soil spaces in urban areas such as along boulevards, in parking lots, and in small pavement cutouts if provided with some irrigation until well established. They tolerate clay and alkaline soil well. However, the flowers of some selections may stain car paint. Insect pests are few but Crape-Myrtle is susceptible to powdery mildew damage, especially when planted in some shade or when the leaves are kept moist. There are new cultivars (many developed by the USDA) available which are resistant to powdery mildew and aphids.

Many cultivars of Crape-Myrtle are available: hybrid `Acoma', 14 to 16 feet tall, white flowers, purple-red fall foliage, mildew resistant; hybrid `Biloxi', 25 feet tall, pale pink blooms, orange-red fall foliage, hardy and mildew resistant; `Cherokee', 10 to 12 feet, bright red flowers; `Powhatan', 14 to 20 feet, clear yellow fall foliage, medium purple flowers. The hybrid cultivars `Natchez', 30 feet tall, pure white flowers, resistant to aphids, one of the best Crape-Myrtles; `Muskogee', 24 feet tall, light lavender flowers, and `Tuscarora', 16 feet tall, dark coral pink blooms, are hybrids between *Lagerstroemia indica* and *Lagerstroemia fauriei* and have greater resistance to mildew. The cultivar `Crape-Myrtlettes' have the same color range as the species but only grow to three to four feet high. The National Arboretum releases are generally superior because they have been selected for their disease resistance. These releases may prove more resistant to powdery mildew in the Deep South, although further testing needs to be done to confirm this.

Propagation is by cuttings or seed.

Pests

Aphids often infest the new growth causing an unsightly but harmless sooty mold to grow on the foliage. Heavy aphid infestations cause a heavy black sooty mold which detracts from the tree's appearance.

Diseases

Powdery mildew can severely affect Crape-Myrtle. Select resistant cultivars and hybrids to avoid this disease. Leaf spots are only a minor concern and do not require treatment.

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ENH-52

Crapemyrtle in Florida[1]

Gary W. Knox[2]

Crapemyrtle (*Lagerstroemia* species) has become a dominant landscape plant in North and Central Florida and throughout the South. Breeding programs over the last 30 years have produced superior forms with a wide range of plant sizes and habits; improved flowering, new flower colors, ornamental bark, ornamental foliage, and disease resistance; and increased vigor. Its remarkable success as a landscape plant is largely due to the widespread usage of hybrid *L. indica* × *fauriei* cultivars.

History and Taxonomy

Lagerstroemia species are deciduous shrubs or trees with geographic origins in China, Japan, and other parts of southeast Asia. *L. indica* has been cultivated as an ornamental for centuries and was introduced to the southern United States over one hundred and fifty years ago. *L. speciosa*, commonly called Queen's Crapemyrtle, has been popular as a flowering street tree in tropical areas, including South Florida. *L. fauriei*, *L. subcostata* and *L. limii* have been used in breeding programs, and cultivars of *L. indica* × *fauriei* hybrids now constitute the most widely grown crapemyrtles today. Other species of *Lagerstroemia* are used as timber in their native ranges in Asia.

The scientific name, *Lagerstroemia*, was coined in 1759 by Carl Linnaeus, who described and named the plant in honor of Magnus von Lagerstroem, an avid naturalist and director of the Swedish East Indies Company. Crapemyrtle derives its common name from its crepe-like, crinkled petals, and the resemblance of its leaves to the true myrtle, *Myrtus communis*. "Crapemyrtle" is a peculiarly American term. Elsewhere in the world, "lagerstroemia" is often used as the common name for crapemyrtle.

Characteristics

Crapemyrtle is valued as a landscape plant for its prolific summer flowers, heat and drought tolerance, and year-round landscape interest. Flowering begins as early as May in some cultivars and continues into the fall. Each 6- to 18-inch cluster of flowers (or panicle) develops on the tips of new growth and is composed of hundreds of 1-to 2-inch flowers. Color ranges include shades of purple, lavender, white, pink and red, including "true" red, a relatively recent development. Some cultivars have bicolor flowers (two colors on each petal), some cultivars have flower colors that fade with age or certain environmental conditions, and other cultivars have panicles composed of a mix of flower colors.

Many *Lagerstroemia fauriei* and hybrid cultivars feature beautiful, colorful bark. Strips of bark peel off in early summer to reveal mottled new bark ranging in color from pale cream to dark cinnamon to rich brown to bright orange. The bark color gradually fades over winter until it peels again the next summer.

Leaves on many of the *Lagerstroemia indica* cultivars are rounded or spoon-shaped and up to 3 inches long. Most hybrid cultivars have lance-shaped leaves up to 5 inches long and 3 inches wide while other species have even larger

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leaves. Leaves are often tinged red in the spring and turn dark green by summer. Several cultivars are known for new growth that is bronze, red or burgundy and some cultivars are claimed to have burgundy-colored foliage all summer. In North Florida and northwards, foliage may turn brilliant yellow, orange or red in autumn.

When the leaves fall in winter, crapemyrtle becomes a living sculpture. The trunk and branches of tree-form plants have an attractively gnarled, sinuous character with smooth bark.

Landscape Use

Crapemyrtle is one of our most versatile landscape plants for sunny locations. They are available for use as medium trees, small trees, shrubs, groundcovers, container plants, large perennial bedding plants and hanging baskets. However, the most commonly available cultivars are best used as small trees in Florida.

For best results and minimum maintenance, choose a cultivar whose growth characteristics and ultimate size fit your intended landscape use. Misplacement of a shrub- or tree-like crapemyrtle will require you to prune it constantly to keep it from outgrowing its place. Single- or multi-stemmed tree-form crapemyrtles are ideal as flowering specimen trees or as small, flowering shade trees near patios, walkways, and entrances. Shrub forms make an excellent accent in a shrub border when planted in groups. Dwarf plants are effective as large groundcovers, perennial bedding plants, or container plants providing vivid, summer-flowering interest. Some dwarf crapemyrtles are used in hanging baskets.

Background plantings of evergreens emphasize the floral display of crapemyrtles. Dark-colored mulches or dark green groundcovers highlight the ornamental characteristics of crapemyrtle trunks and bark.

General Culture

Crapemyrtle is adapted to climatic conditions throughout Florida. Well-established plants are extremely drought tolerant and have low fertility requirements, although they respond to fertilizer and water with lush growth. Crapemyrtle has low salt tolerance, so it should not be irrigated with saline water or used near the coast unless it is well-protected from saline conditions.

Full sun is necessary for best flowering and for development of a full, symmetrical crown. Crapemyrtle is tolerant of a wide range of soil types but grows poorly in wet soils. It is best adapted to loamy soils that are slightly acid (pH 5.0 to 6.5). Species and cultivars susceptible to powdery mildew should be placed in locations that allow air movement to help avoid potential problems with this unsightly disease.

Crapemyrtle transplants easily. Best results occur if container-grown crapemyrtles are planted during early summer when in active growth. Bare root or balled-and-burlapped crapemyrtles should be moved and planted while dormant. Plants should be mulched to a depth of 3 inches.

Newly planted crapemyrtle should be irrigated regularly for the first few weeks to aid in establishment. Trees with a trunk diameter greater than 1 inch benefit from regular irrigation for several months. Crapemyrtle is very drought tolerant once established but moist soil or irrigation promotes growth. Fertilization will stimulate growth of young crapemyrtles but established crapemyrtles usually do not need fertilizer because root systems extend into lawns where they can absorb nutrients from applications of lawn fertilizers.

Young crapemyrtles characteristically develop multiple stems. If a crapemyrtle is to be grown as a small tree, the smallest stems should be removed, leaving one main stem for a single-trunk specimen or 3 to 5 main stems for a multi-trunked tree.

Crapemyrtle generally requires little pruning. “Suckers” or water sprouts may develop along the lower portions of main stems or from roots. These should be removed when using crapemyrtles as trees. Small twiggy growth on disease-susceptible shrub and tree forms should be thinned out from underneath and within the canopy. This keeps the trunk clean to allow air circulation and help prevent powdery mildew disease. Dwarf crapemyrtles periodically grow tall shoots that must be removed to maintain the planting as a groundcover. Shoots of some dwarf cultivars occasionally die to the ground over winter, and dead wood should be removed in the spring.

If pruning is necessary to improve plant shape or form, prune crapemyrtle anytime after the leaves have fallen. However if plants are pruned too early in the fall, new growth may emerge and be killed by the first freeze. Plants are easy to prune while dormant since the branch structure is readily visible without foliage. Pruning while plants are dormant also will not interfere with flower bud formation since crapemyrtle flowers form on new growth. Avoid annual or frequent hard pruning. Severe pruning can induce excess vegetative growth, basal sprouting, and fewer, but larger, flower panicles. It also spoils the beautiful winter branch structure on crapemyrtle trees.

Tip pruning to remove old flower clusters will promote recurrent blooming but is not practical for large plants or low maintenance landscapes. Tip pruning is largely unnecessary on many newer cultivars that naturally repeat-bloom, but tip pruning may enhance recurrent bloom of older *L. indica* cultivars.

Pests

Crapemyrtle can be one of the most pest-free landscape plants with proper cultivar selection and with proper siting. Primary pests in Florida are powdery mildew and the crapemyrtle aphid with its associated sooty mold.

Powdery Mildew

Powdery mildew is caused by the fungus *Erysiphe lagerstroemiae*. It first appears on new shoots as a whitish powder that later spreads to the surface of leaves, stems, and flowers (a black powder on leaves is caused by sooty mold; see the section on "crapemyrtle aphid"). Powdery mildew causes leaves, stems and flowers to become distorted and stunted. In severe cases, leaves may drop prematurely and flower buds may fail to open properly. Shady, humid locations and cool nights encourage powdery mildew as does frequent wetting of the foliage by irrigation or rainfall. Powdery mildew is more prevalent in spring and fall.

The best way to avoid powdery mildew is to plant one of the cultivars bred and selected for resistance to powdery mildew (See Table 1). Additionally, crapemyrtle should be planted in sunny locations allowing free air movement so that wet foliage dries quickly.

Crapemyrtle aphid

Crapemyrtle aphid, *Tinocallis kahawaluokalani*, was apparently introduced into the United States with crapemyrtle, its host plant. Crapemyrtle aphids are pale yellow in color with winged adults having black wings and black protuberances. They primarily are found on undersides of leaves and are particularly attracted to new growth. Crapemyrtle aphid is not found on any other commonly grown plant. No aphid species other than crapemyrtle aphid infest crapemyrtle.

These insects damage crapemyrtle by inserting mouthparts into soft tissue and extracting plant sap. Crapemyrtle aphids can reproduce and develop large numbers rapidly. Heavy infestations distort leaves and stunt new growth.

In North Florida, crapemyrtle aphid populations generally peak between late June and early August. Crapemyrtles should be inspected regularly during this period to monitor populations of aphids. Aphid populations can probably be managed if control measures begin by the first week of July. Elsewhere in Florida, one or more population peaks may occur at any time between May and September. Although many predatory insects feed on crapemyrtle aphids, they usually cannot control the aphids. Sprays of insecticidal soaps or horticultural oils are the most environmentally safe pesticides for controlling crapemyrtle aphids.

During feeding, aphids secrete droplets of a sugary solution called "honeydew." Drops of honeydew fall from the aphids onto leaves and stems below. This sugary solution promotes the growth of sooty mold fungi, *Capnodium* species. Sooty mold appears as a black staining or powdery coating on leaves and stems (a whitish powder on leaves is symptomatic of powdery mildew; see "powdery mildew"). The blackened leaves and stems are often the most obvious sign of aphid infestation.

Although unsightly, sooty mold itself does not directly harm crapemyrtle. However, the black fungus shades the leaves and interferes with photosynthesis, potentially reducing the long-term vigor of the plant. Control of crapemyrtle aphid will halt further development of sooty mold. Existing sooty mold on leaves will wear off the leaves through the actions of sun, rain, and wind. Sprays of insecticidal soaps and horticultural oils for control of crapemyrtle aphid also help to loosen and remove sooty mold.

Secondary Pests

Secondary pests of crapemyrtle include metallic flea beetle (*Altica* species), Florida wax scale (*Ceroplastes floridensis*), Cercospora leaf spot (*Cercospora lythracearum*) and mushroom root rot (*Armillaria tabescens*).

Propagation

Crapemyrtle can be propagated vegetatively by softwood, semi-hardwood, hardwood, or root cuttings. Softwood and semi-hardwood cuttings root easily when taken in spring or summer. Hardwood cuttings from dormant plants also root easily, although use of rooting hormone improves rooting percentages. Root cuttings may be dug in early spring and planted in the greenhouse. Root cuttings root inconsistently.

Seed capsules ripening in the fall may be collected, dried, and stored in sealed containers. No seed pre-treatment is necessary and seeds will germinate within 3 weeks after sowing. Best growth results when seeds are sown during the lengthening days of spring. Flower, bark and growth characteristics of crapemyrtle seedlings vary tremendously.

Cultivars

Many crapemyrtle cultivars have been developed by private individuals, nurseries and public institutions. In 1962, the U.S. National Arboretum in Washington D.C. began a crapemyrtle breeding project with *Lagerstroemia indica*. Major advances occurred when *L. subcostata* and *L. fauriei* were introduced into the breeding program in 1966. The resulting hybrids were highly ornamental and resistant to powdery mildew. As a result of the late Dr. Donald Egolf's efforts, the U.S. National Arboretum has released over 24 selected for cold hardiness, for resistance to powdery mildew, and for varying heights, habits, flower colors, fall foliage colors, and bark characteristics. All U.S. National Arboretum cultivars have Native American names.

The U.S. National Arboretum is continuing Dr. Egolf's work, and many other individuals also have joined the ranks of crapemyrtle breeders. Dr. Carl Whitcomb, Dr. Michael Dirr and Dr. Cecil Pounders currently operate prominent crapemyrtle breeding programs. Evaluations of these and other cultivars are under way at the University of Florida/IFAS North Florida Research and Education Center in Quincy to determine the best cultivars for Florida conditions. Cultivar descriptions and observations from these crapemyrtle cultivar evaluations are listed in Table 1.

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Table 1. Characteristics of Selected *Lagerstroemia* Cultivars (plants are *Lagerstroemia indica* unless otherwise indicated).

Cultivar	Flower Color	Bark Color[1]	Habit[1]	Powdery Mildew Resistance[1]	Comments[1]
DWARF (height less than 4 feet after 5 years)					
Bourbon Street	Rose pink	Nondescript tan	Spreading	Fair	Patented
Chica® Pink	Medium pink	Nondescript tan	Spreading	Poor	
Chica® Red	Fuschia red	Nondescript tan	Rounded	Poor	Poor vigor
Chickasaw	Pink lavender	Nondescript tan	Compact-mounded	Unknown	Plant grows into a mounded "cushion" shape; hybrid parentage should make it disease resistant; later blooming than other dwarfs
Chisam Fire	Red	Nondescript tan	Upright	Unknown	
Creole	Watermelon red	Nondescript tan	Spreading	Unknown	
Delta Blush	Light pink	Nondescript tan	Spreading	Poor	Early flowering; patented
Houston	Watermelon red	Nondescript tan	Mounded	Fair	Leaves are very small, making the plant fine-textured; patented; sibling of Orlando and Sacramento
Lafayette	Blush lavender	Nondescript tan	Spreading	Poor	Patented
Mardi Gras	Purple	Nondescript tan	Spreading	Unknown	
New Orleans	Deep purple	Nondescript tan	Spreading	Fair	Rich purple flowers and glossy foliage; patented
Orlando	Lavender purple	Nondescript tan	Mounded	Fair	Leaves are small, making the plant fine-textured; patented; larger growing than siblings Houston and Sacramento
Ozark Spring	Light lavender	Nondescript tan	Upright	Poor	
Petite Embers™	Red	Nondescript tan	Upright	Fair	
Petite Orchid™	Dark lavender	Nondescript tan	Upright	Fair	
Petite Pinkie™	Medium pink	Nondescript tan	Rounded	Fair	
Petite Plum®	Purple	Nondescript tan	Rounded	Fair	Good purple flower color
Petite Red Imp™	True red	Nondescript tan	Rounded	Fair	Good red flower color
Pink Blush	Light pink	Nondescript tan	Mounded	Fair	Leaves are very small, making the plant fine-textured; patented
Pixie White	White	Nondescript tan	Rounded	Poor	Patented
Pocomoke	Deep rose pink	Nondescript tan	Compact-mounded	Unknown	Plant grows into a mounded "cushion" shape; hybrid parentage should make it disease resistant
Purple Velvet	Dark purple	Nondescript tan	Rounded	Unknown	
Sacramento	Rose pink	Nondescript tan	Mounded	Fair	Leaves are very small, making the plant fine-textured with almost a weeping habit of growth; patented; sibling of Houston and Orlando
Snowbaby	White	Nondescript tan	Upright-rounded	Poor	Occasionally a branch will revert and produce lavender flowers
Tightwad Red®	True red	Nondescript tan	Rounded	Unknown	Good red flower color; patented
Velma's Royal Delight	Magenta purple	Nondescript tan	Rounded	Poor	Great flower color
Victor	Red	Nondescript tan	Upright	Fair	Great red flower color
World's Fair	Red	Nondescript tan	Spreading	Unknown	

Cultivar	Flower Color	Bark Color[1]	Habit[1]	Powdery Mildew Resistance[1]	Comments[1]
SEMI-DWARF (height less than 12 feet after 10 years)					
Acoma	White	Creamy beige	Spreading, pendulous	Excellent	Outstanding hybrid! Distinctive horizontal branching; fine-textured, grey-green foliage; attractive bark; graceful appearance as plant matures
Baton Rouge	Deep rose red	Nondescript tan	Rounded	Very Poor	Originally called a "dwarf" but outgrew this category in Florida; patented
Bayou Marie	Pink	Nondescript tan	Rounded	Poor	Originally called a "dwarf" but outgrew this category in Florida; patented
Blizzard	White	Nondecsript tan	Rounded	Fair	
Caddo	"Bubble-gum" pink	Medium orange brown	Spreading	Good	Beautiful, unusual flower color on this hybrid; supposedly more difficult to root
Centennial	Purple	Nondescript tan	Rounded	Unknown	
Cheyenne	Bright red	Too soon to tell	Too soon to tell	Unknown, should be good	New hybrid cultivar from the U.S. National Arboretum; this should be a good, disease-resistant, red-flowering crapemyrtle in this size category
Conestoga	Light lavender	Nondescript tan	Spreading	Poor	From U.S. National Arboretum, but not a hybrid
Cordon Bleu	Lavender	Nondescript tan	Upright-rounded	Very Poor	Originally called a "dwarf" but outgrew this category in Florida; patented
Hope	Blush-white	Nondescript tan	Open, elliptical	Excellent	Appears "stiff"
Low Flame	Pinkish red	Nondescript tan	Upright rounded	Fair	
Majestic Orchid	Purple	Too soon to tell	Too soon to tell	Unknown	Hybrid of *L. indica* with *L. speciosa*; flowers and leaves are large; not stem hardy in North Florida
Pecos	Medium pink	Rich, dark brown	Vase-shaped	Excellent	Early flowering hybrid
Petite Snow™	White	Nondescript tan	Open, rounded	Fair	Originally called a "dwarf" but outgrew this category in Florida
Pink Ruffles	Medium pink	Beige	Rounded	Fair	
Powhatan	Medium purple	Light brown	Upright but broad	Fair	From U.S. National Arboretum but not a hybrid
Prairie Lace	Medium pink edged with white	Nondescript tan	Compact upright	Fair	Lacy, bicolor flowers are beautiful close-up but fade to a blurry pink at a distance; patented
Royalty	Royal purple	Nondescript tan	Upright-rounded	Very Poor	Good purple flower color, but plant is very susceptible to powdery mildew; originally called a "dwarf" but outgrew this category in Florida
Tonto	Fuschia red	Light brown	Rounded	Good	From the U.S. National Arboretum; prior to the releases of Arapaho and Cheyenne, this was the best disease-resistant hybrid "red;" more difficult to root
White Chocolate	White	Nondescript tan	Rounded	Unknown	New growth is burgundy darkening to brown-green; small white flowers contrast nicely with foliage
Zuni	Medium lavender	Whitish beige	Rounded	Fair	Hybrid plant; glossy foliage; appears "stiff"

Cultivar	Flower Color	Bark Color[1]	Habit[1]	Powdery Mildew Resistance[1]	Comments[1]
INTERMEDIATE (height less than 20 feet after 10 years)					
Apalachee	Light lavender	Cinnamon orange	Upright	Good	Outstanding hybrid! Dark green leaves; dense canopy; excellent bark color; flowers are faintly fragrant; panicles of seed capsules are attractive in winter
Burgundy Cotton™	White	Too soon to tell	Too soon to tell	Unknown	New growth is wine colored; turning red-green and finally green when flowering; broad habit; patented
Candycane	Medium pink edged with white	Nondescript tan	Upright	Fair	Lacy, bicolor flowers are beautiful close-up, but fade to a blurry pink at a distance
Catawba	Violet purple	Nondescript tan	Broad	Fair	Best purple flower color; from U.S. National Arboretum but not a hybrid
Centennial Spirit	Dark red	Beige	Stiffly upright	Good	Good red flower color; "stiff" plant; patented
Christiana	Deep red	Nondescript tan	Upright- rounded	Good	Great red flowers!
Comanche	Coral pink	Sandalwood	Upright-rounded	Excellent	Unusual flower color on this hybrid; new leaves are tinged red-bronze.
Country Red	Dark red	Beige	Upright-rounded	Fair	
Firebird	Dark hot pink	Nondescript tan	Spreading	Fair	
Hopi	Medium pink	Warm beige	Broad-rounded	Good	Excellent hybrid cultivar; originally called "semi-dwarf" but outgrew this category in Florida
Lipan	Reddish lavender	Whitish	Upright	Excellent	Unusual flower color on this hybrid
Near East	Soft pink	Tan	Open, spreading	Excellent	Very old cultivar; beautiful flower color; very loose, irregular habit of growth makes it hard to prune and grow
Osage	Medium pink	Dark orange	Rounded to pendulous (when in bloom)	Excellent	Excellent bark; large, compound flower panicles; glossy foliage; hybrid
Osage Blush	Light pink	Dark orange	Rounded to pendulous (when in bloom)	Excellent	Light, pink-flowered sport of the hybrid 'Osage' discovered by John Davy (Pensacola area, Florida); otherwise the same
Peppermint Lace	Pink edged with white	Nondescript tan	Upright-rounded	Unknown	Patented
Pink Lace	Medium pink	Beige	Rounded	Fair	
Pink Velour®	Hot pink	Nondescript tan	Upright	Unknown	New foliage is deep burgundy-red, adding a new dimension in ornamental value; patented; formerly called "Royal Velvet"
Raspberry Sundae®	Dark pink edged with white	Nondescript tan	Strongly upright	Poor	Bicolor flowers fade to pink in Florida's conditions; new growth is burgundy; patented
Regal Red	Red	Nondescript tan	Upright	Poor	
Sarah's Favorite	White	Too soon to tell	Too soon to tell	Unknown, should be good	Hybrid cultivar known for cold hardiness
Seminole	Medium pink	Nondescript tan	Rounded	Fair	Long flowering period; from U.S. National Arboretum but not a hybrid
Siren Red™	Dark red	Too soon to tell	Too soon to tell	Unknown	Good red flower color; patented

Cultivar	Flower Color	Bark Color[1]	Habit[1]	Powdery Mildew Resistance[1]	Comments[1]
Sioux	Clear medium pink	Medium grey brown	Narrowly upright	Excellent	Beautiful flowers; good red fall color; narrow habit makes it a great plant for tight spaces; hybrid
Splash of Pink	Mix of white, pink and bicolor flowers	Nondescript tan	Rounded	Fair	Unique flowers are beautiful close-up, but fade to a blurry pink at a distance
Wm. Toovey	Pink red	Too soon to tell	Too soon to tell	Unknown	Introduced in 1927
Yuma	Light lavender	Pinkish-cream	Open, rounded	Excellent	Resembles northern Lilac when in bloom; great bark; loose, irregular growth habit makes it hard to prune and grow; hybrid
TREE (height greater than 20 feet after 10 years)					
Arapaho	Dark red	Too soon to tell	Too soon to tell	Unknown, should be good	New hybrid cultivar from the U.S. National Arboretum; this should be the best disease-resistant red-flowering crapemyrtle
Basham's Party Pink	Lavender pink	Creamy beige	Rounded, vase-shaped	Good	Very similar to 'Muskogee'; hybrid, but not from the U.S. National Arboretum
Biloxi	Light pink	Rich, dark brown	Open, vase-shaped	Good	Open canopy casts light shade and may allow grass to grow beneath; great bark; hybrid
Byers Wonderful White	White	Light beige	Upright	Fair	Huge, loose panicles of flowers as large as basketballs
Carolina Beauty	Deep red	Nondescript tan	Upright	Very poor	Good red flower color, but plant is extremely susceptible to pests
Choctaw	Light pink	Warm, light brown	Rounded	Good	Beautiful, large panicles of bright, clear pink flowers on this hybrid
Dallas Red	Dark red	Nondescript tan	Upright, rounded with age	Fair	
Dynamite®	True red	Light beige	Upright-rounded	Unknown	Best red flower color yet! Some flowers fade under Florida conditions; patented
Fantasy	White	Red-orange	Vase-shaped	Excellent	Outstanding bark; early flowering; grows to medium-size tree; difficult to root; a cultivar of *Lagerstroemia fauriei*
Glendora White	White	Too soon to tell	Too soon to tell	Unknown	Pure white flowers
Kiowa	White	Cinnamon brown	Vase-shaped	Excellent	Outstanding bark; early flowering; grows to medium-size tree; difficult to root; a cultivar of *Lagerstroemia fauriei*
Miami	Dark pink	Chestnut brown	Rounded, vase-shaped	Excellent	Good orange fall color; hybrid
Muskogee	Lavender-pink	Sandalwood	Rounded	Good	Fast-growing; great orange fall color; widely planted hybrid and perhaps overplanted
Natchez	White	Rich, cinnamon brown	Rounded	Excellent	Starts flowering early and blooms well all summer; great bark; good red fall color; outstanding hybrid but overplanted
Potomac	Medium pink	Beige	Upright	Fair	Leafs out early and is susceptible to late frosts; from U.S. National Arboretum but not a hybrid
Red Rocket®	Cherry red	Nondescript tan	Upright-rounded	Unknown	Good red flower color; patented

Cultivar	Flower Color	Bark Color[1]	Habit[1]	Powdery Mildew Resistance[1]	Comments[1]
Townhouse	White	Mahogany red	Vase-shaped	Excellent	Outstanding bark; grows to medium-size tree; broader habit than 'Fantasy'; difficult to root; a cultivar of *Lagerstroemia fauriei* from the J.C. Raulston Arboretum, Raleigh, NC
Tuscarora	Dark coral pink	Nondescript tan	Upright	Excellent	Unusual flower color on this hybrid; plant appears "stiff"
Tuskegee	Dark pink	Creamy beige	Vase-shaped	Excellent	Fast-growing
Twilight	Dark purple	Nondescript tan	Upright	Good	Good purple flower color; good orange fall color
Watermelon Red	Watermelon red/ pink	Creamy beige	Spreading	Fair	Old cultivar
Wichita	Lavender	Rich brown	Upright-vase	Excellent	Hybrid cultivar from the U.S. National Arboretum

[1] Bark color, habit, powdery mildew resistance and comments from author's personal observations.

UF IFAS Extension UNIVERSITY of FLORIDA

ENH458

Ilex cassine: Dahoon Holly[1]

Edward F. Gilman and Dennis G. Watson[2]

Introduction

Attractive when tightly clipped into a tall screen or allowed to grow naturally into its single-trunked, small tree form, Dahoon Holly is ideal for a variety of landscape settings. Capable of reaching 40 feet in height, Dahoon Holly is usually seen at a height of 20 to 30 feet with an 8 to 12-foot spread. The smooth, supple, shiny dark green, evergreen leaves, two to three inches long, have just a few serrations near the tip. Possessing male and female flowers on separate plants, at least two Dahoon Hollies (male and female) must be planted in the landscape to ensure production of the brilliant red berries in fall and winter. The berries serve as an excellent food source for wildlife but are far less prevalent than on East Palatka or Fosters Holly.

Figure 1. Middle-aged *Ilex cassine*: Dahoon Holly
Credits: Ed Gilman

General Information

Scientific name: *Ilex cassine*
Pronunciation: EYE-lecks kuh-SIGH-nee
Common name(s): Dahoon Holly
Family: *Aquifoliaceae*
USDA hardiness zones: 7A through 11 (Fig. 2)
Origin: native to North America
Invasive potential: little invasive potential
Uses: hedge; screen; specimen; street without sidewalk; deck or patio; reclamation; sidewalk cutout (tree pit); tree lawn 3-4 feet wide; tree lawn 4-6 feet wide; tree lawn > 6 ft

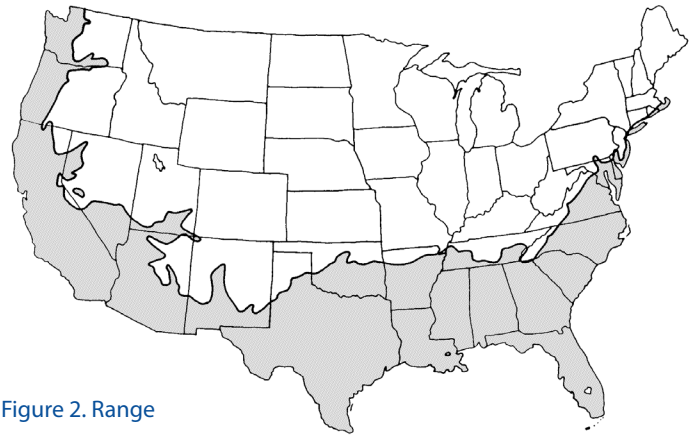

Figure 2. Range

1. This document is ENH458, one of a series of the Environmental Horticulture, UF/IFAS Extension. Original publication date November 1993. Revised December 2006. Reviewed February 2014. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Edward F. Gilman, professor, Environmental Horticulture Department; Dennis G. Watson,former associate professor, Agricultural Engineering Department, UF/IFAS Extension, Gainesville, FL 32611.

wide; urban tolerant; Bonsai; highway median; container or planter
Availability: generally available

Description

Height: 20 to 30 feet
Spread: 8 to 12 feet
Crown uniformity: irregular
Crown shape: pyramidal, oval
Crown density: open
Growth rate: moderate
Texture: medium

Foliage

Leaf arrangement: alternate (Fig. 3)
Leaf type: simple
Leaf margin: entire, serrate
Leaf shape: elliptic (oval), oblong
Leaf venation: pinnate
Leaf type and persistence: evergreen
Leaf blade length: 2 to 4 inches
Leaf color: green
Fall color: no color change
Fall characteristic: not showy

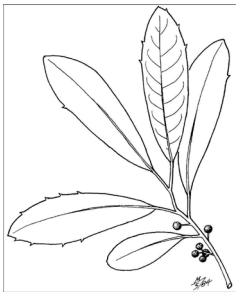

Figure 3. Foliage

Flower

Flower color: white/cream/gray
Flower characteristics: not showy

Fruit

Fruit shape: round
Fruit length: less than .5 inch
Fruit covering: fleshy
Fruit color: red, yellow
Fruit characteristics: attracts squirrels/mammals; showy; fruit/leaves not a litter problem

Trunk and Branches

Trunk/bark/branches: branches droop; not showy; typically multi-trunked; thorns
Pruning requirement: little required
Breakage: resistant
Current year twig color: green
Current year twig thickness: medium
Wood specific gravity: unknown

Culture

Light requirement: partial sun or partial shade, full sun
Soil tolerances: clay; sand; loam; slightly alkaline; acidic; extended flooding; well-drained
Drought tolerance: moderate
Aerosol salt tolerance: moderate

Other

Roots: not a problem
Winter interest: no
Outstanding tree: no
Ozone sensitivity: unknown
Verticillium wilt susceptibility: resistant
Pest resistance: resistant to pests/diseases

Use and Management

Growing well in full sun to partial shade, Dahoon Holly does best on moist soils since the wet, boggy soils of swamps is its native environment. Dahoon Holly can tolerate drier locations with some watering, but often has a thin crown in this environment. It is not recommended in the southern part of its range in a dry, exposed site unless irrigation is provided. It lends itself well to use as a specimen or street tree, and is ideal for naturalizing in moist locations. Little pruning is needed to create a well-structured, strong tree. It appears to adapt well to the confined spaces of urban and downtown landscapes and is tolerant of some salt spray. The crown is fuller in full sun.

Ilex cassine var. *angustifolia* , Alabama Dahoon, has narrower, more linear leaves than the species and more abundant but smaller berries. *Ilex myrtifolia* has smaller leaves and fruit, and its cultivar `Lowei' has yellow berries and dark green foliage.

Propagation is by seeds, which germinate in one year, or by cuttings. Cuttings are preferred since they give plants of a known sex and also root easily.

Pests and Diseases

No pests or diseases are of major concern. A twig gall sometimes forms in response to a fungus infection. Mites can infest foliage on trees planted on dry sites.

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ENH-583

Osmanthus americanus: Devilwood[1]

Edward F. Gilman and Dennis G. Watson[2]

Introduction

A native to the southeastern United States, Devilwood is a very attractive, small evergreen tree which is most commonly seen at 15 to 25 feet in height and sports lush, dark, olive green leaves throughout the year. It is occasionally seen 30 to 40 feet tall in its native habitat and grows slowly. The clusters of small, white, fragrant, early springtime flowers are followed by the production of small, dark blue drupes, ripening in fall and persisting on the tree until the following spring, if not first consumed by birds and other wildlife. Its ease of growth, pest-resistance, attractive foliage and flowers, and wildlife-attracting fruits would make Devilwood a popular choice for naturalizing or the mixed shrubbery border. The trees tolerate heavy pruning particularly well and may also be used as a hedge. Devilwood is so-named because the fine-textured wood is difficult to split and hard to work.

Figure 1. Young *Osmanthus americanus*: Devilwood
Credits: Ed Gilman

General Information

Scientific name: *Osmanthus americanus*
Pronunciation: oz-MANTH-us uh-mair-ih-KAY-nus
Common name(s): Devilwood, Wild-Olive
Family: *Oleaceae*
USDA hardiness zones: 5B through 9B (Fig. 2)
Origin: native to North America
Invasive potential: little invasive potential
Uses: hedge; screen; reclamation; deck or patio; highway median; street without sidewalk; parking lot island < 100 sq ft; parking lot island 100-200 sq ft; parking lot island > 200 sq ft; tree lawn 3-4 feet wide; tree lawn 4-6 feet wide; tree lawn > 6 ft wide; specimen
Availability: not native to North America

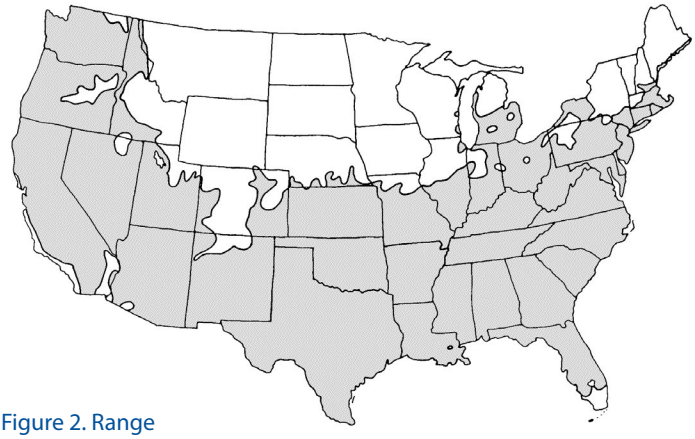

Figure 2. Range

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2. Edward F. Gilman, professor, Environmental Horticulture Department; Dennis G. Watson, former associate professor, Agricultural Engineering Department, UF/IFAS Extension, Gainesville, FL 32611.

Description

Height: 15 to 25 feet
Spread: 10 to 15 feet
Crown uniformity: symmetrical
Crown shape: vase, round
Crown density: dense
Growth rate: moderate
Texture: medium

Foliage

Leaf arrangement: opposite/subopposite (Fig. 3)
Leaf type: simple
Leaf margin: entire
Leaf shape: lanceolate, ovate, elliptic (oval)
Leaf venation: pinnate
Leaf type and persistence: evergreen
Leaf blade length: 2 to 4 inches, 4 to 8 inches
Leaf color: green
Fall color: no color change
Fall characteristic: not showy

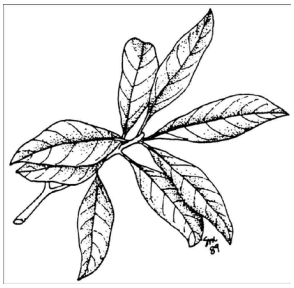

Figure 3. Foliage

Flower

Flower color: white/cream/gray
Flower characteristics: showy

Fruit

Fruit shape: oval
Fruit length: .5 to 1 inch
Fruit covering: fleshy
Fruit color: blue
Fruit characteristics: attracts birds; not showy; fruit/leaves not a litter problem

Trunk and Branches

Trunk/bark/branches: branches droop; not showy; typically multi-trunked; thorns
Pruning requirement: little required
Breakage: resistant
Current year twig color: green, brown
Current year twig thickness: thick
Wood specific gravity: unknown

Culture

Light requirement: full sun, partial sun or partial shade
Soil tolerances: clay; sand; loam; acidic; extended flooding; well-drained
Drought tolerance: moderate
Aerosol salt tolerance: high

Other

Roots: not a problem
Winter interest: no
Outstanding tree: yes
Ozone sensitivity: unknown
Verticillium wilt susceptibility: unknown
Pest resistance: free of serious pests and diseases

Use and Management

Naturally found along streambanks or swamp margins, Devilwood should be grown in full sun or partial shade on moist, well-drained soil. Drought tolerance is moderate once established. The tree is probably as shade tolerant as any osmanthus. Not tested as an urban tree but may have some merit in wet soils.

Propagation is by cuttings or seed, and is difficult by either.

Pests and Diseases

No pests or diseases are of major concern.

UF IFAS Extension UNIVERSITY of FLORIDA

ENH394

Eriobotrya japonica: Loquat[1]

Edward F. Gilman and Dennis G. Watson[2]

Figure 1. Middle-aged *Eriobotrya japonica*: Loquat.
Credits: Wouter Hagens

Introduction

The dense, rounded, dark green canopy of Loquat is decorated in USDA hardiness zones 8b through 11 in late winter and spring with clusters of apricot yellow, pear-shaped, edible furry fruits. Fruit rarely sets further north. Loquat is a rapidly-growing evergreen tree and can reach 25 to 30 feet in height in the shade but is frequently seen 15 feet tall with a 15 to 25-foot-spread in a sunny location. The 10 to 12-inch-long leaves are rusty-colored beneath and have a coarse texture. Fragrant clusters of creamy white flowers are produced in fall, followed by the delicious, brightly colored, winter fruit.

Figure 2. Range

General Information

Scientific name: *Eriobotrya japonica*
Pronunciation: air-ee-oh-BOT-ree-uh juh-PAWN-ih-kuh
Common name(s): Loquat
Family: *Rosaceae*
USDA hardiness zones: 8A through 11 (Figure 2)
Origin: not native to North America
Invasive potential: According to the IFAS Assessment of Non-Native Plants in Florida's Natural Areas (IFAS Invasive Plant Working Group 2008), *Eriobotrya japonica* should be treated with caution in the central and south zone in Florida, may be recommended but managed to prevent

1. This document is ENH394, one of a series of the Environmental Horticulture, UF/IFAS Extension. Original publication date November 1993. Revised February 2013. Reviewed June 2016. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Edward F. Gilman, professor, Environmental Horticulture Department; Dennis G. Watson, former associate professor, Agricultural Engineering Department, UF/IFAS Extension, Gainesville FL 32611.

escape. It is not considered a problem species and may be recommended in the north zone in Florida (counties listed by zone at: http://plants.ifas.ufl.edu/assessment/pdfs/assess_counties.pdf)
Uses: hedge; trained as a standard; urban tolerant; street without sidewalk; deck or patio; screen; fruit; specimen; espalier; container or planter; highway median
Availability: not native to North America

Description

Height: 20 to 30 feet
Spread: 30 to 35 feet
Crown uniformity: symmetrical
Crown shape: round
Crown density: dense
Growth rate: moderate
Texture: coarse

Foliage

Leaf arrangement: alternate (Figure 3)
Leaf type: simple
Leaf margin: pectinate, serrate
Leaf shape: oblong, elliptic (oval)
Leaf venation: pinnate
Leaf type and persistence: broadleaf evergreen, evergreen
Leaf blade length: 8 to 12 inches
Leaf color: green
Fall color: no color change
Fall characteristic: not showy

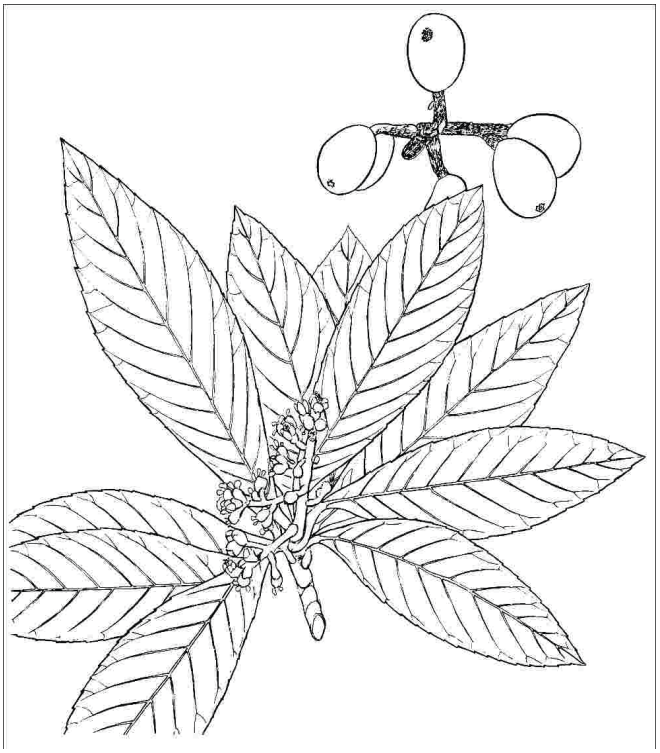

Figure 3. Foliage

Flower

Flower color: white/cream/gray
Flower characteristics: showy

Fruit

Fruit shape: round, oval
Fruit length: 1 to 3 inches
Fruit covering: fleshy
Fruit color: yellow, orange
Fruit characteristics: attracts birds; showy; fruit/leaves a litter problem

Trunk and Branches

Trunk/bark/branches: branches droop; not showy; typically one trunk; thorns
Pruning requirement: needed for strong structure
Breakage: resistant
Current year twig color: gray
Current year twig thickness: thick
Wood specific gravity: unknown

Culture

Light requirement: full sun, partial sun or partial shade
Soil tolerances: clay; sand; loam; alkaline; acidic; well-drained
Drought tolerance: moderate
Aerosol salt tolerance: moderate

Other

Roots: not a problem
Winter interest: yes
Outstanding tree: no
Ozone sensitivity: unknown
Verticillium wilt susceptibility: unknown
Pest resistance: sensitive to pests/diseases

Use and Management

Its neat habit and compact growth make Loquat an ideal specimen or patio shade tree, and it can be used as a residential street tree or median strip tree in areas where overhead space is limited. But an adequate clear trunk needs to be developed early in the life of the tree to provide for vehicle clearance. Branches will have to be pruned to grow up, as they tend to droop with time under the weight of the developing branch. It is not suited for planting next to the street if trucks pass close to the tree since adequate clearance is not possible but is successful in wide median strips. It also blends well into informal shrubbery borders and the fruit is attractive to wildlife. It espaliers well against a sunny wall, and makes a good screen due to its dense

canopy. Sprouts along the trunk can be a maintenance nuisance.

Providing best fruit and form when grown in full sun, Loquat can tolerate partial shade and a variety of well-drained soils. It grows well on soils with a high pH and maintains the characteristic dark green foliage. Clay soil is acceptable as long as there is sufficient slope to allow surface water to run away from the root system. It often looks best in the southern portion of its range when given some shade in the afternoon, especially if it is not irrigated. Loquat should be well-watered until established, but can then survive periodic droughts. Do not overfertilize since this could increase sensitivity to fire blight disease. Loquat may live only 20 to 30-years so it should not be considered a permanent fixture in the landscape. It performs well along the coast with some protection from salty air. It is not for New Orleans area due to wet soils.

Although Loquat can easily be grown from seed, many cultivars are available for consistent fruit quality. `Champagne' (March-May), best for USDA hardiness zone 9, has yellow-skinned, white-fleshed, juicy, tart fruit, one of the better fruits. `Gold Nugget' (May-June), best near coast, has larger, sweeter fruit with orange skin and flesh. `MacBeth' (April-May) has exceptionally large fruit with yellow skin and creamy flesh. `Thales' is a late yellow-fleshed variety. `Coppertone', a hybrid, has dense growth with copper-colored new foliage and pale pink flowers. `Variegata' has white variegated leaves.

Propagation is by seed, cuttings, or grafting of cultivars.

Pests

Scales and caterpillars are occasional problems.

Diseases

To reduce fireblight problems, provide good air circulation and keep away from other fireblight hosts, such as Pyracantha, pears, etc. If leaves and stems blacken from the top downward, prune back one-foot or more into healthy wood. Sterilize shears with a mixture of one part bleach to nine parts water between cuts.

Root rot occurs on wet soils. Locate the tree in a well-drained soil.

Literature Cited

Fox, A.M., D.R. Gordon, J.A. Dusky, L. Tyson, and R.K. Stocker. 2008. IFAS Assessment of Non-Native Plants in Florida's Natural Areas: Status Assessment. Cited from the Internet (November 16, 2012), http://plants.ifas.ufl.edu/assessment/pdfs/status_assessment.pdf

UF IFAS Extension UNIVERSITY of FLORIDA

ENH-200

Acer rubrum: Red Maple[1]

Edward F. Gilman and Dennis G. Watson[2]

Introduction

Red maple has an oval shape and is a fast grower with strong wood, reaching a height of 75 feet. Unless irrigated or on a wet site, red maple is best used north of USDA hardiness zone 9. Trees are often much shorter in the southern part of its range unless growing next to a stream or on a wet site. This tree is preferred over silver maple or boxelder when a fast growing maple is needed. When planting the species *Acer rubrum*, select only those which have been grown from seed sources in your area. The newly emerging leaves and red flowers and fruits signal that spring has come. They appear in December and January in Florida, later in the northern part of its range. The seeds of red maple are quite popular with squirrels and birds. This tree if sometimes confused with red-leaved cultivars of Norway maple.

Figure 1. Mature *Acer rubrum*: Red Maple
Credits: Ed Gilman

General Information

Scientific name: *Acer rubrum*
Pronunciation: AY-ser ROO-brum
Common name(s): Red maple, swamp maple
Family: *Aceraceae*
USDA hardiness zones: 4A through 9B (Fig. 2)
Origin: native to North America
Invasive potential: little invasive potential
Uses: reclamation; highway median; screen; shade; street without sidewalk; deck or patio; tree lawn 4–6 feet wide; tree lawn > 6 ft. wide; Bonsai
Availability: not native to North America

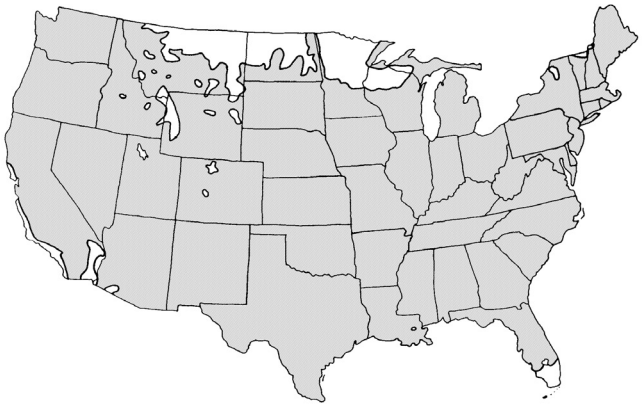

Figure 2. Range

1. This document is ENH-200, one of a series of the Environmental Horticulture, UF/IFAS Extension. Original publication date November 1993. Revised December 2006. Reviewed February 2014. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Edward F. Gilman, professor, Environmental Horticulture Department; Dennis G. Watson, former associate professor, Agricultural Engineering Department, UF/IFAS Extension, Gainesville, FL 32611.

Description

Height: 60 to 75 feet
Spread: 25 to 35 feet
Crown uniformity: irregular
Crown shape: oval, round, upright/erect
Crown density: moderate
Growth rate: fast
Texture: medium

Foliage

Leaf arrangement: opposite/subopposite (Fig. 3)
Leaf type: simple
Leaf margin: incised, serrate, lobed
Leaf shape: ovate
Leaf venation: palmate
Leaf type and persistence: deciduous
Leaf blade length: 2 to 4 inches
Leaf color: green
Fall color: yellow, orange, red
Fall characteristic: showy

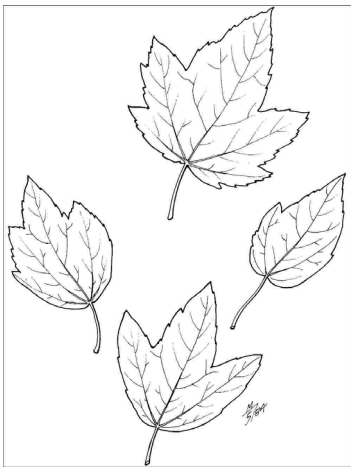

Figure 3. Foliage

Flower

Flower color: red
Flower characteristics: showy

Fruit

Fruit shape: elongated
Fruit length: 1 to 3 inches
Fruit covering: dry or hard
Fruit color: red
Fruit characteristics: attracts squirrels/mammals; showy; fruit/leaves not a litter problem

Trunk and Branches

Trunk/bark/branches: branches droop; not showy; typically one trunk; thorns
Pruning requirement: needed for strong structure
Breakage: susceptible to breakage
Current year twig color: gray, reddish
Current year twig thickness: medium
Wood specific gravity: 0.54

Culture

Light requirement: full sun, partial sun or partial shade
Soil tolerances: clay; sand; loam; acidic; extended flooding; well-drained
Drought tolerance: moderate
Aerosol salt tolerance: low

Other

Roots: can form large surface roots
Winter interest: yes
Outstanding tree: no
Ozone sensitivity: tolerant
Verticillium wilt susceptibility: susceptible
Pest resistance: resistant to pests/diseases

Use and Management

The outstanding ornamental characteristic of red maple is red, orange, or yellow fall color (sometimes on the same tree) lasting several weeks. Red maple is often one of the first trees to color up in autumn, and it puts on one of the most brilliant displays of any tree, but trees vary greatly in fall color and intensity. Cultivars are more consistently colored.

The tree makes the best growth in wet places and has no other particular soil preference, except chlorosis may develop on alkaline soil where it also grows poorly. It is well suited as a street tree in northern and mid-south climates in residential and other suburban areas, but the bark is thin and easily damaged by mowers. Irrigation is often needed to support street tree plantings in well-drained soil in the south. Roots can raise sidewalks as silver maples can, but they have a less aggressive root system and so they make a good street tree. Surface roots beneath the canopy can make mowing difficult.

Red maple is easily transplanted and usually develops surface roots in soil ranging from well-drained sand to clay. It is not especially drought-tolerant, particularly in the southern part of the range, but selected individual trees can be found growing on dry sites. This trait shows the wide range of genetic diversity in the species. Branches often grow upright through the crown, forming poor attachments to the trunk. These should be removed in the nursery or

after planting in the landscape to help prevent branch failure in older trees during storms. Select branches with a wide angle from the trunk and prevent branches from growing larger than half the diameter of the trunk.

A number of cultivars are listed. Due to graft-incompatibility problems that cause the tree to break apart, preference should be given to cultivars produced on their own roots. In the northern and southern end of the range, choose cultivars with regional adaptation. The cultivars are 'Armstrong'—upright growth habit, almost columnar, somewhat prone to splitting branches due to tight crotches, 50 feet tall; 'Autumn Flame'—45 feet tall, round, above average fall color; 'Bowhall'—upright growth habit, branches form embedded bark, graft incompatibility on grafted trees; 'Gerling'—densely branched, broadly pyramidal, about 35 feet tall when mature; 'October Glory'—above average fall color, excellent tree, retains leaves late, 60 feet tall; 'Red Sunset'—above average orange to red fall color, does well in the south in USDA hardiness zone 8, probably the best cultivar for the deep south, oval, 50 feet tall; 'Scanlon'—upright growth habit; 'Schlesinger'—good fall color, rapid growth rate; 'Tilford'—globe-shaped crown. Variety *drummondii* suitable in USDA hardiness zone 8.

There is a recently introduced hybrid cross between red and silver maple called hybrid maple (*Acer* x *fremanii*). Cultivars of this hybrid include 'Armstrong' with a narrow columnar crown to 35 feet tall, 'Autumn Blaze' with an oval crown to 50 feet tall, 'Celebration' with a narrow upright crown and a strong central leader to 50 or 60 feet tall, 'Celzam' with a narrow oval crown to 50 feet tall, and 'Scarlet Sentenial' with great fall color, and oval crown to 40 feet tall. The culture of these trees is probably similar to red maple.

Pests

Leaf stalk borer and petiole borer cause the same type of injury. Both insects bore into the leaf stalk just below the leaf blade. The leaf stalk shrivels, turns black, and the leaf blade falls off. The leaf drop may appear heavy but serious injury to a healthy tree is rare.

Gall mites stimulate the formation of growths or galls on the leaves. The galls are small but can be so numerous that individual leaves curl up. The most common gall is bladder gall mite found on silver maple. The galls are round and at first green but later turn red, then black, then dry up. Galls of other shapes are seen less frequently on other types of maples. Galls are not serious, so chemical controls are not needed.

Crimson erineum mite is usually found on silver maple and causes the formation of red fuzzy patches on the lower leaf surfaces. The problem is not serious so control measures are not suggested.

Aphids infest maples, usually Norway maple, and may be numerous at times. High populations can cause leaf drop. Another sign of heavy aphid infestation is honey dew on lower leaves and objects beneath the tree. Aphids are controlled by spraying or they may be left alone. If not sprayed, predatory insects will bring the aphid population under control.

Scales are an occasional problem on maples. Perhaps the most common is cottony maple scale. The insect forms a cottony mass on the lower sides of branches. Scales are usually controlled with horticultural oil sprays. Scales may also be controlled with well-timed sprays to kill the crawlers.

If borers become a problem it is an indication the tree is not growing well. Controlling borers involves keeping trees healthy. Chemical controls of existing infestations are more difficult. Proper control involves identification of the borer infesting the tree then applying insecticides at the proper time.

Twig borers can cause die-back of the terminal 8 to 12 inches of small-diameter branches. This is usually not serious and does not require control measures, but it can be a problem on young trees in the nursery.

Diseases

Anthracnose is more of a problem in rainy seasons. The disease resembles, and may be confused with, a physiological problem called "scorch". The disease causes light brown or tan areas on the leaves. Anthracnose may be controlled by fungicides sprayed on as leaves open in the spring. Two additional sprays at two-week intervals will be needed. The disease is most common on sugar and silver maples and boxelder. Other maples may not be affected as severely. Sprays may need to be applied by a commercial applicator having proper spray equipment.

Girdling roots grow around the base of the trunk rather than growing away from it. As both root and trunk increase in size, the root chokes the trunk. Girdling roots are detected by examining the base of the trunk. The lack of trunk flare at ground level is a symptom. The portion of the trunk above a girdling root does not grow as rapidly as the rest so may be slightly depressed. The offending root may be on the surface or may be just below the sod. The tree crown shows premature fall coloration and death of parts

of the tree in more serious cases. If large portions of the tree have died it may not be worth saving. Girdling roots are functional roots so when removed a portion of the tree may die. When the girdling root is large the treatment is as harmful as the problem. After root removal, follow-up treatment includes watering during dry weather. The best treatment for girdling roots is prevention by removing or cutting circling roots at planting or as soon as they are detected on young trees.

Scorch may occur during periods of high temperatures accompanied by wind. Trees with diseased or inadequate root systems will also show scorching. When trees do not get enough water they scorch. Scorch symptoms are light brown or tan dead areas between leaf veins. The symptoms are on all parts of the tree or only on the side exposed to sun and wind. Scorching due to dry soil may be overcome by watering. If scorching is due to an inadequate or diseased root system, watering may have no effect.

Nutrient deficiency symptoms are yellow or yellowish-green leaves with darker green veins. The most commonly deficient nutrient on maple is manganese. Implanting capsules containing a manganese source in the trunk will alleviate the symptoms. Test soil samples to determine if the soil pH is too high for best manganese availability. Plants exposed to weed killers may also show similar symptoms.

Tar spot and a variety of leaf spots cause some concern among homeowners but are rarely serious enough for control.

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ENH-818

Viburnum rufidulum: Rusty Blackhaw[1]

Edward F. Gilman and Dennis G. Watson[2]

Introduction

A native of the well-drained, upland woods of southeastern North America, Rusty Blackhaw forms a multiple or (occasionally) single-trunked small tree or large shrub, reaching 25 feet in height with an equal spread. The dark bark is blocky, resembling older Flowering Dogwood bark. Trunks usually grow no thicker than six inches and arch away from the tree, forming a pleasing, vase-shaped crown. Leaves are dark green, three inches long, leathery, and extremely glossy. The tree is covered in springtime with striking five-inch-wide clusters of small, white blooms. These flowers are followed by clusters of dark blue, waxy, one-half-inch-long fruits that are extremely popular with wildlife and will occasionally persist on the plant from September throughout the autumn, if not eaten by wildlife.

Figure 1. Mature *Viburnum rufidulum*: Rusty Blackhaw
Credits: Ed Gilman

In fall, Rusty Blackhaw puts on a brilliant display of scarlet red to purple foliage.

General Information

Scientific name: *Viburnum rufidulum*
Pronunciation: vye-BER-num roo-FID-yoo-lum
Common name(s): Rusty Blackhaw, Southern Blackhaw
Family: *Caprifoliaceae*
USDA hardiness zones: 5B through 9B (Fig. 2)
Origin: native to North America
Uses: sidewalk cutout (tree pit); reclamation; container or planter; street without sidewalk; deck or patio; specimen; hedge; parking lot island < 100 sq ft; parking lot island 100-200 sq ft; parking lot island > 200 sq ft; tree lawn 3-4 feet wide; tree lawn 4-6 feet wide; tree lawn > 6 ft wide; highway median

Figure 2. Range

1. This document is ENH-818, one of a series of the Environmental Horticulture, UF/IFAS Extension. Original publication date November 1993. Revised October 1998. Reviewed February 2014. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Edward F. Gilman, professor, Environmental Horticulture Department; Dennis G. Watson, former associate professor, Agricultural Engineering Department, UF/IFAS Extension, Gainesville, FL 32611.

Availability: somewhat available, may have to go out of the region to find the tree

Description

Height: 20 to 25 feet
Spread: 20 to 25 feet
Crown uniformity: irregular
Crown shape: vase
Crown density: moderate
Growth rate: slow
Texture: medium

Foliage

Leaf arrangement: opposite/subopposite (Fig. 3)
Leaf type: simple
Leaf margin: serrulate
Leaf shape: ovate, obovate
Leaf venation: pinnate
Leaf type and persistence: deciduous
Leaf blade length: 2 to 4 inches
Leaf color: green
Fall color: red, purple
Fall characteristic: showy

Figure 3. Foliage

Flower

Flower color: white/cream/gray
Flower characteristics: showy

Fruit

Fruit shape: round
Fruit length: less than .5 inch
Fruit covering: fleshy
Fruit color: blue
Fruit characteristics: does not attract wildlife; not showy; fruit/leaves not a litter problem

Trunk and Branches

Trunk/bark/branches: branches droop; not showy; typically multi-trunked; thorns
Pruning requirement: little required
Breakage: resistant
Current year twig color: brown
Current year twig thickness: thin, medium
Wood specific gravity: unknown

Culture

Light requirement: full sun, partial sun or partial shade, shade tolerant
Soil tolerances: clay; sand; loam; alkaline; acidic; occasionally wet; well-drained
Drought tolerance: high
Aerosol salt tolerance: none

Other

Roots: not a problem
Winter interest: no
Outstanding tree: yes
Invasive potential: little invasive potential
Ozone sensitivity: unknown
Verticillium wilt susceptibility: susceptible
Pest resistance: resistant to pests/diseases

Use and Management

Rusty Blackhaw will grow and look nice in full sun or partial shade on any reasonably fertile, well-drained soil. The tree grows in a shady spot but forms a more open habit. Flowering is significantly reduced in the shade. Although tolerant of drought, it will not tolerate compacted soil. This would be a good tree for planting beneath power lines and in other limited space areas. Useful as a hedge, specimen, or border tree, this deciduous tree adapts well to urban areas. Shoots arise from the root system, sometimes as far out as the dripline. This could be a maintenance problem when planted in a bed of mulch. But sprouts would be routinely cut with regular mowing when planted as a street tree in a lawn. Pests are usually not a major problem.

Propagation is by seed or cuttings.

Pests

This tree is usually pest-free. Viburnum aphid is gray to dark green and feeds in clusters at the tips of the branches, causing leaf curl. *Viburnum opulus* is especially susceptible. The insects can be dislodged with high pressure water spray from the garden hose.

Inspect the stems of unhealthy-looking plants for possible scale infestations. If found, spray with horticultural oil for some control.

Diseases

Bacterial leafspot causes round, water-soaked spots on leaves and young stems. These develop into shrunken, brown areas about 1/8-inch in diameter. Destroy infected leaves, if you wish. This is not a problem to be concerned about.

Bacterial crown gall forms galls on the lower stems. Do not replant in the same spot.

Shoot blight causes grayish to brown decayed spots on the leaves. The spots first appear at the leaf margins, then spread to the rest of the leaf. Infected flower clusters or twigs are killed.

A number of fungi cause leaf spots. Rake up and destroy infected leaves. These are usually not a serious problem.

Powdery mildew causes a white powdery growth on the leaves, but this Viburnum is usually not affected.

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ENH-543

Magnolia virginiana: Sweetbay Magnolia[1]

Edward F. Gilman and Dennis G. Watson[2]

Introduction

Sweetbay Magnolia is a graceful southern, evergreen to semi-evergreen, wide columnar tree, ideal for use as a patio tree or specimen. It can grow to a mature height of 40 feet in the north or to 60 feet in the south. Trees glimmer in the wind due to the whitish-green undersides of the leaves. They are very noticeable as you drive by them on interstates along water-logged woodlands. The tree provides excellent vertical definition in a shrub border or as a free standing specimen and flourishes in moist, acid soil such as the swamps in the eastern U.S. and along stream banks. The creamy-white, lemon-scented flowers appear from June through September, and are followed by small red seeds which are used by a variety of wildlife. It can be trained into a multi-trunked, spreading specimen plant, or left with the central leader intact as a wide column.

Figure 1. Middle-aged *Magnolia virginiana*: Sweetbay Magnolia
Credits: Ed Gilman

General Information

Scientific name: *Magnolia virginiana*
Pronunciation: mag-NO-lee-uh ver-jin-ee-AY-nuh
Common name(s): Sweetbay Magnolia, Swamp Magnolia
Family: *Magnoliaceae*
USDA hardiness zones: 5A through 10A (Fig. 2)
Origin: native to North America
Invasive potential: little invasive potential
Uses: deck or patio; specimen; street without sidewalk; espalier; tree lawn 4-6 feet wide; tree lawn > 6 ft wide; highway median
Availability: not native to North America

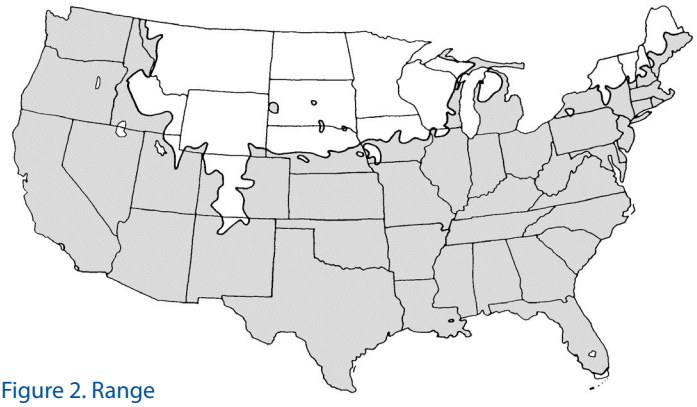

Figure 2. Range

1. This document is ENH-543, one of a series of the Environmental Horticulture, UF/IFAS Extension. Original publication date November 1993. Revised December 2006. Reviewed February 2014. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Edward F. Gilman, professor, Environmental Horticulture Department; Dennis G. Watson, former associate professor, Agricultural Engineering Department, UF/IFAS Extension, Gainesville, FL 32611.

Description

Height: 40 to 50 feet
Spread: 15 to 25 feet
Crown uniformity: symmetrical
Crown shape: columnar, vase
Crown density: moderate
Growth rate: moderate
Texture: medium

Foliage

Leaf arrangement: alternate (Fig. 3)
Leaf type: simple
Leaf margin: entire
Leaf shape: elliptic (oval), oblong
Leaf venation: brachidodrome, pinnate
Leaf type and persistence: deciduous, semi-evergreen, evergreen
Leaf blade length: less than 2 inches, 2 to 4 inches
Leaf color: green
Fall color: no color change
Fall characteristic: not showy

Flower

Flower color: white/cream/gray
Flower characteristics: very showy

Figure 3. Flower

Fruit

Fruit shape: elongated
Fruit length: 1 to 3 inches
Fruit covering: dry or hard
Fruit color: red, green
Fruit characteristics: attracts birds; showy; fruit/leaves not a litter problem

Trunk and Branches

Trunk/bark/branches: branches don't droop; showy; typically multi-trunked; thorns
Pruning requirement: little required
Breakage: resistant
Current year twig color: green
Current year twig thickness: thin
Wood specific gravity: unknown

Culture

Light requirement: full sun, partial sun or partial shade
Soil tolerances: sand; loam; clay; acidic; well-drained; extended flooding
Drought tolerance: little
Aerosol salt tolerance: low

Other

Roots: not a problem
Winter interest: no
Outstanding tree: yes
Ozone sensitivity: tolerant
Verticillium wilt susceptibility: susceptible
Pest resistance: resistant to pests/diseases

Use and Management

Sweetbay Magnolia makes an excellent tree for planting next to buildings, in narrow alleys or corridors, or in other urban areas with limited space for horizontal crown expansion. It has not been planted extensively in downtown urban areas, but its flood and drought tolerance and narrow crown combine to make it a good candidate. It usually maintains a good, straight central leader, although occasionally the trunk branches low to the ground forming a round multi-stemmed, spreading tree. It should be grown and planted more often.

Sweetbay Magnolia roots easily from softwood cuttings, grows freely near coastal areas, and is happiest in southern climates. It is thriving in the Auburn Shade Tree Evaluation trials in Alabama without irrigation. However, in the confined soil spaces typical of some urban areas, occasional irrigation is recommended.

The species is deciduous in USDA hardiness zones 7 and 8 (evergreen farther south) but the variety *australis* and cultivar 'Henry Hicks' are evergreen; 'Havener' has larger flower petals.

Pests and Diseases

Scales sometimes infest foliage and twigs, particularly on dry sites where the tree is under stress.

Tulip-Poplar weevil (sassafras weevil) feeds as a leaf miner when young and chews holes in the leaves as an adult.

Leaf spots occasionally occur on the foliage but are of little concern.

Bismarckia nobilis: Bismarck Palm[1]

Timothy K. Broschat[2]

The Bismarck palm is a native of Madagascar that grows to a height of 30 to 60 feet with a spread of 12 to 16 feet. The massive 4-foot-wide costapalmate leaves are typically silver-green in color, but a light olive-green-leaved variety also exists (Figure 1). The persistent leaf bases are split, creating an attractive pattern on the 15–18-inch-diameter trunks. The dark brown male and female inflorescences are produced on separate trees, with females developing olive-brown fruit about 1.5 inches in diameter. The bold texture and color and eventual great height of this species make a strong statement in any setting, but can be overpowering in small residential landscapes.

Figure 1. *Bismarckia nobilis*.
Credits: T. K. Broschat

Bismarck palms are considered to be hardy down to about 30°F or USDA cold hardiness zone 10A (see http://planthardiness.ars.usda.gov/PHZMWeb/), but often survive in protected sites in zone 9B (25°F). This species is not as resistant to windstorm damage as most other species of palms. They are highly drought tolerant and moderately tolerant of salt spray on the leaves. These palms grow well on a wide variety of soils, but are susceptible to potassium deficiency (see http://edis.ifas.ufl.edu/ep269) which causes translucent yellow-orange or necrotic spotting (Figure 2) and/or leaflet tip necrosis on the oldest leaves (Figure 3). Potassium deficiency also causes premature leaf death and can reduce the number of leaves that the palm can support.

Figure 2. Older leaf of *Bismarckia nobilis* showing translucent yellow-orange spotting caused by potassium deficiency.
Credits: T. K. Broschat

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2. Timothy K. Broschat, professor, Environmental Horticulture Department, Ft. Lauderdale Research and Education Center, UF/IFAS Extension, Gainesville FL 32611.

Figure 3. Older leaves of *Bismarckia nobilis* showing extensive leaflet tip necrosis caused by potassium deficiency.
Credits: T. K. Broschat

Magnesium deficiency (see http://edis.ifas.ufl.edu/ep266) is occasionally observed in this species where it imparts an unusual light yellowish tint to the silvery leaves (Figure 4). Manganese deficiency (see http://edis.ifas.ufl.edu/ep267) has been reported on *Bismarckia*, but it is not common. Symptoms include chlorosis, necrotic streaking, and leaf tip necrosis of the youngest leaves (Figure 5). The only other nutritional problem encountered in Bismarck palms is boron deficiency (see http://edis.ifas.ufl.edu/ep264). In transient mild cases, this will be expressed as one or more necrotic bands around the newly emerging leaves (Figure 6). Chronic boron deficiency is fairly common in this species and typically results in spear leaves not opening properly, with more than one unopened spear leaf being present at any given time (Figure 7). In more severe cases, new leaves may be stunted and distorted. Nutrient deficiencies in the landscape can be corrected or prevented by regular use of a controlled-release granular fertilizer having an analysis of 8-2-12-4Mg plus micronutrients. See *Fertilization of Field-grown and Landscape Palms in Florida* (http://edis.ifas.ufl.edu/ep261) for more information about palm fertilization.

Figure 4. Magnesium-deficient *Bismarckia nobilis*. Note the unusual discoloration of the leaves.
Credits: T. K. Broschat

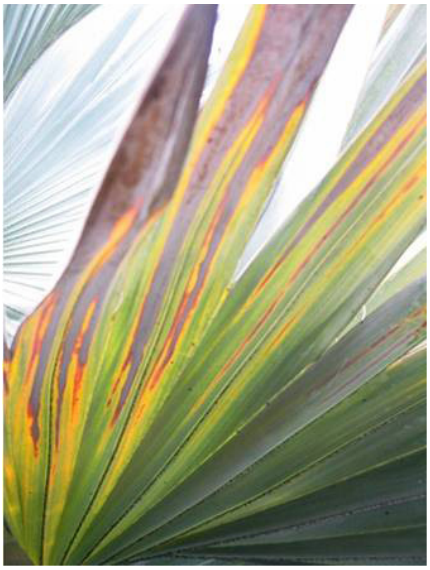

Figure 5. Young leaf of manganese-deficient *Bismarckia nobilis*. Note the necrotic streaking that is diagnostic for this disorder.
Credits: Scott Schultz

Figure 6. Juvenile *Bismarckia nobilis* showing the effects of two temporary boron deficiency events during the development of a single leaf. The actual deficiencies occurred about five months before this leaf emerged.
Credits: T. K. Broschat

Figure 7. Chronic boron deficiency in *Bismarckia nobilis*. Note the small leaves and multiple unopened spear leaves.
Credits: T. K. Broschat

Bismarck palms are propagated by seeds that germinate slowly over a period of 6 to 12 months at high temperatures (90–100°F). For more information about germinating palm seeds see *Palm Seed Germination* (http://edis.ifas.ufl.edu/ep238). They grow rather slowly when young but once they develop a trunk, growth rate is more moderate. Mature field-grown specimens are more difficult to transplant than most other species of palms. Landscapers have achieved reasonably good transplant success by root-pruning the palms several months prior to moving them, by digging unusually large root balls, or by removing all of the leaves at the time of moving. See *Transplanting Palms* (http://edis.ifas.ufl.edu/ep001) for more information on this topic.

Bismarck palms can be pruned at any time of the year, but only completely dead leaves should be removed by cutting the petiole close to the trunk. Avoid cutting leaves that are only partially dead, as these are serving as a supplemental source of potassium to the palms. Cutting living leaves also releases a volatile chemical that serves as an attractant for palmetto weevils (*Rhynchophorus cruentatus*) (see http://edis.ifas.ufl.edu/in139), which will lay their eggs in the leaf bases. The resulting larvae then burrow into the palm trunk in the vicinity of the meristem or bud and can kill the palm (Figure 8). Bismarck palms are highly attractive to this pest, especially when stressed by cold temperatures, transplanting, or other environmental factors.

Figure 8. Bismarck palm infested with palmetto weevils.
Credits: Stephen Brown

Bismarck palms appear to be fairly disease resistant, but like all palms, are susceptible to Ganoderma butt rot (see http://edis.ifas.ufl.edu/pp100), a fungal disease caused by *Ganoderma zonatum*. This disease causes decay in the lower part of the trunk that can result in instability of the palm and invariably its death. A brown and white shelf-like mushroom called a conk may or may not be present on the palm trunk before it dies. This disease is not treatable or preventable.

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UF IFAS Extension
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ENH-598

Phoenix canariensis: Canary Island Date Palm[1]

T. K. Broschat[2]

The Canary Island date palm (CIDP) is native to the Canary Islands. Although it can reach heights of 40–50 feet, it is slow growing and requires many years to attain that height. It has 8- to 15-foot-long rigid leaves that contain up to 200 V-shaped leaflets, the basal ones of which are modified into long, sharp spines (Figure 1). Healthy specimens should have full, round canopies with 130–150 leaves, but potassium (K) deficiency typically reduces the number of leaves in the canopy to half that number or less. In South Florida, this species produces about 50 leaves per year. Leaves are not self-cleaning and must be manually removed when dead, but the leaf bases eventually rot off, leaving an attractive diamond-shaped pattern of leaf scars on the 2- to 3-foot-diameter trunk. On older specimens, the basal foot or so of the trunk typically is covered with short root initials.

Figure 1. Healthy Canary Island date palms.
Credits: T. K. Broschat, UF/IFAS

Flower stalks are orange in color, about 3 feet in length, and bear male and female flowers on separate trees. Fruits are orange and edible, though not particularly tasty. Canary Island date palms readily hybridize with other *Phoenix* species, yielding individuals that vary considerably in their appearance from either parent. Fresh seeds germinate in 2–3 months under high temperatures(85°F–95°F) and uniform moisture.

Canary Island date palms are grown throughout the warmer parts of the United States from USDA Hardiness Zones 9A–11 (> 20°F) (http://planthardiness.ars.usda.gov/PHZMWeb/). They can be grown on a wide range of soil types, with their primary requirement being good drainage. They are drought tolerant and moderately tolerant of salt spray.

Transplanting Canary Island Date Palms

Transplanting CIDP is no different from other species, with root balls of 2–3 feet from the trunk being typical. About half to two-thirds of the lower leaves should be removed at the time of digging to reduce water loss and facilitate handling. The remaining leaves should be tied in a tight bundle with a long wooden splint attached to the trunk and the leaf bundle to prevent the crown from snapping off during handling (Figure 2). Because CIDP wood is very soft, physical damage to the bud area can easily occur during handling and may be responsible for transplant failure rates of up to 35% in this species. Make sure that

1. This document is ENH-598, one of a series of the Environmental Horticulture Department, UF/IFAS Extension. Original publication date November 1993. Revised December 2006 and August 2013. Reviewed September 2016. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. T. K. Broschat, professor, Environmental Horticulture Department; UF/IFAS Fort Lauderdale Research and Education Center, Davie, FL 33314.

the palm's crown is fully supported when placed on a truck or trailer to prevent bud damage. For more information about transplanting palms, see *Transplanting Palms in the Landscape* (http://edis.ifas.ufl.edu/ep001).

Figure 2. Proper handling of Canary Island date palm.
Credits: T. K. Broschat, UF/IFAS

Management in the Landscape

Canary Island date palms are highly susceptible to K and magnesium (Mg) deficiencies under landscape conditions. Potassium deficiency symptoms appear as translucent light green to yellow and necrotic spotting on the oldest leaves. As the deficiency progresses, leaflet tip necrosis becomes the predominant symptom. These necrotic leaflet tips are quite brittle and usually break off, leaving the distal portions of K-deficient leaves with irregular margins (Figure 3). Potassium deficiency symptoms are most severe toward the tips of the oldest leaves, with younger leaves and basal leaflets of all leaves showing few or no symptoms. Potassium deficiency also causes premature loss of older leaves, resulting in a canopy of many fewer leaves than is normal for the species. Because K-deficient older leaves are unsightly, they are often trimmed off. This is not recommended since these symptomatic older leaves are actually serving as a supplemental source of K for the tree in the absence of sufficient K in the soil. Proper fertilization to alleviate K deficiency symptoms is the best solution to the problem.

Most Canary Island date palms growing in the Southeast have some degree of K deficiency, but some also show striking lemon yellow bands along the outer margins of otherwise green older leaves. These symptoms are characteristic of Mg deficiency. When both K and Mg deficiencies exist on the same palm, the oldest (lowest) leaves show K deficiency symptoms, and the mid-canopy leaves display Mg deficiency symptoms (Figure 4). Transitional leaves have Mg-deficient bases and K-deficient tips (Figure 5). Canary Island date palms in the Southeast should be fertilized three times per year (four times in South Florida) with an 8-2-12-4 Mg plus micronutrients palm fertilizer that has 100% of its nitrogen, K, and Mg in controlled-release form and its micronutrients, such as iron and manganese, in water-soluble sulfate or chelated (iron only) form. See *Fertilization of Field-grown and Landscape Palms in Florida* (http://edis.ifas.ufl.edu/ep261) for more information.

Figure 3. Potassium-deficient older leaf tip of Canary Island date palm.
Credits: T. K. Broschat, UF/IFAS

Figure 4. Canary Island date palm showing potassium and magnesium deficiencies.
Credits: T. K. Broschat, UF/IFAS

Pests and Diseases of Canary Island Date Palms

Canary Island date palms are highly susceptible to palmetto weevils (*Rhynchophorus cruentatus*) (http://edis.ifas.ufl.edu/in139), which lay their eggs in the petioles of the older leaves. The larvae burrow into the heart of the palm, eventually killing it (Figures 6 and 7). These weevils are particularly attracted to volatile chemicals emitted by stressed or wounded CIDP, which can attract weevils from up to half a mile away. Leaf removal during pruning and transplanting operations is a primary cause of palmetto weevil infestations. Insecticidal treatments of

cut leaf surfaces is recommended for transplanted CIDP. The practice of trimming CIDP leaves into a "pineapple" shape is highly discouraged, not only because it removes leaves needed for K nutrition, but because these cut leaf wounds are strong attractants for palmetto weevils. The smaller silky cane weevil (*Metamasius hemipterus*) (http://edis.ifas.ufl.edu/in210) also attacks CIDP, but these weevils tend to remain in the leaf bases and do not kill the palm by themselves. However, the wounds they create in the leaf bases attract the more destructive palmetto weevils that can ultimately kill the tree (Figure 8).

Figure 5. Transitional leaf showing potassium deficiency (tip) and magnesium deficiency (base) symptoms.
Credits: T. K. Broschat, UF/IFAS

Canary Island date palms are susceptible to a number of diseases, most of which are lethal. One disease that is mostly cosmetic in its effect is Graphiola leaf spot, commonly known as "false smut." The fungus, *Graphiola phoenicis*, produces small (< 1/16 inch) brown to black spots on both surfaces of the leaflets on the oldest leaves (Figure 9). The symptoms of Graphiola leaf spot are commonly confused with those of K deficiency, which also causes spotting on the oldest leaves. Eventually, reproductive structures called "sori" erupt from the spots, producing small, thread-like structures that can easily be felt when rubbing a finger across the leaflet. Some literature suggests that this disease causes premature senescence of older leaves, but this is more likely caused by K deficiency, which is typically present on the same leaves. Treatment of this disease may not be warranted in a landscape situation since it requires multiple applications of fungicides to control, and the disease appears to do little harm to the palm. For more information, see *Graphiola Leaf Spot (False Smut) of Palm* (http://edis.ifas.ufl.edu/pp140).

Figure 6. Canary Island date palm infested with palmetto weevils.
Credits: R. Giblin-Davis, UF/IFAS

Figure 7. New leaves infested with palmetto weevil cocoons.
Credits: R. Giblin-Davis, UF/IFAS

Figure 8. Canary Island date palm petioles showing damage caused by silky cane weevils.
Credits: T. K. Broschat, UF/IFAS

Figure 9. Canary Island date palm leaf with Graphiola leaf spot. Larger brown lesions are caused by Stigmina leaf spot.
Credits: T. K. Broschat, UF/IFAS

Fusarium wilt (caused by the fungus *Fusarium oxysporum* f. sp. *canariensis*) is one of the most serious diseases of CIDP (Figure 10). Early symptoms appear as necrosis of the leaflets on one side of the rachis (Figure 11). This is usually accompanied by a reddish-brown strip on the affected side of the rachis and petiole (Figure 12). Eventually, the entire leaf dies. Symptoms usually begin on the oldest leaves and progress upward, leaving a skirt of dead leaves at the bottom of the canopy. Eventually, the palm dies. In this species, the disease is primarily transmitted by infested pruning tools, which spread the disease from one CIDP to another (Figure 13). Development of initial symptoms in the middle of the canopy is associated with pruning of flower and fruit stalks with infested pruning tools. There are no known chemical controls for this disease, but the rate of spread can be greatly reduced by disinfecting pruning tools between trees and avoiding trimming any leaves that are not completely dead. See *Fusarium Wilt of Canary Island Date Palm* (http://edis.ifas.ufl.edu/pp139) for more information.

Petiole/rachis blight is a nonlethal disease with similar symptoms to Fusarium wilt. It also causes necrosis of the leaflets on one side of the rachis and a reddish-brown stripe on the petiole. While it causes premature leaf loss, this disease usually does not kill palms. Petiole/rachis blight can be caused by many different fungi, but especially *Serenomyces*. Chemical control of this disease has generally been ineffective, but fortunately, it appears to be seasonal. For more information, see *Petiole (Rachis) Blight of Palm* (http://edis.ifas.ufl.edu/pp145).

There are two trunk rot diseases of CIDP. The first, Ganoderma butt rot, is caused by the fungus *Ganoderma zonatum*. This fungus is soilborne and infects the base of the trunk of mature palms, causing a central discoloration and rot within the bottom 3–4 feet. Once about 80%–90% of the cross-sectional area has been killed, older leaves will begin to die. The palm may show wilt symptoms before dying (Figure 14). Shelf-like fruiting structures called "conks" may protrude from the trunk. These conks emerge whitish and look like hard marshmallows, but eventually develop into a shelf with characteristic reddish-brown tops and white bottoms. A single conk can produce over a pint of reddish-brown, dust-like spores that are easily dispersed by the wind. Conks are not always produced, which makes disease diagnosis difficult. There is no way to cure or prevent this disease, and there are no known environmental factors that favor or discourage it. See *Ganoderma Butt Rot of Palm* (http://edis.ifas.ufl.edu/pp100) for more information.

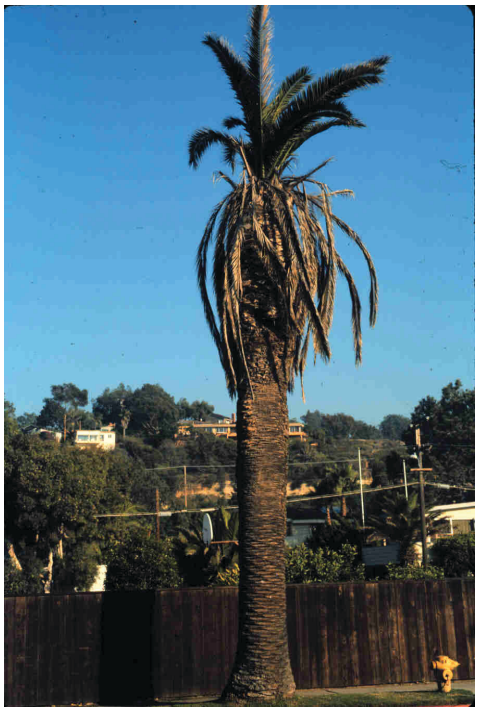

Figure 10. Canary Island date palm infected with Fusarium wilt.
Credits: T. K. Broschat, UF/IFAS

While Ganoderma butt rot affects the basal portion of palm trunks, another disease, Thielaviopsis trunk rot, causes a soft rot and crown collapse in the upper part of the trunk. This disease is caused by the fungus *Thielaviopsis paradoxa*, which requires a physical wound in the softer upper part of the trunk for infection to occur. Symptoms of this disease may include oozing and fermented trunk lesions, followed by wilting of the canopy, and ultimately canopy collapse (Figure 15). Unfortunately, this collapse is not always preceded by visible trunk symptoms or wilting of the foliage, so there may be no warning that the palm is about to fail. Although there are no chemical controls for this disease, simply preventing trunk wounding and limiting leaf removal to dead leaves largely eliminates the chances of a palm becoming infected. Wounds favored by this fungus may be caused by pruning, pulling off old leaves

prematurely, climbing spikes, and rough handling during transplanting. See *Thielaviopsis Trunk Rot of Palm* (http://edis.ifas.ufl.edu/pp143) for more information.

Figure 11. Canary Island date palm leaf showing leaflet necrosis on one side of the rachis.
Credits: T. K. Broschat, UF/IFAS

Figure 12. Canary Island date palm leaf showing reddish-brown stripe on one side of the petiole.
Credits: M. L. Elliott, UF/IFAS

Two closely related diseases with identical symptoms are lethal yellowing (LY) and Texas Phoenix palm decline (TPPD). Both diseases are caused by phytoplasmas that require phloem-feeding insect vectors for transmission. Symptoms in this species begin as flower or fruit abortion (only during spring or summer months), followed by premature death of older leaves. When about one-third of the lower leaves have died, the spear leaf dies, with the remaining leaves dying thereafter (Figure 16). Lethal yellowing on CIDP is found only in South Florida within the United States, but TPPD is found in southern Texas and West Central Florida. Both diseases can be prevented by injecting the trunk three times per year with the antibiotic oxytetracycline. For more information, see *Lethal Yellowing (LY) of Palm* (http://edis.ifas.ufl.edu/pp146) and *Texas Phoenix Palm Decline* (http://edis.ifas.ufl.edu/pp163).

Figure 13. Canary Island date palms dying from Fusarium wilt spread by infested pruning tools
Credits: M. L. Elliott, UF/IFAS

Figure 14. Canary Island date palm on left showing symptoms of Ganoderma butt rot.
Credits: M. L. Elliott, UF/IFAS

Figure 15. Canopy collapse in Canary Island date palm infected with Thielaviopsis trunk rot.
Credits: H. M. Donselman, UF/IFAS

Figure 16. Lethal yellowing on Canary Island date palm.
Credits: N. Harrison, UF/IFAS

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UF IFAS Extension UNIVERSITY of FLORIDA

ENH-600

Phoenix roebelenii: Pygmy Date Palm[1]

Timothy K. Broschat[2]

The pygmy date palm is one of the most popular small landscape palms in Florida. It is single-stemmed, but is often grown as clumps of 2–4 closely spaced individuals which, when older, give the impression of a multi-stemmed palm (Figure 1). It grows to a height of about 12 ft, with a spread of 6–8 ft. The feather-shaped (pinnate) leaves have slender petioles and basal leaflets that are modified into sharp 2–3 inch long spines. The slender, often crooked trunk varies in width from 3–6 inches and is covered with distinctive peg-like leaf bases (Figure 2). Older specimens will have a large mass of aerial root initials at the base of the trunk. Cream-colored male and female flowers are found on separate trees (dioecious) in the spring that are followed by small elongated reddish-brown fruits that turn black upon ripening.

Figure 1. Pygmy date palm
Credits: T. Broschat

Figure 2. Trunk of pygmy date palm
Credits: T. Broschat

Pygmy date palms are adaptable to a wide range of soil types. They are considered to be cold hardy to USDA zone 10A (30°F), but are widely grown in zone 9B (25°F). They are not tolerant of salt spray or saline soils. Most pygmy date palms in Florida exhibit potassium (K) deficiency symptoms on their oldest leaves. Symptoms are most severe towards the tips of affected leaves and appear as a yellow-orange discoloration of the leaflets and necrosis of the leaflet tips (Figure 3). Potassium deficiency also causes premature leaf death, so K-deficient palms retain fewer leaves than healthy ones. Potassium-deficient leaves, though unsightly, should not be removed until they are completely dead, as they serve as a supplementary source of K in the absence of sufficient K in the soil. Proper fertilization will

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gradually increase the number of leaves in the crown. Once a fully round crown has been achieved, visible symptoms of K deficiency will also begin to disappear. Landscape palm fertilizers should have an analysis of 8-2-12 (or 8-0-12) with 100% of the nitrogen (N), K, and magnesium (Mg) in controlled release form, and micronutrients such as manganese (Mn) and iron (Fe) in water soluble (sulfate or chelate) form in order to be effective. For more information about K deficiency and fertilization of landscape palms in Florida, see EDIS publications EP269 and EP261.

Figure 3. Potassium-deficient older leaves of pygmy date palm
Credits: T. Broschat

Another nutrient deficiency occasionally encountered on pygmy date palms is Mg deficiency. Symptoms of Mg deficiency are similar to those of K deficiency, but differ in that Mg-deficient leaves have a broad yellow band along the outer margin of each leaf, with the center of the leaf sharply transitioning to dark green (Figure 4). Unlike potassium deficiency, magnesium deficiency does not cause leaflet tip necrosis. While K deficiency is nearly ubiquitous on pygmy date palms in Florida, Mg deficiency is usually the result of improper fertilization. Fertilizers with high N or K, but little or no Mg, applied to the palm or nearby turfgrass can result in imbalances between N and Mg or K and Mg that can result in Mg deficiency. Routine application of the fertilizer mentioned above will prevent Mg deficiencies and can be used to correct mild to moderate Mg deficiencies. For more information about Mg deficiency see EDIS publication EP266.

Iron (Fe) deficiency is uncommon in pygmy date palms, but can occur on palms planted too deep or in poorly drained soils. Symptoms appear on the new leaves as a uniform chlorosis (yellowing of the leaflets). In severe chronic situations, the entire palm may be yellow-green in color. Iron deficiency is best prevented by planting at the correct depth and avoiding planting into sites with poor drainage or high water tables. Since Fe deficiency is not actually caused by a lack of Fe in the soil, Fe fertilizers may not always be effective in treating the problem. See Iron Deficiency in Palms EP265.

Figure 4. Magnesium deficiency on pygmy date palms
Credits: T. Broschat

Manganese (Mn) deficiency is a common problem in pygmy date palms growing in alkaline soils. Symptoms begin as longitudinal necrotic streaks on slightly chlorotic leaflets (Figure 5). As the deficiency progresses, leaflet tips become withered and curled giving the leaves a frizzled appearance (Figure 6). Symptoms of Mn deficiency develop on newly emerging leaves and are most severe towards the base of those leaves. Routine fertilization with the 8-2-12 fertilizer mentioned above should prevent most Mn deficiencies, but severe cases may require supplemental applications of manganese sulfate. For more information about Mn deficiency in palms see EDIS publication EP267.

Figure 5. Manganese deficiency on pygmy date palm showing necrotic streaking on leaflets
Credits: T. Broschat

Boron (B) deficiency is fairly common on pygmy date palms. Although a wide range of symptoms are possible, the most common is the production of several spear leaves that do not open normally, if at all (Figure 7). Crumpled dark green new leaves are also occasionally produced as a result of this disorder. See EP264 for more information about B deficiency in palms.

Pygmy date palms are relatively resistant to diseases, but two diseases are fairly common in this species. Ganoderma butt rot, a soil-borne fungal disease caused by *Ganoderma zonatum*, causes decay in the bottom couple of feet of the trunk (Figure 8). There is no control for this disease. Another common disease, particularly during cooler months, is Pestalotiopsis leaf spot, which causes necrotic lesions on the leaflets, rachis, and petioles (Figure 9). In severe cases, this disease can kill the palm.

Pygmy date palms are occasionally damaged by mites and insects such as mealybugs, scales, weevils, and caterpillars. Young leaves of pygmy date palms are normally covered with a whitish material (Figure. 10) that is often mistaken for a whitefly, mealybug, or scale infestation. This material drops off naturally as the leaves age.

Figure 6. Manganese deficiency on pygmy date palm. Note curling or frizzling of leaflets towards the base of the le
Credits: T. Broschat

Figure 7. Boron-deficient pygmy date palm showing multiple unopened spear leaves
Credits: T. Broschat

Figure 8. Ganoderma butt rot of pygmy date palm showing discoloration of decayed trunk on left and healthy trunk on right
Credits: T. Broschat

Figure 9. Pestalotiopsis leaf spot on pygmy date palm
Credits: T. Broschat

Figure 10. Naturally occurring whitish material on young leaf of pygmy date palm
Credits: T. Broschat

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UF IFAS Extension UNIVERSITY of FLORIDA

ENH-732

Roystonea regia: Royal Palm[1]

T.K. Broschat[2]

The royal palm is a large majestic palm that is native to south Florida and Cuba. It is considered cold hardy to about 28°F or USDA Cold Hardiness Zone 10A. This species quickly grows to heights of 50–70 ft., with a spread of 20–25 ft., and has a smooth light gray trunk up to 2 ft. in diameter (Figure 1). It is ideal for landscaping streets, parks, and commercial properties, but becomes too large for typical residential landscapes. The bases of royal palm leaves are tightly overlapping and form a smooth green five-foot-high region above the trunk called the "crownshaft." Royal palms are considered self-cleaning: naturally dying old leaves will cleanly drop off by themselves, at a rate of about one leaf per month. While this eliminates the need to trim off old dead leaves, the sheer size (10–15 ft. long) and weight (up to 50 lbs. when fresh) of these leaves can cause injury to people and damage to property when they fall. Inflorescences consisting of hundreds of tiny cream-colored flowers are followed in late summer by dark red to black fruits that are readily consumed by birds and thus widely dispersed.

If the seed is to be planted, the fleshy fruit pulp should be removed and the seeds rinsed thoroughly in water. Always wear rubber gloves when handling fruits of royal palms, since the pulp contains calcium oxalate crystals that are highly irritating to exposed skin. The seeds should be sown in a well-drained, uniformly moist potting soil and kept warm (95°F is ideal). Royal palm seeds appear to have immature embryos at the time that the fruit falls and thus will not germinate for 5–8 months after planting. The grass-like seedlings should be transplanted into containers after the second leaf emerges. For more information about palm seed germination, see BUL274/EP238 Palm Seed Germination.

Figure 1. Royal palm (*Roystonea regia*)
Credits: T.K. Broschat

Royal palms are moderately tolerant of salt spray, but they are intolerant of high salt concentrations in their root zone (Figure 2). They grow well in wet soils, yet are quite drought tolerant once they become established. The species is prone to potassium (K), manganese (Mn), and boron (B) deficiencies, especially on calcareous native or fill soils.

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Potassium deficiency symptoms in royal palms appears as leaflet tip necrosis and curling (frizzling) that is most severe on the oldest leaves (Figure 3). Potassium deficiency also causes premature leaf loss and reduces the number of leaves a palm can support. In severe cases of K deficiency, affected palms may have only a couple of stunted, off-color, and frizzled leaves. Such palms may also show a tapering of the trunk (pencil-pointing), and they often die from the deficiency (Figure 4). For more information about K deficiency, see ENH1017/EP269 Potassium Deficiency in Palms.

Figure 2. Royal palm suffering from high salts in the root zone
Credits: M.L. Elliott

Figure 3. Potassium deficiency symptoms on royal palm. Note the necrotic frizzling on the oldest leaflets.
Credits: T.K. Broschat

Symptoms of manganese deficiency can easily be confused with those of K deficiency, since both cause leaflet tip frizzling. However, Mn deficiency symptoms appear on newly emerging leaves and are most severe toward the base of the leaf, while K deficiency symptoms are most severe toward the tips of the oldest leaves (Figure 5). Severely Mn-deficient royal palms may die if not treated with manganese sulfate. For more information about Mn deficiency in palms, see ENH1015/EP267 Manganese Deficiency in Palms.

Figure 4. Severe potassium deficiency in royal palm. This palm died shortly after the picture was taken.
Credits: T.K. Broschat

Figure 5. Manganese deficiency in royal palm
Credits: T.K. Broschat

Boron deficiency causes stunting or distortion of newly emerging leaves, and in some cases, the entire crown may begin to grow sideways or even downwards (Figure 6). Boron deficiency in royal palms can be fatal, but often is chronic. For more information about B deficiency in palms, see ENH1012/EP264 Boron Deficiency in Palms.

Figure 6. Severe boron deficiency in royal palm
Credits: T.K. Broschat

Regular fertilization with a controlled release fertilizer having an analysis of 8-2-12-4 Mg (or 8-0-12-4 Mg) plus micronutrients can correct and prevent nutrient deficiencies in these palms. See ENH1009/EP261 Fertilization of Field-grown and Landscape Palms in Florida for more information about palm fertilization.

Royal palms have few serious insect pests, but one that is often severe and closely mimics K or Mn deficiencies is the royal palm bug (*Xylastodoris luteolus*). This tiny, pale green, elongated bug infests newly emerging leaves as they unfold. Their feeding, primarily during the spring months, causes leaflets to appear chlorotic, then grayish-brown and frizzled (Figure 7). These leaves are typically frizzled throughout their length and are most apparent in mid-canopy leaves during mid-summer. This helps distinguishes royal palm bug damage from K and Mn deficiencies, which affect older and younger leaves, respectively. See EENY097/IN254 Royal Palm Bug for more information about this pest.

Figure 7. Royal palm bug damage
Credits: T.K. Broschat

Compared to other palm species, royal palms are relatively disease resistant, being susceptible primarily to two trunk rotting fungal diseases. Ganoderma butt rot, caused by *Ganoderma zonatum*, infects the central portion of the bottom three feet of the trunk. A cross section through the trunk will reveal discoloration of the decayed, but not soft, wood. After about 85% of the cross sectional area of the trunk has been killed by the fungus, wilt symptoms may appear in the canopy and the palm will die shortly thereafter. The fruiting structure of the fungus, called a conk, may or may not appear on the outside of the lower trunk prior to palm death. Once a conk or wilt symptoms have been observed, the palm should be removed immediately as it could fall without warning and cause serious injury or property damage (Figure 8). For more information about this disease, see PP-54/PP100 Ganoderma Butt Rot of Palms.

Figure 8. Royal palm infected with Ganoderma butt rot
Credits: Jason Conner

Another lethal disease that is occasionally seen on royal palms is Thielaviopsis trunk rot. This fungus requires a wound in the upper, softer portion of the trunk for infection to occur. Pulling off leaves prematurely is one way to create such a wound. Once infection occurs, the fungus causes a wet soft rot through the trunk. When most of the cross-sectional area of the trunk has been rotted, the entire crown will topple over without warning (Figure 9). Although there is no control for this disease, it can be prevented by avoiding wounding the upper portion of the trunk. For more information about this disease, see PP-219/PP143 Thielaviopsis Trunk Rot of Palm.

Figure 9. Thielaviopsis trunk rot in royal palm.
Credits: M.L. Elliott

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UF IFAS Extension
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ENH-733

Sabal palmetto: Sabal or Cabbage Palm[1]

T. K. Broschat[2]

The sabal palm, or cabbage palm, is native to Florida and coastal regions of North and South Carolina and Georgia, and is the state tree of both South Carolina and Florida. The name "cabbage palm" comes from its edible immature leaves, or "heart," which has a cabbage-like flavor. Sabal palms have curved, costapalmate, fan-shaped leaves with blades 3–4 feet long and petioles 3–6 feet long. When free of nutrient deficiencies, this species has a full, round canopy atop a trunk 10–16 inches in diameter and up to 40 feet in height (Figure 1). Branched inflorescences produced during the late spring months usually extend beyond the leaves in the canopy and contain thousands of tiny, creamy-white, fragrant flowers that attract bees. The palm produces black fruits of about ¼ inch in diameter in late summer (Figure 2). Although the fruits contain little flesh, they are often consumed by raccoons and other animals that disperse the seeds. Sabal palms are considered cold hardy to about 15°F, or about USDA Zone 8b (for more about USDA Plant Hardiness Zones, visit http://planthardiness.ars.usda.gov/PHZMWeb/) (Meerow 2006). They are fairly tolerant of salt spray on their foliage, but intolerant of salt in their root zone.

Seed Germination

Sabal palm seeds are not difficult to germinate, but should be planted when fresh for best germination. With uniform moisture and high temperatures (86°F–95°F), germination can occur in as few as 18 days, with 50% of final germination occurring within 33 days (Carpenter 1987; Sento 1970). Newly emerged seedlings look much like grass, but each succeeding leaf has an additional leaf segment that adds to their width. The slow-growing seedlings can take 15–30 years to develop a visible trunk under natural conditions, but in nurseries this can occur much faster (McPherson and Williams 1996). Initial trunk elongation can be quite rapid under favorable conditions (up to 6 inches per year), but this quickly slows to less than an inch per year as the palm matures (McPherson and Williams 1996).

Figure 1. Sabal or cabbage palm (*Sabal palmetto*).
Credits: T. K. Broschat, UF/IFAS

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Figure 2. Sabal palm fruit stalk.
Credits: T. K. Broschat, UF/IFAS

Transplanting

Sabal palms are typically dug from pastures and other private property and transplanted as mature specimens into landscapes. Broschat and Donselman (1984) showed the root system of sabal palms is unusual in that cut roots do not branch and produce new growing tips, but rather die back to the trunk. The cut roots are replaced by massive numbers of new adventitious roots originating from the root initiation zone at the base of the trunk. Since young, trunkless sabal palms do not yet have functional root initiation zones to produce such replacement roots, transplanting these palms from the field at this stage is virtually impossible.

It can take 8 months or longer to produce a new root system in this species, and the palms must subsist solely on water stored in their trunks during that time. Palms with less than 10 feet of trunk appear to have insufficient water storage capacity to support themselves during this establishment period, resulting in high mortality rates. In an effort to reduce water loss from transplanted sabal palms during this stressful phase, Broschat (1991) demonstrated that removing all leaves from sabal palms at the time of digging increased survival rate to 95%, compared to 64% for those transplanted with a third of their leaves left on (Figure 3). Palms that were completely defoliated for transplant also had fewer dead leaves and larger canopies than those transplanted with a third of their leaves.

Some nurserymen are transplanting sabal palms from the field into large containers, where more favorable environmental conditions can result in better survival rates. Palms with intact root systems and full canopies can then be transplanted with ease into the landscape. Careful root pruning 4–6 months prior to digging may also enhance transplant survival in palms with less than optimal trunk heights. Sabal palms should always be transplanted at the same depth as they were originally growing. Deeper planting can cause root suffocation and palm death. For more information about transplanting palms, see *Transplanting Palms in the Landscape* (http://edis.ifas.ufl.edu/ep001).

Figure 3. Sabal palms correctly planted without leaves.
Credits: T. K. Broschat, UF/IFAS

Nutrition and Fertilization

Sabal palms, like most palm species, should have a full 360° canopy of green leaves. Unfortunately, potassium (K) deficiency (http://edis.ifas.ufl.edu/ep269) causes premature leaf loss in palms and limits the number of leaves a palm can support. Thus, the number of leaves in a palm canopy (assuming the lower leaves have not been trimmed off) is a function of K deficiency severity.

In addition to a reduction in canopy leaf number, K deficiency causes visual symptoms on the oldest leaves. Mild K deficiency appears as translucent yellow-orange spotting on the oldest leaves, followed by extensive leaflet tip necrosis and foliar discoloration (Figure 4). Because K-deficient leaves are unsightly, people often trim them off, but these leaves serve a purpose for the palms and should not be removed until they are completely dead. Potassium is a mobile element within palms and, under deficiency conditions, the palms extract K from their oldest leaves and translocate it to the newly developing leaves. This allows growth to continue without interruption in the absence of sufficient K in the soil. Removing these K-deficient leaves removes a supplemental source of K for the palm. When sabal palm leaves are completely dead, they may be cut several inches from the trunk, leaving an attractive pattern of persistent split leaf bases. If left untrimmed, the brittle dead leaves typically snap off in high winds at varying distances from the trunk. In some specimens, these leaf bases persist on the trunk for many decades, while in others they fall off naturally after a couple of years (Figure 5). Leaf

base persistence may be a genetic trait, but this has yet to be studied.

Figure 4. Potassium deficiency symptoms on sabal palm.
Credits: T. K. Broschat, UF/IFAS

Figure 5. Leaf bases (boots) retained on some individuals, but not on others.
Credits: T. K. Broschat, UF/IFAS

The only other nutritional disorder encountered in sabal palms is magnesium (Mg) deficiency (http://edis.ifas.ufl.edu/ep266). This deficiency results in broad yellow bands around the perimeter of old leaves, with the central part of the leaf remaining green. Magnesium deficiency is usually induced by improper fertilization with fertilizers having high N:Mg or K:Mg ratios.

Sabal palms should be fertilized three times per year (four times in south Florida) with an 8-2-12-4Mg fertilizer in which 100% of the N, K, and Mg is in controlled-release form, the manganese (Mn) is in sulfate form, and the iron (Fe) is in sulfate or chelate form. If surrounding turfgrass or other ornamental plants are fertilized, they should be given the same fertilizer. See *Fertilization of Field-Grown and Landscape Palms in Florida* (http://edis.ifas.ufl.edu/ep261) for more details about palm fertilization.

Pests and Diseases

Stressed sabal palms are susceptible to palmetto weevil (*Rhynchophorus cruentatus*) invasion. Transplanted sabal palms are particularly attractive to this pest, which burrows into leaf bases and lays its eggs. The larvae then excavate much of the crown stem, killing the meristem in the process. See *Palmetto Weevil* (http://edis.ifas.ufl.edu/in139) for more information about this pest.

Sabal palms are relatively disease resistant, but they are susceptible to three lethal diseases. Ganoderma butt rot (http://edis.ifas.ufl.edu/pp100) is a soilborne fungus that invades the lower 3–4 feet of the trunk and causes trunk decay. Brown and white shelf-like conks may be present on the trunk (Figure 6). After about 80%–90% of the trunk cross-sectional area has rotted, wilt symptoms become apparent in the canopy, and the palm dies (Figure 7). There is no control for this disease, nor are there any known environmental factors that affect its occurrence.

Figure 6. Conk or fruiting body of *Ganoderma zonatum*.
Credits: T. K. Broschat, UF/IFAS

Thielaviopsis trunk rot (http://edis.ifas.ufl.edu/pp143) also causes a lethal trunk rot in sabal palms, but this fungus requires a wound in the upper part of the trunk to gain entrance. Once established, this fungus causes a soft rot of the trunk, typically just below the canopy. When most of the trunk area has rotted, either the trunk collapses or the entire crown topples over. Wilt symptoms may provide some advanced warning of this trunk failure. There is no control for this disease, although preventing trunk wounds

greatly reduces the chances of infection. This is not a common disease in sabal palms, and it is most likely to occur on recently transplanted sabal palms because some degree of trunk wounding typically occurs during handling.

Figure 7. Wilt caused by *Ganoderma zonatum*.
Credits: T. K. Broschat, UF/IFAS

A more recent disease of sabal palms is Texas phoenix palm decline (TPPD) (http://edis.ifas.ufl.edu/pp163), which is caused by a phytoplasma (a bacterium without a cell wall). This disease is similar to lethal yellowing (http://edis.ifas.ufl.edu/pp146), a disease that does not affect sabal palms. Both diseases are spread solely by phloem-feeding insects, such as planthoppers or leafhoppers. Symptoms of TPPD in sabal palms include the rapid wilt and death of the lower leaves, followed by spear leaf loss and meristem death (Figure 8). It is currently confined primarily to several counties in west central Florida, with Sarasota, Manatee, and Hillsborough Counties being the focal point. It can be prevented by injecting the trunk with the antibiotic oxytetracycline every 4 months.

A common problem in sabal palms is the sloughing of the "pseudobark" from the outside of the trunk. Once this occurs, further erosion of the trunk tissue can occur, often exposing the vascular bundles and occasionally destroying large sections of trunk (Figure 9). The cause of this problem has not been determined, and no pathogenic fungi have been isolated from affected trunk tissue. It has often been attributed to damage from irrigation sprinklers, but it also occurs on palms that have never been irrigated. It does not appear to have any noticeable effect on palm health or survival.

Another "problem" that often causes concern is a translucent clearing of the leaf blade on either side of the costa (mid-rib of the leaf blade). This typically V-shaped area is visible only when the leaf is viewed from below (Figure 10). This condition is normal for this and several other *Sabal* species and is not indicative of any disease or nutritional deficiencies.

Figure 8. Texas phoenix palm decline in sabal palms.
Credits: M. L. Elliott, UF/IFAS

Figure 9. Pseudobark erosion on sabal palm trunk.
Credits: T. K. Broschat, UF/IFAS

Figure 10. Natural clearing in sabal palm leaf blade.
Credits: T. K. Broschat, UF/IFAS

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UF IFAS Extension
UNIVERSITY of FLORIDA

FOR 246

Phoenix sylvestris, Wild Date Palm[1]

Robert J. Northrop, Michael G. Andreu, Melissa H. Friedman, Mary McKenzie, and Heather V. Quintana[2]

Family

Arecaceae, palm family.

Genus

Phoenix is the Latin term for the Greek word that means "date palm."

Species

The species name *sylvestris* translates from the Latin term for "of the forest."

Common Names

Wild Date Palm, Toddy Palm, Sugar Date Palm, Silver Date Palm

This palm produces edible fruits but it is generally called "wild date palm" to distinguish it from the closely related *Phoenix dactylifera*, which is known as "date palm" and is cultivated agriculturally as the commercial source of edible dates. This palm is a major source of sugar in India, and the sap is sometimes fermented into a drink called a "toddy," which explains the names "sugar date palm" and "toddy palm." The common name "silver date palm" probably refers to the silvery green foliage.

Description

This palm is native to India and southern portions of Pakistan. In both countries, it occurs in areas where there is sparse vegetation mainly composed of scrub species and along flat lands where monsoons occur. Though slow growing, it can reach heights of up to 50 feet and grows well in areas of the United States where temperatures do not fall below 15°F. Leaves are pinnately compound and blue-green, and they can grow to 10 feet in length. Leaflets can reach approximately 18 inches long and grow opposite to one another on the rachis in such a way that the entire leaf looks flat. The petiole, or stem that attaches the leaf to the trunk, is 3 feet long and armed with spines. Young trunks bear triangular shaped leaf scars (the place where leaves once attached to the trunk) that become more diamond-shaped with age. On older trees, aerial roots tend to be present at the base of the trunk. Yellow inflorescences can reach lengths of 3 feet, are heavily branched, bear small white blossoms, and grow among the leaves. The oblong fruits are 1 inch long and occur in orange clusters, turning dark red to purple when mature.

Allergen

Each individual tree is either a male or a female (as is true for all species within this genus). Male trees are extremely allergenic because their pollen is air-borne, whereas female palms cause minimal to no allergies.

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Figure 1. Specimens of *Phoenix sylvestris* growing wild in India.
Credits: Dinesh Valke, CC BY-NC-ND 2.0

Figure 2. Immature fruits of *Phoenix sylvestris* hanging in clusters. Note the spines on the petioles of the leaves.
Credits: Hari Prasad Nadig, CC BY-SA 2.0

Applications

Commercial/Practical

In India, sugar and alcohol are made from wild date palm flowers and jelly is made from the fruit.

Horticultural

The wild date palm is an attractive landscape specimen with its blue-green leaves, textured trunk, and yellow inflorescences. The canopy of this palm is dense, exhibits a round shape, and can provide light shade. This palm will thrive and show the best growth when it is planted in direct sunlight. Wild date palm is drought tolerant and prefers well-drained sandy soils, but it grows better when regularly watered. This species is susceptible to lethal yellowing disease (http://edis.ifas.ufl.edu/pp146), so it is best to avoid planting wild date palm where the disease is known to be present.

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UF IFAS Extension UNIVERSITY of FLORIDA

FOR 247

Dypsis lutescens, Areca Palm[1]

Melissa H. Friedman, Michael G. Andreu, Heather V. Quintana, and Mary McKenzie[2]

Family

Arecaceae, palm family.

Genus

The history behind the genus name *Dypsis* is unknown.

Figure 1. A cultivar of *Dypsis lutescens* growing outside at a botanical garden in Thailand.
Credits: Scott Zona, CC BY 2.0

Species

The species name *lutescens* is the Latin term for "growing yellow," and it alludes to this palm's yellow petioles or stems.

Common Names

Areca Palm, Golden Cane Palm, Yellow Bamboo Palm

Years of widespread cultivation have earned this palm numerous common names. While areca means "tender palm," it is unclear to what this name refers. Most of its other common names likely came from physiological characteristics, such as the yellow color of its plant parts, which results from high sun exposure or nutrient deficiencies, and the cane- or bamboo-like appearance of its stems.

Description

Areca palm is endemic to eastern Madagascar, where it is endangered due to the loss of its natural habitat in open areas of hydric forests and along riverbanks. In Florida and throughout the United States, areca palm is a common landscape plant that survives best where the average annual low temperature ranges from 35 to 40°F. This palm typically grows to between 20 to 35 feet tall and has a crown spread of 10 to 20 feet. It can tolerate full sun to partial shade and grows best in well-drained soils where it has access to plenty of water. The yellowish-green to dark green leaves or fronds are pinnately compound, grow between 6 to 8 feet in

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length, and are ovoid in shape. Leaflets are 2 feet long, lance shaped, and create a distinct "V" shape on the leaf because they grow in opposite directions from one another along the center of the orange to light green rachis. The trunk of this palm is multi-stemmed, and each stem is 2 to 3 inches in diameter. Tightly packed rings or leaf scars extend the length of the trunk, and they range in color from orange and yellow to dark green, with lighter colors resulting from greater sun exposure. Branching, yellow flower stalks emerge from below the leaves and droop downward. Each fruit is approximately 1 inch long and shaped like an egg, and the fruit turns from yellow to dark purple or black as it matures.

Figure 2. A cultivar of *Dypsis lutescens* being grown in containers under shade cloth at a nursery.
Credits: Scott Zona, CC BY 2.0

Applications

Horticultural

This palm is grown indoors or outdoors. When grown outdoors, it can accent the landscape or make a great natural fence. In general, it should be planted during the summer rainy season to allow its roots to fully establish and its fronds to branch out. When used for accent, areca palms can be planted in clusters and the lower fronds pruned to show the attractive stems, as well as to prevent fungus or insect infestations. These palms may also be planted in clusters that are spaced 10 feet apart. Eventually, the clusters will create a screen as the palms grow and their fronds spread out horizontally. Some horticultural experts recommend fertilizing the palm regularly to keep it green; however, yellowing is a natural feature of this plant and can be regulated somewhat with shading.

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Wodyetia bifurcata, Foxtail Palm[1]

Mary McKenzie, Michael G. Andreu, Melissa H. Friedman, and Heather V. Quintana[2]

Family

Arecaceae, palm family.

Genus

Wodyetia is the Latin term for "Wodyeti" and is the surname of an Australian aboriginal man who was lauded as being the last of his kind to be versed in the plants and animals that occur in the area of Queensland where he was from.

Species

The species name *bifurcata* means "twice divided," alluding to how fibers within the fruit of this palm are arranged.

Common Name

Foxtail Palm

The common name is in reference to the fronds' appearance, which some people think resemble the bushy tail of a fox.

Description

This palm is endemic to the scrublands of the rocky northeastern peninsula of Australia. In the United States, it survives best where temperatures do not fall below 30°F. The foxtail palm can reach heights of 30 feet, growing fast in full sun, but the plant is tolerant of both sunny and shady conditions. The pinnately compound leaves or fronds can reach lengths of 8 to 10 feet and are attached to a petiole or stem that is about 6 to 12 inches long. The dark green leaflets are each 1/2 foot long, grow whorled around the rachis, and split into segments at the tips. The trunk is light gray to almost white, is somewhat enlarged mid-length, and has dark leaf base scars encircling it. On top of the trunk sits a pale to blue-green, smooth crownshaft, which is the part of the palm where its leaves emerge. The stem's swollen base becomes slender towards the top, and, when mature, accounts for as much as 3 feet of the palm's total height. The inflorescence occurs just below the crownshaft, is heavily branched, and bears white male and female flowers. Fruits are 2 inches long, egg shaped, and orange to red when ripe.

Figure 1. Fronds emerging from the crownshaft of *Wodyetia bifurcata*. Credits: Shubhada Nikharge, CC BY-NC-SA 2.0

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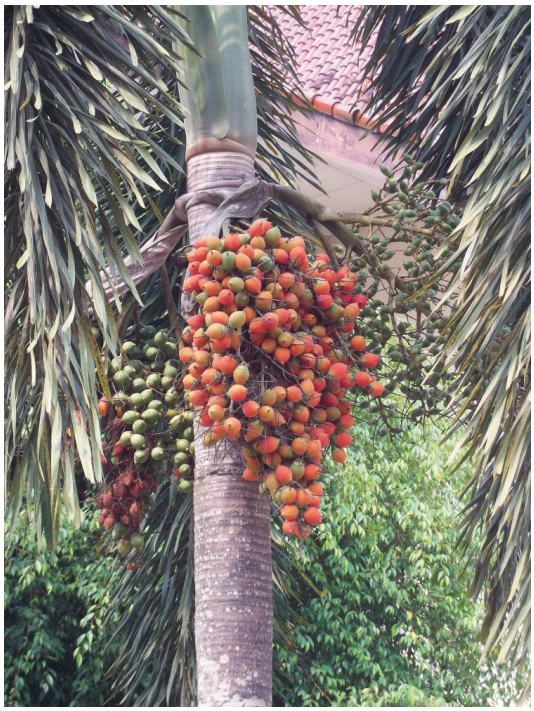

Figure 2. Maturing fruits hanging on the trunk just below the crownshaft of *Wodyetia bifurcata*.
Credits: CANTIQ AND UNIQUE, CC BY-NC-SA 2.0

Applications

Horticultural

Many people like the foxtail palm because it grows relatively fast and its bushy fronds make it look quite different from many other palms on the market. Its resemblance to royal palm and similar aesthetic value also make it a desirable landscape specimen. In addition, this palm can grow well indoors as a potted plant if given the proper soil, light, and space. Foxtail palm prefers a well-drained soil with a slightly acidic pH. This palm is drought tolerant, but it exhibits the best growth when ample water is applied at its base. Watering from above can encourage leaf spot fungus to develop or can aggravate this fungus if it is already present. The recent high demand for this palm as a landscape plant has endangered its survival in its native range in Australia, since poachers harvest seed from protected areas. However, whether growing in its native range or transplanted elsewhere, each palm has the ability to produce productive and fertile seed, making the illegal harvest of foxtail palms in their native range unnecessary.

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ENH-767

Syagrus romanzoffiana: Queen Palm[1]

Timothy K. Broschat[2]

The queen palm is a popular feather-leaved palm with graceful arching leaves (Figure 1). It is one of the hardiest of the tropical-looking palms, being suitable for planting in USDA plant hardiness zone 9B (>25°F). Queen palms are considered to be moderately tolerant of salt spray. They can reach heights up to 50 ft with a spread of 20–25 ft. The smooth gray trunk varies from 8–15 inches in diameter, depending on the seed source and environment, and may contain bulges. Large inflorescences of cream-colored flowers are produced from within the leaves in the canopy during spring and summer months. These are followed by bright orange, round to slightly elongated fruits between ¾ and 1 inch long (Figure 2). Fruit drop is a major concern for queen palms because fruit clusters can weigh over 100 pounds and contain over a thousand seeds. These accumulate on the ground beneath the canopy, where some will sprout into unwanted seedlings (Figure 3).

Queen palm seeds to be used for propagation should be half ripe to fully ripe with the fruit pulp removed. Soaking the cleaned seeds in water for two days prior to planting in a well-drained, but uniformly moist potting soil can improve germination in this species. Queen palm seed germinates slowly and erratically, taking from six weeks to six months. As with most palm species, high temperatures (90–95°F) are required for seed germination. For more information about germinating palm seeds see "Palm Seed Germination" (EDIS EP238).

Queen palms are not considered to be self-cleaning, so every leaf must be manually cut off after it dies. The flower and fruit stalks are typically removed at the time that dead leaves are removed to reduce the mess caused by falling fruit. Avoid removing leaves that are not completely dead because these leaves serve as a supplementary source of potassium (K) in the absence of sufficient K in the soil.

Figure 1. Queen palm, *Syagrus romanzoffiana*.
Credits: T. K. Broschat, UF/IFAS

Most queen palms in southeastern United States exhibit some degree of K deficiency, which in its mildest stages causes small, translucent, yellow-orange spotting on the oldest leaves. As the deficiency becomes more severe, the

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tips of leaflets towards the ends of the oldest leaves become necrotic and frizzled (curled) (Figure 4). This eventually causes premature death of the oldest leaves and reduces the number of leaves that the palm can support. In severe cases, all of the leaves in the canopy will be affected and even new leaves will emerge chlorotic, reduced in size, and frizzled. If untreated, severe K deficiency can be fatal to palms. For more information about pruning palms and K deficiency in palms, see "Pruning Palms" (EDIS EP443) and "Potassium Deficiency in Palms" (EDIS EP269).

Figure 2. Inflorescence and immature fruit stalk on queen palm.
Credits: T. K. Broschat, UF/IFAS

Figure 3. Fallen ripe fruit of queen palm.
Credits: T. K. Broschat, UF/IFAS

While frizzling of the leaflets at the ends of the oldest leaves is indicative of K deficiency, frizzling of the leaflets at the base of the youngest leaves is caused by manganese (Mn) deficiency (Figure 5). If young leaves of frizzled queen palms are examined more closely, longitudinal necrotic streaking will typically be observed on otherwise chlorotic leaflets. The position of the frizzling (base vs. tip of the leaf) plus the presence of necrotic streaking helps distinguish Mn deficiency from severe K deficiency, which from a distance appear identical. It is not unusual to see both Mn and K deficiencies on the same palm or even on the same leaf if the K deficiency is severe enough. For more information about Mn deficiency, see "Manganese Deficiency in Palms" (EDIS EP267).

Figure 4. Potassium deficient older leaf of a young queen palm.
Credits: T. K. Broschat, UF/IFAS

Figure 5. Manganese deficiency on queen palm.
Credits: T. K. Broschat, UF/IFAS

On alkaline soils, queen palms may also exhibit uniformly yellow (chlorotic) new leaves. This is typically caused by iron (Fe) deficiency. They may also show various leaf distortions on otherwise dark green new leaves that are caused by boron (B) deficiency. Boron deficiency can cause puckering, crumpling, truncation, incomplete opening, twisting, or stunting of the new leaves, or it may cause the palm to

branch or grow sideways or even downwards (Figures 6, 7, and 8). Since the availability of micronutrients such as Mn, B, or Fe to plants decreases sharply with increasing soil pH, queen palms generally grow poorly on alkaline soils. For more information about Fe or B deficiencies in palms, see "Iron Deficiency in Palms" (EDIS EP265) and "Boron Deficiency in Palms" (EDIS EP264).

Figure 6. Freeze-dried appearance of queen palm killed by Fusarium wilt.
Credits: M. L. Elliott, UF/IFAS

Figure 7. Stunted new leaf and sideways growth of queen palm caused by boron deficiency.
Credits: T. K. Broschat, UF/IFAS

Since most queen palms in the landscape are deficient in one or more nutrient deficiencies, regular application of an 8-2-12+4Mg palm fertilizer that has 100% of its N, K, and Mg in controlled-release form is recommended for queen palms in the southeastern United States. For more information about landscape palm fertilization see "Fertilization of Field-grown and Landscape Palms in Florida" (EDIS EP261).

Figure 8. Branching and downward growth in queen palm caused by boron deficiency.
Credits: T. K. Broschat, UF/IFAS

Queen palms in the landscape are susceptible to several lethal diseases. Ganoderma butt rot, caused by *Ganoderma zonatum*, causes an internal discoloration and decay of the trunk (Figure 9). This is generally confined to the bottom 3–4 feet of the trunk, and, once about 85% of the cross sectional area of the trunk has been destroyed by the fungus, the canopy may show signs of wilting or other water stress symptoms, followed by fairly rapid loss of lower leaves, and, eventually, death of the palm (Figure 10). Fungal fruiting bodies called conks may emerge from the lower portion of the trunk prior to death of the palm. Initially they look like hard marshmallows, but eventually they become woody, shelf-like structures with a brown top and white bottom (Figure 11). These conks can produce billions of reddish-brown dust-like spores that will blow everywhere, spreading the disease. Thus, while there is no control for this disease, removing conks in the early stages of their development can reduce the rate of spread of this disease. Be sure to remove or grind the stump after cutting down any palm to prevent *Ganoderma* conks from growing and reproducing on the stump. For more information about this disease, see "Ganoderma Butt Rot of Palm" (EDIS PP100).

Figure 9. A series of cross sections through the lower trunk of a queen palm infected with *Ganoderma zonatum*. Note that the diameter of the internal discoloration decreases as the height above the ground increases.
Credits: T. K. Broschat, UF/IFAS

Figure 10. Wilted crown of queen palm infected with *Ganoderma zonatum*.
Credits: T. K. Broschat, UF/IFAS

Another fungus, *Thielaviopsis paradoxa*, also causes a trunk rot of queen palms, but this one is largely confined to the softer upper parts of the trunk, often just below the crown. This fungus requires a wound in the trunk to become established. Such wounds are often caused by rough handling during transplanting or pruning, including pulling off dead leaves or leaf bases that are still firmly attached to the trunk. Once established, this disease causes a soft rot of the trunk that may be visible from the outside as a water-soaked, often bleeding, or soft sunken area on the trunk. Once a majority of the trunk cross-sectional area has been rotted, the crown may wilt or simply topple over with no warning (Figure 12). There is no control for this disease, but it can easily be prevented by avoiding trunk wounding when pruning or transplanting. For more information about this disease, see "Thielaviopsis Trunk Rot of Palms" (EDIS PP143).

Figure 11. Conk or fungal fruiting body of *Ganoderma zonatum*.
Credits: M. L. Elliott, UF/IFAS

Figure 12. Toppled crown of queen palm caused by Thielaviopsis trunk rot.
Credits: M. L. Elliott, UF/IFAS

A more recent disease on queen palms is Fusarium wilt, caused by *Fusarium oxysporum f. sp. palmarum*. It infects the petioles of the oldest leaves, causing a characteristic reddish-brown longitudinal stripe on one side of the petiole and rachis. The leaflets on that side of the rachis quickly die, while leaflets on the other side remain green for a while (Figure 13). Eventually, the entire leaf dies, and this process is rapidly repeated on successively younger leaves until the entire crown is dead. These dead leaves remain in place for a while, giving the palm a "freeze-dried" look (Figure 14). There is no control for this disease. Although it is believed

Figure 13. Reddish-brown petiole and rachis stripe of queen palm caused by Fusarium wilt. Note that leaflets on affected side are necrotic.
Credits: M. L. Elliott, UF/IFAS

Figure 14. Freeze-dried appearance of queen palm killed by Fusarium wilt.
Credits: M. L. Elliott, UF/IFAS

to be spread primarily by wind-blown spores, it is likely also spread via contaminated pruning tools, moving it from infected to healthy trees. For more information about this disease, see "Fusarium Wilt of Queen and Mexican Fan Palms" (EDIS PP278).

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